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Instructions for Use of Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each subject. In addition, a geographical reference is published wherever the article relates to any particular railway company, or to the State matters of any particular State. The geographical method of grouping serves to locate in the index any article descriptive of practices, conditions, events, etc., when the searcher knows the electric railway, city or State to which the article applies. Groupings are made under the name of the city in which the main office of the company is located, but an exception is made in the case of electrified sections of steam railroads, such entries being made direct under the name of the railroad. City or State affairs appear direct under the names of the city or State involved.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the more common keywords used in the index. This list has been subdivided for convenience into sixteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index. As an example, if a reader wished to locate an article on power-driven motor trucks he would obviously look in the list under the general subject "vehicles," and of the four keywords that appear under this only "Commercial Vehicles" could apply to the article in question. The reader would therefore refer to this keyword under "C" in the body of the index.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND LEGAL

Accidents (including wrecks)
Accident claim department
Legislation
Legal
Public service and regulative commissions
Public service corporations
Safety-first movement

CARS

Car design
Cars (descriptive)
Cleaning of cars
Gasoline cars
Lubrication
Heating of cars
Lighting of cars
Storage battery cars
Tower cars
Ventilation of cars
Work cars
Wrecking cars

CAR EQUIPMENT

Axles
Bearings
Brakes
Controllers and wiring
Couplers
Current-collecting devices
Doors, seats and windows
Fenders and wheel guards
Gears and pinions
Headlights
Journals
Motors
Trucks, car
Wheels

EMPLOYEES

Employees
Strikes and arbitrations

FARES

Fare collection (including apparatus)
Fares
Freight rates
Through routes and joint rates
Tickets
Transfers

FINANCIAL AND STATISTICS

Accounting
Appraisal of railway property
Financial
Franchises
Maps
Operating records and costs
Statistics
Traffic investigations

HEAVY ELECTRIC TRACTION

Heavy electric traction (general)
High-tension d.c. railways
Interurban railways (general)
Locomotives
Low-tension d.c. railways
Single-phase railways

MAINTENANCE OF EQUIPMENT

Cleaning of cars
Inspection of cars
Maintenance records and costs
Paints and painting
Repair shop equipment
Repair shop practice
Repair shops
Tests of equipment
Washing of cars
Welding, special methods

OPERATION

Dispatching trains
Multiple-unit trains
Operating records and costs
Passenger handling records
Rules
Schedules and time tables
Signals
Stopping of cars
Telephones
Trailer operation
Yards

POWER

Boilers and equipment
Cables
Energy consumption
Feeders
Overhead contact system
Poles
Power distribution
Power generation
Power stations and equipment
Purchased power
Storage batteries
Substations and equipment
Third-rail contact system
Transmission lines
Turbo-generators and equipment

RECORDS

Maintenance records and costs
Operating records and costs
Passenger handling records
Record forms

STRUCTURES

Bridges
Carhouses
Freight stations
Power stations
Repair shops
Terminal stations and terminals
Waiting stations

TRACK

Pavement
Rail joints and bonds
Rails
Special work
Ties
Track construction
Track maintenance

TRAFFIC

Freight and express
Parks and pleasure resorts
Public, relations with
Publicity
Routing of cars
Signs on cars
Traffic investigations
Traffic stimulation

VEHICLES (not on tracks)

Commercial vehicles
Motor buses
Service and tower wagons
Trackless trolleys

MISCELLANEOUS

Advertising on cars
Fire protection and insurance
Lightning
Loading limits for cars
Municipal ownership
Organization charts
Public, relations with
Standardization
Storerooms
Timber preservation

In addition to the groups of articles covered by these headings the papers and reports from railway associations and technical societies are grouped under the names of the various organizations. Proceedings of other associations are indexed only in accordance with the subject discussed. The heading "Cars" includes all extended descriptions of individual types of cars, but short accounts of cars displaying no important innovations appear only under the name of the railway to which they apply. Under the headings "Financial" and "Statistics" appear the articles relating generally to capitalization, earnings and operating costs, as distinguished from the detailed and highly subdivided figures that are entered under "Operating Records and Costs." Short descriptions of machine tools appear only under the heading "Repair Shop Equipment" and are not indexed alphabetically, because of the wide choice in most cases of the proper keyword.

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*Indicates Portrait.

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The statistical and outlook features of this special number of the Electric Railway Journal have three objects: They aim (1) to present a summary of 1915 electric railway facts; (2) to interpret these facts in the light of present knowledge, and (3) to suggest the probable lines of progress in the immediate future.

1915 A BUSY YEAR FOR THE "JOURNAL"

From the editorial point of view the past year presented many interesting problems emphasizing the newspaper character of the ELECTRIC RAILWAY JOURNAL. Take the rise of the jitney, for example. As soon as it appeared on the Pacific Coast like a cloud no bigger than a man's hand, the editors detected the coming storm and began to warn the industry. Jitney news and special articles received prominent positions from the start, and no trouble or expense was spared to render the service effective. Special emphasis was laid on the economic phases of the jitney. The San Francisco convention issues are worthy of mention also. A special pre-convention issue was prepared to portray the electric traction situation in the West. Reporting the convention required a division of the editorial staff and a close co-ordination of effort to permit the mailing on Saturday in New York of a full report of the proceedings up to and including those on Friday, with a difference in time of three hours in the wrong direction. The proceedings and abstracts of some papers were telegraphed, and with the hearty co-operation of the association officers the program went through on schedule. Other conventions, including the mid-winter meeting of the association in Washington and a number of State and sectional meetings, were handled on a newspaper basis also. Realizing the importance of getting reports of association activities to the industry while they have news value, the JOURNAL segregated American Association news and provided for the immediate publication, in complete but condensed style, of every significant event. Among the other many important events reported during the past year were the Chicago smoke abatement and terminal electrification commission report, the report of the Bureau of the Census on street and electric railways, those of many commission and arbitration board rulings, several important steam railroad electrifications and other notable developments in the field of electric railway operation.

THE UPKEEP OF THE ROLLING STOCK

The pages of the two volumes of the ELECTRIC RAILWAY JOURNAL published during 1915 afford an unusual opportunity for master mechanics each to learn what the others have been doing, for never before have so many contributed the results of their efforts to our columns. The routine of shop work is more or less monotonous, but there is plenty of interesting development to keep the wide-awake man out of the ruts. The most interesting of these developments eventually take form in the reports of the Engineering Association committee on equipment which has recently given special attention to axles, gears and pinions, steel wheels and air-brake hose. The past year was an economy year, shortage of funds for new equipment furnishing a stimulus for the rehabilitation of equipment on hand. A number of men have told how they repaired motors of old types for the purpose of reducing maintenance costs. It is an interesting problem to determine just when it pays to scrap old motors to secure the benefits of improvements in design and manufacture, but there is no question as to the importance of making the most of those in use. Hard service brings out inherent weaknesses in design and construction, and ingenuity points the way for their elimination. The series of articles on equipment defects, by C. W. Squier, printed in Vol. XLV, is an epitome of the kind of work in our line which is being done by alert master mechanics. The work of inspection and "rejuvenation" is facilitated by the design of the modern car shop. A number of mechanical departments have been fortunate in being newly housed recently. We have selected for description during the past year, as typical of good practice, the new shops in Cleveland, Ohio; Springfield, Ohio; Holyoke, Mass., and Monroe, Tex.; and those of the Mesaba Railway on the frontier of Minnesota. While these cover a wide range in size, equipment and location, they all show a purpose to provide comfortable working quarters and to arrange mechanical appliances to minimize labor costs.

The General Staff and the Electric Railways

THE interesting information comes from Gen. George H. Harries that the General Staff of the United States Army is considering the possibilities of using the electric railways of the country for the transportation of troops and supplies in case of war and that with this end in view it has now practically decided to have a complete survey of all the electric railway lines made. There is no doubt, as we pointed out in our issue of Nov. 20, that the electric railway lines of the country, especially those along the coast, possess great strategic advantages and that a tabulation of the routes, running times, power capacities, supply of rolling stock and data on clearances and other necessary information about interconnections would be very helpful for the movement of troops and supplies. The plan of utilizing the electric railways in this way has been indorsed in the columns of this journal by Major-Gen. William A. Bancroft, of the Boston Elevated Railway, and by Dr. Louis Bell, who took an active part in the engineering corps organized to look after the defenses in Boston during the Spanish war, so that the interest in the plan by the General Staff of the Army is not unexpected. In supplying the information required at Washington, the electric railway companies of the country have a patriotic duty which we know they will cheerfully perform.

Chief Features of 1915 Electric Railway Statistics

AN analysis of our annual rolling stock and track statistical tables, published elsewhere in this issue, shows the year 1915 to be unusual in three significant respects. In the first place, there was a marked depression in the electric railway business for the first three quarters of the year, a condition which is reflected by the 10 per cent falling off in total rolling stock orders and 11 per cent decrease in mileage of new track placed in operation, as compared with the previous year. The reduction is general in character, as may be shown from several angles of analysis, *i.e.*, as regards number of city, interurban, or miscellaneous cars ordered, mileage of new city or interurban track and number of companies ordering cars or building track. A reduction in mileage is likewise shown for all the regularly classified geographical groups of States except the Western group, where a large and increased amount of new interurban line is shown owing to the completion of a few individual projects in Utah, Kansas, Oregon and Oklahoma.

This slump in railway orders, however, is qualified by two compensating facts of significance. One is that the total rolling stock decrease is not characteristic of the last two months. During this latter period, purchasing activity revived to the extent that our rolling stock columns recorded orders for 739 cars as against only 172 during the same period in 1914. It is only fair to credit part of this revival to the current inclination among many railway companies to order their next summer's car equipment in advance of the usual buying season for the purpose of allowing for tardy deliveries, owing to the present overcrowding of manufacturing plants with war orders. Even neglecting this consideration, however, the rolling stock orders of the last two months are well in excess of any two heavy buying months of the preceding year, and there still remain a large number of railways which have not yet prepared their budgets for the ensuing year. In regard to the second compensating fact, although the track building business seemed threatened with starvation, there was a corresponding increase in mileage of electrified steam railroads placed in operation, so that the total mileage of track newly placed in electric operation is about the average for the last four years. This electrified mileage, it is interesting to note, is almost 100 per cent in excess of any other similar annual figure. Thus, while the city and interurban electric railways practically ceased new construction, initial electric service was inaugurated on three main-line sections of important trunk-line railroads, and operation was begun or extended on four other lines, as shown in detail on the statistical pages.

Refinements Mark 1915 Track Development

CONSTRUCTION, maintenance and renewals of track in paved streets have commanded unusual attention on the part of way engineers in the year just passed. Interest in track materials of all kinds also has not lagged. The way committee of the American Electric Railway Engineering Association, through its recommended standards for track construction and special work, has done much to crystallize opinion in these two departments. Standards and specifications for splice bars and rails were adopted by the association some time ago so that the track structure, so far as the way committee is concerned, is pretty well standardized. The difficulty now appears to be to interest engineers sufficiently to make them use these specifications and standards. Many continue to exercise their prerogatives and persist in incorporating their individual ideas in new track designs. Whether, as time goes on, there will be a gradual leaning toward the more general use of the approved standards is difficult to predict. Many arguments have been presented in favor of adhering to these standards which, we believe, represent the best engineering practice, but so far they have availed little. Dollars and cents arguments are the kind that convince the average railway engineer, and it appears that little progress will be made until it can be shown that a longer life at a lower unit cost can be obtained by using a recommended standard, adopted after exhaustive study, than from a design that represents an individual's ideas.

Little or no new development in track foundation designs or construction methods has come to light recently. Ballasted construction predominates, and there is an increasing demand for the construction consisting of a concrete slab with a sand or crushed-stone ballasted cushion beneath the ties. In some instances this slab construction has conformed to the standard recommended by the way committee, and the track slab joins the concrete foundation supporting the pavement. In other designs, only a flat slab has been provided which leaves the edges of the ballast cushion exposed to drainage from the sub-soil beneath the adjoining pavement. Foundation construction of this kind is quite certain to develop defects which will not obtain in those types in which the cushion is completely confined.

Concrete-beam track construction, which to all intents and purposes has been a failure in America, still has some advocates and, in fact, has given good service in some localities. A modified type of beam construction has been designed and installed by the Southern Public Utilities Company at Anderson, S. C. The provision of additional bearing area beneath the rail base as a preventive against concrete failure, extra reinforcement at the joints and wooden washers to compress under load to make up for shrinkage in the concrete are features which should improve the results obtained from this type of construction. While the beam type of construction, or track laid on a concrete slab without cross-ties other than enough to serve as anchorages, has been unsatisfactory in this country, it has been used successfully in Europe for a great many years. In fact, a large part of the English track construction is laid in this manner, but special provision has been made against failure of the concrete beneath the rail base. Absolute rigidity in track construction seems to be the acme of perfection in the minds of the English tramway engineers, whereas American way engineers have concluded that some flexibility is necessary to prolong life and reduce track and rolling stock maintenance to a minimum.

Doubtless the most marked development in the track structure has been the return to the more general use of steel ties. While Brooklyn reports that 18.6 years' use made less than 40 per cent of the long-leaf yellow pine ties useless for further service, and treated and untreated hardwood ties have been reported as giving a service life even longer than this, the indestructibility of the steel tie in many soils has been a strong argument in its favor. At the beginning of the European war, there appeared to be some possibility that the scarcity of creosote would restrict the use of creosoted ties, but American producers have adjusted themselves to the situation and have practically supplied the demand. The price of hardwood ties has advanced materially, but this alone was not responsible for the increased demand for steel ties. When the steel tie was redesigned to embody the flexibility offered by wooden ties and to supply a sufficient bearing area to prevent destruction of the concrete through abrasion and at the same time could be sold at a reasonable price, it overcame the objections to former designs and its popularity in street railway track was a foregone conclusion. The principle of one form of the steel ties has also been adapted to the foundation supports of steam and electric railway crossings, where it is giving an excellent account of itself.

Taking up now the subject of pavement, it is undoubtedly the source of more friction with municipal authorities than any other part of the track construction, just as its cost of maintenance is increasing more rapidly than that of any other single item in the track. If the expense of the pavement, which is the heritage of horse car days, could be removed from the electric railway plant cost, it would, in a measure, make up for the diminishing returns due to longer average hauls. Granite block ranks first in the minds of way engineers as a material for paving the track allowance on heavy traffic streets, and treated wood block and brick come next in favor where the traffic is lighter. A comparatively new development in pavement construction that has attracted the attention of not only way engineers but the whole pavement industry is the substitution of a mortar or dry sand and cement mixture for the sand cushion now so generally used. An examination of pavements in service reveals the fact that the presence of the sand cushion has been the source of more pavement failures, perhaps, than the traffic that moves over the surface. The mortar cushion obviates most of these difficulties, as has been shown by the experience of more than ten years on some properties, and without doubt but few progressive way engineers will use anything but this type of cushion in their future pavement construction.

Labor-saving tools, including electrically-operated cranes and shovels, concrete mixers, rail grinders and drills have replaced hand tools, and it seems very probable that the pneumatic tamper, recently introduced on steam roads, will replace the tamping bars and picks on electric railways. While the difficulty of obtaining good labor has been a factor in forcing the introduction of labor-saving machines, reduction in construction costs as well as speeding up operations have been the real cause of their general adoption. Wherever street widths and construction conditions will permit, dump cars of various sizes have also replaced teams and wagons and effected considerable savings. Experience has also shown that the best quality of track construction is obtained on force account rather than by contract, hence most companies have fitted themselves with full construction and maintenance equipment. In other words, most way engineers realize their responsibilities and exercise extraordinary diligence in the selection and installation of track materials.

Rails and special work, of course, are an essential part of track construction, but the problems in connection with them are of such great importance that they will be considered in a separate article, appearing on the following page.

The Problems in Rails and Special Work

WE have referred briefly in the general editorial on track construction to the question of standards in rails and special work and to the action of the association thereon, but there are other questions in connection with both of these subjects which demand treatment in any general review. One of these is the matter of rail composition and method of manufacture, and in that connection reference should be made to titanium treatment, which as a means of insuring uniformity in the chemical analysis of the metal, is being quite generally specified. The announcement that vanadium steel for rails had sucessfully passed the laboratory and strength of materials tests also indicates that the use of this alloy, which has been so successful in other fields, may also become an important factor in the manufacture of track rails. Greater hardness as a preventive against rail corrugation seems to afford at least a partial remedy, and reports indicate that vanadium steel furnishes this desired quality and, at the same time, increases the elastic limit. Mayari steel rails also were laid for the first time in Worcester, Mass., in 1915. This is a nickel-chromium composition concerning which W. C. Cushing's report on special steels to the International Railway Congress Association, spoke so favorably. In design, there has been progress in the theory that the shape of the rail has a good deal to do with the problem which has been so elusive up to this time, that of corrugation. Further developments in this direction would be welcome.

If the demand for welded and riveted joints continues to grow, it appears to be but a question of time until use of the strictly mechanical joint for sub-surface track construction will become an obsolete practice. The various forms of welded and riveted joints now being used have proved beyond question the many advantages which can only be obtained with this form of construction. Joint life largely measures the rate of track depreciation, hence, security in this particular is certain to reduce maintenance costs. Fortunately for the industry the cost of the various types of special joints is somewhat lower than formerly, a condition perhaps largely due to the increased demand. On the other hand, the fact that the welded and riveted joints greatly diminish difficulties at this point in the track has made higher first cost less of an obstacle barring the way to their general adoption. Portable welding outfits which can be purchased at a reasonable cost, have put electric-welded joints within the reach of every electric railway property, and they have been largely responsible for the increased demand for joints of this type.

On larger properties, where the outfit necessary to install cast-welded joints can be afforded, it is being used very successfully. Many years of service have demonstrated beyond a doubt that objections to the cast-welded joints have been largely theoretical and that the percentage of joint failures is relatively small. Where a large number of joints are to be installed the Lorain electric welds continue to be used while the Thermit process continues to be popular, especially on account of its convenience. Other special riveted and welded joints are being installed locally but have not obtained wide popularity.

At the outbreak of the European war some fear was expressed that the manufacturers of special work would suffer thereby through a lack of ferromanganese, but this has not proved to be the case to any appreciable extent. Recent service records indicate that improvements in foundry practice and heat treatment have overcome many of the difficulties inherent in the earlier manganese steel crossings, and more uniform results are being obtained. Some changes in design were necessary to accomplish this end and, perhaps, the most advanced step taken has been the introduction of standard specifications for the manufacture of manganese steel special work. These specify not only the chemical analysis and finish but recommend design limitations which will insure increased serviceability in manganese steel special work. Some difficulties at present appear to be insurmountable, namely, the complete elimination of segregation, but a rearrangement of the supporting webs has removed this weakness from the crucial points of crossings, thus insuring a longer wear life.

Special-work experience on the Pacific Coast which was described in detail on page 576 of the March 20, 1915, issue of the ELECTRIC RAILWAY JOURNAL, bears out the results of our investigations of this subject and shows that the same difficulties have been experienced throughout the country. However, the hope is held out that the improvements pertaining to the more recent designs will overcome many of these objections. Insert special work, particularly that where the plate is set on a spelter bed, was found objectionable, because it was practically impossible to reset the loose inserts securely in the field. The general tendency appears to be that the demand for inserts set on partially or completely machined bearings is on the increase, and we confidently predict that in the course of the next few years only that type of construction will be sold to roads where dense, heavy traffic obtains.

Another phase of special work design which has attracted much attention during the past year has been the question of providing a flange bearing. Experience with this type of construction in Kansas City, Mo., indicates that the objections to a shallow flangeway are only theoretical, and that even the chilled-iron wheel does not develop chipped flanges in operating over flange-bearing crossings. On the other hand, the elimination of the heavy blows struck at track intersections not only prolongs the life of the crossing and the supporting structure, but removes the cause of numerous incipient defects that develop in the rolling stock. Provisions for flange bearings and the rate of incline in the approach to a flange bearing were included in the specifications for special work adopted at the San Francisco convention.

Changes in the Power Station

As was to be expected in an "off" electric railway year the power plant was not the scene of any sensational development during 1915. Nevertheless the year was one of substantial progress. A most notable event was the adoption of a standard boiler code by the American Society of Mechanical Engineers after years of work on the part of a special committee appointed to prepare it. The effort necessary to bring this proposition to a satisfactory conclusion and to harmonize conflicting interests was comparable with that now being exerted on the proposed national electrical safety code mentioned elsewhere. This code includes boiler design, construction and materials. It is therefore analogous to only a part of the electrical safety code.

Some progress has also been made in the direction of a more rational unit for rating boilers, at least to the extent of an increasing recognition of the inadequacy of the old nominal horsepower rating. There are two inconsistencies in present practice. In the first place it is ridiculous to rate a boiler in horsepower, because this rating, if anything but nominal, must involve the water rate of the engine or engines furnished with steam by the boiler. Second, the output of a boiler depends very largely upon the furnace. Hence a unit should be used which will permit the separation of the furnace from the boiler proper.

The committee on power generation of the A. E. R. E. A. emphasized last year the importance of more systematic accounting in this field and outlined a general plan for keeping records which should make the interchange of data more practicable. Obviously the more readily comparable the data from different power plants can be made the more rapid will be the advance in power generation economy. One result of interchanging data will be a better realization of the fact that the nature of the load is related to the cost of energy.

This journal has more than once directed attention to the high cost of peak-load power. Where power is purchased there is no difficulty in realizing this cost as the terms of the contracts specifically include it. It is more difficult to comprehend when a company is generating its own power.

One of the most significant events in the history of electric railway power generation occurred recently when the splendid Ninety-sixth Street power plant of the New York Railways in New York City was shut down because it could not compete with the remodeled Seventy-fourth Street plant of the Interborough Rapid Transit Company, which supplies power to the New York Railways. The latter plant now contains three steam turbine generators of 30,000 kw. each, rendering obsolete the great Corliss engines which once made the Seventy-fourth Street plant famous. Large power-generating systems, large individual plants and small plants as well are being made over to enable them to profit by the advances in machinery design. An instance of the "rejuvenation" of a small plant, that at Springfield, Ohio, was described in a recent issue of this paper. In this plant a novel form of condenser was employed, one in which the surface and jet types were combined. This invention suggests that the condenser still furnishes a fertile field for the ingenious designer.

The electrical end of the power plant has kept pace with the steam end, although the problems met by electrical designers are not of general interest. The manufacturers of electrical machinery are endeavoring to obtain consent to permit it to be run hotter, under certain conditions, than was formerly considered desirable. As it is the permissible rise in temperature which largely determines the weight of electrical apparatus, it is to the advantage of all concerned to have it operate at as high a temperature as is possible without involving excessive maintenance costs. As the radiating surface in electrical apparatus increases less rapidly than the volume, the difficulty of radiating heat becomes greater as the capacity of a unit is larger. Users appreciate this, but they wish their generators and transformers to have long life, hence are reluctant to permit greater temperature rises. The standards committee of the A. I. E. E. is taking a conservative position in the matter.

Electrification for Freight Service

From the commercial standpoint, it may be said that not even a good start has been made in exploiting the opportunities for profitable installations of electric operation on steam railroads. This condition of affairs is chargeable to many causes, of which the majority are, perhaps, indirect and more or less obscure. Among them, the "battle of systems" has played an important part in the past, but at the present time, when actual results have displaced estimated figures, the industry has settled down to a general acceptance of the belief that in most cases the proper choice of "system" is not open to question and that with the cases that are on the border line there is not enough difference between them to be worth much argument. On the other hand, there is no doubt but that the success of electric operation of city and interurban lines, which originally drew attention only to the electrification of steam railroad suburban service, brought about the prevalence of an idea that electricity was primarily a means for handling passenger trains, and this has made its use in any other service seem somewhat like a dangerous experiment.

During the ten years' experience with electrification problems, the field of freight service, and especially long-distance freight service, where the greatest economies seem to be made available, has been completely neglected. On the New Haven system, it is true, freight trains have been hauled electrically for some three years, but because of the limited length of route, only 70 miles, in combination with a not inconsiderable proportion of the traffic diverted to branch lines at intermediate points, the service cannot by any means be classed as long distance. In consequence, the Chicago, Milwaukee & St. Paul electrification, which was placed in operation only last month, constitutes actually the first step toward a demonstration of what may be attained by the thorough exploitation of this opportunity.

Naturally, the return that will be made upon the first cost of this installation cannot be definitely determined until after a year or more of actual operation, but that the investment will be directly profitable can hardly be doubted. The work was undertaken solely upon grounds of economy in operation, and no indirect benefits such as smoke elimination, or increase of terminal capacity entered into the calculations.

Only two other projects undertaken primarily with the idea of obtaining direct profit appear in the history of trunk-line electrification. These are the Butte, Anaconda & Pacific and the Norfolk & Western installations, and although the service in both of these cases is really switching and transfer work on a grand scale, it is significant that both involve a traffic almost exclusively of freight and that both have shown a handsome direct profit on the investment. This is more than any of the previous installations for passenger service have been able to do, and the conclusion is inevitable that the future of electrification will be in the field of freight traffic.

Of course, this does not mean that passenger traffic must henceforth be handled by steam, because the difference between hauling an 800-ton passenger train and a 2400-ton freight train is, in the end, largely a question of gear ratio, or its electrical equivalent. But where there is an ample amount of freight to be moved, the arbitrary conditions set up by passenger service may be eliminated, or at least offset, and the valleys in the daily load curve may be filled, while at the same time the necessity for protecting train movements with idle locomotives is relatively reduced.

That which has gone before, therefore, seems really to have been less of a period of commercial development than an elaborate series of technical experiments, these being made possible by highly artificial conditions which compelled electrification regardless of economic considerations. Freight traffic, up to the present, has been lacking, and without its aid there has been little chance of making really profitable installations. Electrification, in fact, has only just begun to be commercialized, and until it has reached the stage where general recognition is given to its ability to show a definite and direct profit, there is no use in expecting it to progress faster than any other interesting but highly academic experiment. This point, however, seems now within reach. Indeed, results from the St. Paul electrification are not needed to show that freight can be profitably moved by electricity but only to show what extra profits may be attained by long-distance hauls. In the immediate future, therefore, numerous electrifications of favorably situated sections of track are inevitable, because capital will always be eventually available where definite returns are assured.

Getting Together on Power Distribution

TO an unusual degree the past year was one of conferences and reports on power transmission and distribution subjects. This is a field in which utilities must get together. Overhead lines of different utilities, telephone and telegraph companies, lighting and power companies and electric railways must not interfere with each other either as to safety or reliability of service. The same is true of lines placed underground, although here there is less danger of interference. Where the utility uses a ground return there is the stray current to be considered. These facts account for the activity which is manifested in joint committees of one kind and another. The electrical safety conferences, which are closely related to power transmission and distribution, are discussed in a separate article. The joint committee on overhead and underground line construction, in the formation of which the Engineering Association took an active part, has been meeting monthly during the past year and has brought together a representative group of experts. G. W. Palmer, Jr., has been vice-chairman of this committee. While some difficulty has been experienced in bringing out constructive criticism of existing specifications progress is being made along several of the following lines of work laid out more than a year ago: Underground and undergrade crossings; crossings of electric wires over electric railway tracks; crossings of trolley contact wires; overhead crossings of wires or cables of telegraph, telephone, signal and other circuits of similar character over steam railroad rights-of-way or track, or over lines of wire of the same classes; overhead crossings of electric light and power lines, and parallel lines.

In May a comprehensive report on crossing specifications, prepared by a joint committee representing several utilities in Pennsylvania, was presented to the Public Service Commission of that State. This was the outcome of an exhaustive study by electric railway and other engineers and, while not yet formally adopted, stands as a monument to co-operative effort. It forms a booklet of 165 pages.

Another concrete and commendable piece of work accomplished in 1916 was the set of specifications for 600-volt overhead line material which was compiled by the power distribution committee of the A. E. R. E. A. This is a compendium of good practice in its field and should be extended, as soon as possible, to take in higher-voltage and catenary construction. This committee also did constructive work in systematizing the designs of concrete and steel poles. An important step was taken in the direction of rationalizing the formulas used in pole design and in harmonizing theory and practice. The committee also succeeded in solving the knotty problem of the lightning-arrestor ground, Shall the ground wire be connected to the rail and the ground or shall it not? The knot was cut by deciding that the track connection may be used when such use is unobjectionable, and these conditions were specified.

As is proper, the substation has received attention in several quarters during 1915. The A. E. R. E. A. committee on buildings and structures made a preliminary design for a standard substation, indicating a conviction that money could be saved if the common elements in the substation could be standardized. In view of the radical differences in substation sites and surroundings standardization is possible in this line to but a limited extent. There has been some discussion on the rating of substation machinery, this subject having been left open by the A. I. E. E. standards committee in view of the existing differences of opinion. On one hand is the desire to recognize the special requirements imposed upon substation apparatus by the intermittent load, while on the other is the general trend toward simplification in rating. The continuous and nominal ratings now find themselves in recognized competition and the more logical, whichever it is, will in the end survive. On general principles this journal has leaned toward the continuous rating as simpler, but recognizes that there are practical and weighty reasons for the nominal rating.

The automatic substation has been brought attractively to the attention of the railway industry this year and for certain classes of work promises well. The first commercial installation is giving a good account of itself and promises to meet objections with good performance. In this type of substation the rotary converter is started and stopped by control apparatus actuated through voltage fluctuation. In this connection the protection of substation machinery by means of long feeder taps is of interest. The automatic substation makes such protection unnecessary because it contains resistance grids which are automatically thrown into circuit when the substation is overloaded. The practical question is whether the resistance should be put into the feeder or into the substation. The subject is open for debate.

Electrolysis mitigation discussion has been quiet for the past twelve months pending the publication of the report of the national joint committee on this subject. The report has been in the hands of the editing committee for some time. Meanwhile the committees of the American and Engineering Associations have very properly deferred to the larger committee. Several return circuit investigations have been made, the National Bureau of Standards maintaining an active interest in the subject. On the recommendation of the bureau the Springfield (Mass.) Railway will try the "three-wire" system of distribution, with alternate positive and negative trolley sections.

Attention was directed to a kind of electrolysis, different from that usually associated with the word, in a San Francisco A. I. E. E. paper presented by S. L. Foster. This was the corrosion of overhead parts on sea-coast lines by leakage currents. The subject is special, but is worthy of more attention than the time which was available for discussion at the San Francisco convention permitted.

Conservation of Life and Property

ACTING on the principle that in the reduction of accidents better public relations can be fostered and money can be saved, the electric railways of the country went into the accident reduction movement with greater energy than ever during the past year. This fact was recognized by the National Safety Council in the formation of an electric railway section and the promise to inaugurate special bulletin service for this industry early in 1916. Moreover, at the recent meeting held in New York the executive committee of the American Electric Railway Association authorized the appointment of a committee on street traffic which will consider the most important phase of safety.

The first annual award of the Brady medal by the American Museum of Safety was an event of considerable interest in the electric railway field. The fortunate recipient of the medal, the Boston Elevated Railway, gained much desirable publicity, as did also the American Association and the safety association. The honorable mention accorded to the Public Service Railway and the Northern Ohio Traction & Light Company was good publicity. The Brady medal award recognizes the efforts made to insure the safety both of the public and of employees. This is fitting because the railway more than other utilities is both a very large employer of labor and is constantly in direct and hazardous contact with the public.

Among safety matters which attracted the attention of the railways last year none was more important than the effort of the National Bureau of Standards to secure the co-operation of the industries in the formulation of a code of safety rules to be applied in electrical construction and operation. At first this attempt was not taken seriously, as the utilities and other organizations recognized the almost insurmountable obstacles in the way of attainment. Dr. E. B. Rosa, in charge of this work for the bureau, persisted, however, and eventually succeeded in getting the attention of those concerned. It was expected that a formal conference would be held in Washington under the auspices of the bureau late in October, but when the time arrived the magnitude of the task of getting ready for such a conference was realized, and it was postponed. In its place an informal but effective two-week convention took place in New York, and excellent progress was made. The utilities are co-operating actively because they realize that there is a demand from public service commissions for something of this sort and that a reasonable national code will in the end insure more uniform regulation than would be possible without it. In deference to the Bureau of Standards other efforts to promulgate safety codes, such as that begun by the utilities of Pennsylvania, are being held in abeyance, and the results of such efforts are being combined with those of the bureau.

The Electric Railway Journal has from the start emphasized the importance of this matter, directing attention to the conferences held and to be held from time to time. Contributed and editorial articles have been published, all bearing upon the necessity for study of the proposed code by those to be affected by its adoption. During the year it has been difficult to secure copies of the rules, but now the American Association has issued them in convenient form and at a nominal price. They should be diligently read, as constructive criticism at this time has double value.

Only secondary to the conservation of human life is that of property, and the accumulating evidence of harmony between the National Fire Protection Association and the electric railways is a cause for congratulation. By its action in convention last May, the N. F. P. A. recognized the position of the American Association as the natural authority on the subject of fire hazards in electric railway properties.

Growth of the Skip-Stop Idea

With the beginning of the new year the problem that seems most portentous of definite results to city railways is that of faster schedules, and the most obvious means to that end appears to be the skip stop. To this plan, which had lain almost dormant since its introduction in Cleveland some three years ago, there has been devoted an extraordinary amount of attention for the past year, and although the experiences of the electric railways along these lines have been by no means uniformly fortunate, a distinct gain for the industry has been registered.

During the year, it is true, the successful attempts to introduce the skip stop have been outnumbered by the unsuccessful ones, but this showing is not necessarily discouraging. The fact that the new method of operation can be introduced at all is good evidence as to its real acceptability to the public. There is no reason to believe that the people of St. Louis, for example (where the skip stop was popularly approved last November), differ materially in their ideas on schedule speed from the inhabitants of Detroit and Milwaukee, who rejected similar plans at the same time. Nor is there any reason to believe that the educational work that was carried on in the two latter cities during the period of experiments with the skip stop has been altogether futile and without value for the future. Indeed, reports from Richmond indicate a popular demand for the elimination of stops even without preliminary trials by the railway, and in the city of Schenectady there is being operated a non-stop rush-hour service for the large factories principally due to requests from patrons.

As a matter of fact, we believe that the skip stop is going to run a course much the same as that of the near-side stop. To-day, admission is made in practically every large city that the latter method of stopping cars is an improvement. Nevertheless, it was only a few years ago that the near-side stop was roundly condemned by the popular voice in almost every community where it was even suggested. In New York it was once inaugurated and abandoned within a few weeks. Yet when it was proposed again two years ago by a progressive few, none of the old objections that had been raised against it in the original trial were found to exist in reality, and it is now in New York to stay. That this was no isolated case is well demonstrated by the curve of growth of the near-side stop that was presented by the committee on schedules and time-tables at the San Francisco convention, and, in the light of the geometrically progressive change in public opinion therein displayed, it becomes difficult to take too seriously the early setbacks of the skip-stop idea which are in evidence at the present time.

These setbacks are, of course, generally chargeable to the failure of popular opinion to approve the innovation, although in St. Louis it seems to be the protest of a certain number of shopkeepers that has been the stumbling block, and as remedies for this condition there seem to exist only agitation by the railways and the lapse of time—the one thing that is really able to overcome the chronic inertia of the public mind. Agitation that is vigorous as well as continuous ought to help materially, and even though it may produce no immediate effect, it should be in the end well worth the slight effort that it involves. City railways, as they stand to-day, are between the devil of rising labor and material costs and the deep sea of a fixed fare, and there should be no likelihood of allowing any plan capable of providing relief to go by default.

With the skip stop in operation, the use of trailers becomes a commercial possibility instead of a pitfall wherein more money is likely to be lost in reduced speed than is saved in platform expense, and trailers will solve the otherwise hopeless problem of congestion in restricted business districts that is before so many cities at the present time. Even under normal operating conditions the time saved by eliminated stops may reach astonishing figures. In Milwaukee, as pointed out in an article on this subject which appears on another page, a reduction of 17 per cent in schedule time was found in one case, and this, on the basis of the results to be expected on the average electric railway, amounts to the equivalent of a 12 per cent reduction in the total of operating expenses. It seems inconceivable, therefore, that such an important economic measure as this, which saves time for the public at the same time that it effects economy for the railway, can fail to come into general use, and we look, as well as hope, for a great extension of the principle in the immediate future.

Car Design a Question of Capacities and Weights

THE outlook for the immediate future in car design gives every indication of the imminence of radical innovations. These, however, would appear to apply rather to car sizes and capacities than to the form of body and seating arrangements, as the small capacity car is persistently maintaining a position of importance in the minds of many operators regardless of the revolution in methods that its introduction is bound to establish in city railway practice. As yet, it is true, the extremely small car has not gained an actual foothold, but if it should once do so and should even approximate the results expected from it, there can be no doubt that it would come into almost universal use. The problem of the small capacity car, however, is really one of operation, centering about the largely unknown factor of the increased receipts that should follow decreased headway, and in the details of design of such small units as have been built thus far, there appears nothing that differs materially from the practice which has come to be accepted in the electric railway industry.

In general car construction, steel has displaced wood to such a degree that the all-wooden car is now as much of a *rara avis* as was all-steel design two years ago. This change has marked the practical disappearance of the old-style "underframe" design where the weight of the car body was supported upon heavy sills below the floor, and progressive designers have now eliminated center sills even from high-speed interurban cars, the buffing and pulling strains being transmitted at the bolsters to the side girders which support the load. The steel vs. wood problem, in fact, has now reached the point where it is involved only in such details as to whether wooden sheathing is to be preferred on car roofs and floors, and even in this case the use of steel seems to be looked upon with growing favor. The wide adaption of autogenous welding has no doubt had an influence in this regard, because through this means small or thin pieces of steel may be handled with a facility that once was considered only possible with wood. Insulation against heat or cold, which was at one time a serious problem in steel car design, has now been thoroughly worked out, sheet cork covered with canvas having proved to be thoroughly satisfactory either inside or outside of steel sheets, and this incidentally has had an indirect effect in demonstrating the possibility of getting along with a less ornamental but more practical interior finish.

In purely city service, where speeds are low, improvement in radial axle equipment has enormously broadened the field for single-truck designs, to say nothing of the growing numerical influence of the one-man car, which is generally built short enough so that, even without radial axles, a single truck can be used without bringing about excessive overhang beyond the wheels. However, the radial axle truck is to-day being made light enough so that its use in preference to the plain single truck does not impose a handicap in weight, and it has, in addition to its advantage of permitting a longer wheelbase than is possible with rigid axles, the faculty of relieving strains and wear when passing around curves, although it does not avoid the wheel slip that comes from the shorter distance traveled by the inside wheel. It seems likely, therefore, that the tendency toward a more general use of the single truck will continue, and this possibility is emphasized by the support now being given to the principle of smaller car capacities which, it may be said, was recently voiced by one car builder in a statement that 90 per cent of the electric railways were operating larger cars than were warranted by their service conditions.

Public Relations in Theory and Practice

THERE is no subject to which the attention of electric railways has been directed in association addresses and in this journal during the past decade to a greater extent than that of the necessity of establishing good public relations. Eminent committees have reported upon it, a code of principles has been adopted, and the methods by which this end can be secured should now be thoroughly understood. On commenting on this subject in our annual review of just one year ago, we suggested that each manager ask himself three questions, namely: "To what extent do I recognize the principle that the first obligation of public utility companies is service?" "To what extent am I following the practice of full and frank publicity?" and "What am I doing to improve the public relations in my own community?" A year has elapsed, but these questions are just as important as they were at the beginning of 1915.

The maintenance of satisfactory public relations depends primarily upon two things, to provide good service, by which we mean as good a service as the rate of fare warrants, and, secondly, to convince the public in the right way that this is the case. As regards the first requisite, we have sufficient faith in the ability of railway managers throughout the country to believe that they know what good service is. If they do not they have only themselves to blame. But we have not the same confidence that the average manager understands equally well the principles of publicity. Just why this should be so is difficult to understand because the methods of publicity are widely practised now by many of the large steam railroads and industrial corporations and even by several of the departments of the Government, yet while there are a few conspicuous examples of individual electric railway companies which conduct continuous and successful publicity campaigns, to a very large number the words carry no significance.

Many instances might be cited, but one must suffice. At the time of a serious strike several years ago, an important metropolitan newspaper, known to be friendly to corporations, sent one of its representatives several hundred miles to the scene to get the facts. He was not a cub reporter but an editorial writer whose salary was not greatly different from that of the general manager whom he tried to see but in vain. Not only the manager but all of the executives were too busy to grant an audience, although the visiting newspaper man made several attempts to see them. But after he had given this undertaking up in despair he had no difficulty in meeting and interviewing the leader of the strikers as well as the Mayor of the city who was known to be unfriendly to the company. No barrier was put in his way at either of these places. Nor did he experience any trouble in seeing the editors of the local papers, who assured him that his experience did not surprise them in the least.

Not every company, fortunately, has strikes, and it is not in these periods of tension that a company's policy in regard to public relations is established. This question is settled during the daily intercourse which the utility has with its patrons as well as with the authorities and the newspapers which have an important influence in affecting public opinion. It is the reputation which the company establishes in these periods of quiet and peace which stands it in good stead in times of stress. This fact gives force to the third question which we suggested last year, and which we repeat this year, that each manager ask himself: "What am I doing to improve the public relations in my community?" If he is not doing all that he should and all that he can, it is time for him to change, and no time for making the change offers any greater opportunities than the present.

Business Is Improving

THE year 1915 will, we believe, stand out prominently in financial history as one that has swung in rapid course from the depths of acute depression to the heights of steadfast optimism. At the beginning of the year American business was felt to be in a critical state; some sections and industries were indeed prostrate, and everywhere there was a pessimistic point of view that saw with almost utter hopelessness only the points of weakness in American conditions. Since the middle of the year, however, evidences of an improving situation have been piling up with increasing rapidity, and favorable reports are now being sent in from all quarters.

In particular, the monthly reports of investment houses and commercial agencies have of late been showing better conditions in the country at large. For December, according to one authority, twenty-two subjects showed an improvement in business as compared to last year—these including new buildings, total bank clearings, bank clearings exclusive of New York, failures, commodity prices, imports, exports of merchandise, balance of trade, balance of gold movements, railroad earnings, money in circulation, comptroller's reports on national banks, bond and stock transactions, political factors (domestic), gold production, idle cars, social conditions, crops, metal situation, and new securities issued and listed. Only two subjects, immigration and new securities authorized, showed a decline in totals as compared to last year, while only one subject, foreign money rates, indicated that caution should be exercised. These returns are fairly indicative of the development that is reflected in every report bearing on the commercial and financial situation, and they cannot but inspire the most profound sentiments of relief and satisfaction. The most disquieting feature in the present situation is the large volume of war business being done, which is not a stable attribute of permanent prosperity, but we believe that this question can be handled without a serious and unsettling reaction if the industrial firms thus profited and the workers therein pursue a sane and conservative policy of now fortifying themselves against the inevitable reverses instead of being prodigal with their present large returns.

The experiences of the electric railway industry have been not unlike those of the country as a whole during the past year, for in this field we find the same combination of early depression and later improvement. It is undeniable that electric railways in the early months felt the depressing influence of the nation-wide curtailment of business and of special factors in the electric railway field, such as rates, wages, regulation, and especially jitney competition, but there are strong evidences that the depression thus enforced was at its maximum in the early summer, and that since then conditions have been becoming ameliorated. The stagnation in orders for new equipment and in new mileage placed in operation, so noticeable during the first nine months of the year, has in the last three months turned into an appreciable activity. This is a development that has naturally been based on a concomitant and to a certain degree antecedent improvement in earnings, so that we are not surprised to find evidences of a trend toward better earnings after the middle of the year. On the basis of more than fifty representative companies located in different sections of the country, it has been calculated that the ratio of gross revenues in one month in 1915 to those in the corresponding month in 1914 increased from an average minimum of between 85 and 90 per cent in the middle of the year to an average of about 96 per cent by the end of September. Returns for the last three months are not completely available, but it is known that many lines, especially those in the East, have shown marked progressive increases, and it is believed that the end of the year has brought an average return for December, 1915, on a par with that of December, 1914.

When we consider the cumulative effect of the decreases and increases throughout 1915, however, it becomes evident that the sum total must be a loss. Some of the smaller railways have undoubtedly suffered much more severely than the large companies, but it seems that for the country as a whole a fair estimate of the average decrease in gross revenues would be between 4 and 5 per cent and in net revenues 6 or 7 per cent. This showing on its face may not appeal strongly to the investment banker or private investor, but the point for such persons, and, in fact, everyone, to remember is that in periods of depression, even more than in prosperity, the relative stability of industries is of greater importance than their individual numerical or percentage returns. In this connection we desire to emphasize this fact—that electric railway earnings in 1913 and 1914, as compared to steam railroad earnings, building permits, bank clearings, steel and iron production, agricultural products and the cotton crop, showed the highest relative stability, and that under normal conditions they would respond most quickly to business rejuvenation. There are peculiar factors in the electric railway field that undoubtedly retard somewhat the full response of electric railway earnings to the influences making for improved conditions, but in view of the greater relative stability of such earnings we are confident that not even these factors will prohibit electric railways from making a comparatively favorable showing when the full returns of 1915 in all lines of industry can be compiled.

A word may well be said regarding some of these special problems of electric carriers, however, for they influence particularly the relative profitableness of the industry, in which the casual investor is more interested than in the relative stability. Probably the question most discussed to-day is that of jitney and automobile competition is waning and we believe that electric railjects that we shall not discuss them here in connection with the business situation except to say that jitney competition seems to be waning and that electric railways will ultimately adjust themselves to the private automobile situation without serious loss. As to other special factors it may be remarked that in spite of the stable character of electric railway earnings, the problem of furnishing continually more and better service under constantly increasing costs at a depreciated rate of fare is one of serious moment. We are of the opinion, however, that the public is daily becoming better educated, through the disastrous results of excessive repression of the transportation agencies of the country, to a wider appreciation of the service performed by electric railways and their needs for successful operation and development. It is gradually becoming patent that fares must be adequate to allow the companies to pay a fair return and so to obtain capital for needed improvements, and courts, commissions and the public at large are acquiring a more rational point of view regarding the urgency of relief through increased rates of fare.

It must be remembered, however, that the harmful results of too high wage-fixing by arbitration, excessive tax requirements, restricted legislation and improvident rate-making are, of course, too far-reaching to be remedied at once, and the mitigation of these special problems thus far must be continued with even more assiduity if the transportation industry is to develop to the fullness of its powers. The industry is endeavoring to do its part through the furnishing of good, quick and safe service, and through the establishing of more economical methods of operation, such as by the skip-stop plan—all of which will have an important influence on the financial status of electric railroading. The full restoration of confidence in electric railway investments, however, is largely dependent on the public itself, but we are confident that the public now is realizing better its responsibilities as well as its opportunities in this matter. Thus there are positive reasons for the future success of electric railways which, in view of the present propitiousness of general conditions, seem clearly to warrant now a banishing of pessimism.

Classification of Rent Items

RECENTLY we published a letter stating that in the matter of accounting for rents the electric railway classification is guilty of an inconsistency not found in the steam railroad classification. It is admitted by our correspondent that in accounting for rentals (aside from operating expenses assumed) on leased property as a deduction from income, the electric railway classification pursues the theoretically correct course of looking upon these rentals as a return to the lessor on such leased property. It seems to be contended, however, that in the case of rentals on jointly operated property the failure to provide joint facility accounts for the operating expenses assumed on such property, and to charge against income the additional payments made to the owning or controlling company as a return applicable to the investment in the used property, constitutes an omission which steam railroad practice proves should be remedied. This is an argument which we cannot support, for to our mind the very failure so to account for the payments on jointly used property brings out the exact point wherein the theory of the electric railway classification is more sound than that of the steam railroad classification.

Let us reiterate, for a moment, the basis of the editorial along this same line in the issue of Nov. 13. We believe that all rent items should be treated as operating expenses with the exception of the permanent pure rental charges on property held under long leases, such leases being, as before stated, usually the concrete evidence of the right to that "exclusive use and control for operating purposes" of which our correspondent speaks. Charges of this latter character represent the portion of the accounting company's return that goes to the lessor for his part of the company's used and useful property. Charges on property, however, whose use is merely temporary or accidental, or which is primarily owned or controlled by another corporation for its own use even if it allows joint operation thereof, do not constitute a return on property exclusively used and controlled, and they should be handled as operating expense, as the electric railway classification provides.

To these premises the fact that rental payments may consist of two portions—the first representing actual or apportioned costs of operation that are assumed, and the second a return on the investment involved in the rented property—does not present any insuperable objections. In the case of rentals under leases on property exclusively used and controlled, the maintenance and similar expenses that are assumed are obviously proper charges to the operating expense group, just as if they were paid by the lessor himself, while what might be called the "pure" rental above these expenses, or the return on the leased property, is properly charged as a deduction from income. The operating costs assumed in such a case were an obvious factor not discussed in the preceding editorial, and their presence is deemed not at all inconsistent with the supported theory of accounting for the pure rental payment. Property exclusively used and controlled under lease is property that would be included in the company's valuation, and the different accounting for the operating costs and the pure rental or return thereon is just as natural as the different accounting for the operating expenses and the return on the property actually held in legal ownership. All property that is held temporarily, incidentally or only in joint operation with the primary owner, however, is not property that would be included in the accounting company's valuation. Consequently there should be no concern as to what portion of the payments for the use of such property represents operating costs or return on the investment, for the entire payments are legitimate operating expenses incurred in the operation of the company's used and useful property, and the determination of and accounting for the return on such nonvalued property may be left to the one really interested—the primary owner and user.

Moreover, the fact that all temporary, incidental and joint charges on electric railways are carried to the one "general and miscellaneous" division of the operating expense group, instead of the joint facility charges being subdivided among certain divisions of the group, as in steam railroad accounting, is a separate issue that does not at all affect our thesis—that all temporary, incidental and joint facility charges belong in the operating expense group. Whether subdivisions for the maintenance, operation and administration of joint facilities should be used, against which a great deal might be said on account of impracticability, is not the question. The point is that there should not be included as deductions from income what the steam railroad classification calls "joint facility rents" (amounts above any actual or apportioned expenses of maintenance, operation and administration), or any payments for interchanged or floating equipment. Such payments do not represent used and useful property to which can be assigned a portion of the fair return of the company.

This brings us to the question as to what figure on the income statement best represents the return on the investment. Our choice of the term "gross income," which has met with an objection, was based on two reasons. In the first place, the varied terminology in regard to "earnings," "revenues" and "income," both gross and net, made it seem necessary to use an official term definitely fixed. In the second place, the investment that is used in measuring the fair value of a property is not alone that of the bondholders or of the stockholders but the total amount contributed by both. Hence fixed charges on the funded debt and dividends on the capital stock must both be considered as essential elements of the return on the investment. "Gross income" is the official term used before fixed charges on the funded debt are deducted, while "net income" is the term used after such deduction. For obvious reasons, therefore, the gross income is the official figure to be used in calculating approximately the return. We say "approximately," for of course it must be used with qualifications in mind. Interest on unfunded debt, amortization charges, appropriations to sinking and other necessary reserve funds and similar items naturally in various cases may serve to reduce the gross income figure until the real balance for funded debt and capital stock is obtained. Exceptions only prove the rule, however, and with such possible deductions in mind the gross income may justly be used in measuring the reasonableness of the return. To use the net income figure, after the fixed charges on the funded debt have been deducted, would be to ascribe no importance at all to the interest rate and other features surrounding the acquisition of the bondholders' investment—a theory of valuation work to which we can in no way agree.

> *In the general revival of prosperity in this country the electric railway companies are not enjoying their share. The chief reason is that they are not receiving adequate payment for the service which they perform. This condition can be remedied, but it requires united effort. With "a long pull and a strong pull and a pull all together" we should make substantial progress during 1916.*
>
> JAMES H. MCGRAW

Eliminated Stops in City Service

Various Considerations in Connection with the Faster Schedules Accompanying a Reduction in the Number of Stops Are Discussed by Electric Railway Operators, Whose Experiences Indicate the Economy as Well as the Practicability of This New Method of Operation

During the past year a great deal of attention has been devoted to the possibilities in increasing the schedule speed of cars in city service by the elimination of part of the stops that are made under ordinary conditions. All of the experience that has been acquired with this new method of operation points to the fact that it is of utmost importance to the electric railway industry, and in order to present the inherent opportunities of the movement, the following articles by electric railway operators who have investigated it are published. These include discussions on the economics of schedule speed and on the situation in Cleveland which is undoubtedly the most conspicuous example of skip-stop operation; an account of the simple and successful plan of introduction in Rochester; and an outline of the preliminary work that has been done in Chicago. It is to be hoped that they will aid in focussing attention on this really vital subject.

The Economy of Higher Speeds

BY B. F. WOOD
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Since the competition of the automobile became an acute problem of the electric railway industry, one significant fact in connection with it has stood out above all others, and that is the necessity for faster schedules. Speed is desired by the public at large, which has frequently supported the irresponsible jitney bus because of its rapidity of movement. At the same time, increased speed makes possible an increase in service at the same expense. An analysis of costs on any property will show this to be the case, and as an elaboration of this statement there is presented in the following paragraphs a study of the figures for the average electric railway appearing in the last electric railway census, which indicates that each decrease of 10 per cent in the running time will permit an increase in service of some 7 per cent without an increase in the cost of operation. It should be said here, however, that faster schedules may be obtained in two ways:

1. Increasing the maximum speed; and,
2. Reducing the number of stops.

Manifestly, the former method brings with it the possibility of increased accidents as well as of interference with legal restrictions. For this reason, it is not considered in this analysis, which deals only with decreases in schedule time that may be obtained either by reducing delays or by cutting out stops, and all of the deductions herein submitted are predicated upon the existence of an absolute maximum running speed.

Such a situation as this, for example, might exist in connection with the introduction of a skip-stop scheme, whereby enough stops might be cut out to shorten the running time, say, 10 per cent. For a given schedule, the number of cars required would vary in proportion to the change in schedule time. Of course, conditions might be conceived where the rush hour was of such a short duration that an appreciable number of the trippers would make but one trip per day, and under such circumstances the number of cars would not vary exactly in proportion to the schedule time. However, a close approximation of direct proportion would obtain in any event so that the relation may be generally applied.

Since the average electric railway of the country has its operating expenses distributed as shown by the figures of the electric railway census for 1912 (see ELECTRIC RAILWAY JOURNAL, Jan. 16, 1915, page 131), it may be said that a number of the items which go to make up the total expense would be directly affected by a reduction in running time, and these are shown in Table I. This table shows, in the first column, the amounts chargeable to the various accounts included under operating expenses, these amounts being expressed in percentages of the total operating expenses. In the adjoining column are transferred the percentages representing those accounts which are affected by an increase in speed, which total 54.4 per cent. Expressed otherwise, each $100 of operating expenses includes $54.40 that will be affected by faster schedules, and if schedules are reduced 10 per cent there will be a reduction of 10 per cent in the affected accounts, this reduction amounting to $5.44, and this would pay for practically 6 per cent more service. There are, as a matter of fact, other incidental savings which do not appear in the table, but these will be taken up in a later paragraph.

An explanation of the reasons for the selection of the affected accounts that are shown in the second column of Table I is, perhaps, necessary. First in the list is the general heading covering way and structures. It is obvious that none of the expenses involved here would be influenced by changes in the speed or in the number of cars, provided the changes were within reason. A possible exception may be made in connection with the items applying to buildings, but this will be discussed later. Therefore no entry from this account appears in the list of items affected by schedule speed.

With regard to the charges under the general head of equipment, however, it may be said that material changes should take place if the schedule time of the cars is decreased. The charge for superintendence of equipment, perhaps, would not be affected except upon a property of the largest size, but the charge for maintenance of cars should vary exactly in proportion to the running time. The reason is that, as the speed increases, a greater daily or yearly mileage is obtained from each car, and proportionately fewer cars are needed to do a given amount of work. Maintenance of cars will, in the end, vary as the car-years rather than as the car-miles. Indeed, there is ample experience to show that within a reasonable variation in mileage the cost of maintaining a car will average very close to a fixed sum per car per year, so that a car making a large annual mileage will cost less per mile for repairs than one making a small mileage per year. Based upon the census figures, then, the entire charge for maintenance of cars, amounting to 5.1 per cent of the total operating expense, will be affected by a change in speed, and this percentage has been entered in the column of affected accounts shown at the right in Table I.

With regard to the charge for maintenance of the electric equipment on the cars, it should be said that an increase of schedule speed obtained by a reduction in the number of stops involves no increase in the work done by the car motors. Paradoxical as it may seem, a faster schedule will result in a lower power consumption per car-mile, always considering, of course, that the

TABLE I—DISTRIBUTION OF OPERATING EXPENSES FOR AVERAGE RAILWAY SHOWING ACCOUNTS AFFECTED BY INCREASED SPEED

Account	Percentage of Total Operating Expenses	Percentage Affected by Higher Speed
Way and structures	13.9	...
Equipment:		
Superintendence of equipment	0.5	...
Maintenance of cars	5.1	5.1
Maintenance of electrical equipment	3.0	3.0
Miscellaneous	0.9	0.6
Depreciation of equipment	1.1	1.1
Other operations	0.3	0.2
Maintenance of power equipment	1.1	...
Traffic expenses	0.8	...
Power:		
Power plant employees	1.9	...
Substation employees	0.6	...
Fuel for power	6.1	6.1
Other power supplies	0.6	0.4
Power purchased	7.4	7.4
Other operations	1.6	...
Conducting transportation:		
Superintendence of transportation	2.1	...
Conductors, motormen and trainmen	29.5	29.5
Miscellaneous transportation expenses	7.2	...
General and miscellaneous:		
General	5.7	...
Injuries and damages	6.2	...
Insurance	0.9	0.6
Rent of equipment	0.4	0.4
Miscellaneous	3.1	...
Total	100.0	54.4

higher speed comes only by the cutting out of stops. Briefly to cite an example; a car on an 8-m.p.h. schedule with twelve stops per mile, requires about 150 watt-hours per ton-mile. If the same car is operated without any stops, the schedule time will be reduced approximately 40 per cent, and the power consumption will be decreased somewhat more than in direct proportion, or to less than 90 watt-hours per ton-mile.

If, when the schedule time is reduced by a given percentage, the power consumption per car-mile is reduced by a still greater percentage, it follows that the work done by each motor in a given time is actually reduced. The maintenance of the electrical equipment should therefore be somewhat reduced because of the less work done. But in practice maintenance costs vary rather with the number of motors in service than with minor changes in the amount of work. Therefore the total charge under this account will be reduced at least in proportion to the number of motors at work, the cost per motor remaining about the same. This whole account, therefore, may be said to vary in proportion to the running time and is so entered in Table I.

According to the classification adopted by the electric railway census, four items other than those above mentioned appear under the general heading of equipment. These include "Miscellaneous equipment expense;" "Depreciation of equipment," and "Other operations." With regard to the first it may be safely said that two-thirds has to do with the cars that are in service, so that two-thirds of this charge has been transferred to the list of affected accounts. The item covering depreciation of equipment is obviously directly proportional to the number of cars required to do the work, and all of this item has been transferred. With regard to other operations, probably two-thirds are directly affected by the number of cars, and two-thirds of the percentage appearing under this account has been transferred.

The fourth item above referred to covers the maintenance of power-house equipment, and in connection with this it should be said that the census figures apply both to roads which purchase power and to those which produce their own energy, so that a strict adherence to the classification as shown in the census summaries makes the average road assume the rather unusual situation of generating two-thirds of its power and purchasing one-third. There is, however, no insuperable objection to this procedure, provided the method that is followed is understood. Upon this basis the item covering maintenance of power equipment would remain practically unchanged regardless of the reduced amount of power required under the conditions of higher speed. The reason for this is that the repairs for any power station of a given capacity and equipment are substantially constant regardless of the output, and in this case, except upon the largest properties, the change in capacity of the power station would be too slight to make any appreciable difference in the maintenance charges of the machinery.

The next item which appears in the summary of the census figures is that of traffic expenses. Obviously, this would not be affected by any change in operating methods because it depends upon the condition and character of the business done by the railway rather than upon the methods by which that business is handled.

Under the general heading of power, the first subdivision covers charges due to power-plant and substation employees. These charges could hardly be affected, even on roads of a very large size, by the slight reductions in energy consumption that are here considered. Therefore, the percentages expressing these items are not transferred to the list of affected accounts. The item covering fuel for power should vary in direct proportion to the energy consumption and, therefore, this item is transferred. The item covering other power supplies and expenses includes only some charges that would be affected by a change in power station output. These should amount to approximately two-thirds of the whole item and, therefore, two-thirds of the figure representing the item is transferred. The item of power purchased should be directly affected by a change in power station output as previously outlined, and the entire percentage, as shown, is transferred to the affected accounts. Other operations in connection with power can hardly be affected one way or the other, and this item is not transferred.

The item covering superintendence of transportation, under the general heading of conducting transportation, is also not subject to change with an increase in scheduled speed. It is true, of course, that a greater daily mileage from each car would result in correspondingly reduced platform expense, but on the other hand, the number of car operations would remain unchanged, because as many cars would pass a given point during a given time under the higher speed as under the lower one.

In connection with the expense for conductors, motormen and trainmen, amounting to 29.5 per cent of the total operating expense, it is obvious that the increased daily car mileage that comes from an increase in speed will influence this charge in inverse proportion, and the item is transferred complete. The item of miscellaneous transportation expenses, however, should not change with the increased speed.

In general, the items under the heading of general and miscellaneous expenses should change but little under the assumed conditions. General expenses, which include the salaries of the various officials, manifestly would not be affected, because of different methods of operation. Injuries and damages would perhaps be affected to the extent of a slight decrease in interior accidents and boarding and alighting accidents, on account of the reduced number of stops and starts, and exterior accidents might increase because the cars would run past more corners without stopping. However, the two conditions might well balance one another. The item of insurance would change only in proportion to the extent of insurance that was carried upon cars and upon shops and carhouses. Two-thirds of this item has, therefore, been transferred. The items covered by stationery and printing, store and stable expenses, rent of track and terminals and other operations are small and can hardly be affected in any event. Rent of equipment would be directly influenced with the decreased need for cars, and this appears in the list of affected accounts.

With regard to results other than the reduced operating expenses that are to be expected from an increase in speed, it may be said that interest and depreciation upon the cars released is an important item. Because of the normal growth which may properly be expected upon any railway system, the release of a number of cars through more efficient operation would not result in keeping the cars in idleness, but would soon have an effect equivalent to a reduction in the number of cars owned. Each car is worth, roughly speaking, $4,000, and interest and depreciation on it would amount, at 12 per cent, to $480 per year.

In round numbers the gross income of all operating companies for the last census was $586,000,000, and this, divided among the 84,000 revenue cars in service, amounted to $7,000 per car, of which 56.8 per cent, or about $3,960, is operating expense. The above-mentioned interest and depreciation, amounting to $480 per car, is 12.1 per cent of $3,960 and may therefore be represented by a figure of 12.1 per cent of the operating expense. However, an allowance of 1.1 per cent of the total operating expenses has already been considered in connection with the census figures, so that the figure here derived should be reduced to 11 per cent to avoid duplication on this score. In other words, for each $100 of operating expense, there will be an invisible charge for interest and depreciation on the cars owned which amounts to $11. This, as explained above, is affected by the number of cars required to do a given amount of work and should be included with the items affected by faster schedules. In Table I is shown a list of these items totaling 54.4 per cent of the operating expense, and when the 11 per cent for interest and depreciation on cars is added a new total appears equal to 65.4 per cent.

TABLE II—INCREASE IN SERVICE TO BE EXPECTED ON THE AVERAGE RAILWAY FROM A 10-PER CENT REDUCTION IN RUNNING TIME

	Affected Items Expressed in Per Cent of Total Operating Expense	Increase in Service Made Possible by Each 10 Per Cent Decrease in Schedule Time, Per Cent
Direct effect on operating expenses, (Table I)	54.4	5.84
Interest and depreciation on released cars	11.0	1.18
Interest and depreciation on released shop and carhouse space	2.7	0.29
Total	68.1	7.31

In addition, for each car owned there will have to be provided about 800 sq. ft. of carhouse at a cost of $1.25 per square foot, making a total of $1,000, and there must also be provided about 200 sq. ft. of repair shops for each car at a cost which will approximate, including equipment, about $4 per square foot. This will make the total shop and carhouse facilities amount to about $1,800 per car. On large properties the interest and depreciation on these facilities would be affected by a small increase in mileage per car, and assuming interest and depreciation on the buildings and equipment at 6 per cent, the charge involved would approximate $108 per car. As before mentioned, the operating expense on the average road amounts to about $3,960 per car, and on this basis the annual charge for shops and carhouses is equivalent to 2.7 per cent of the operating expenses. However, this possibility would apply only in the case of the very largest systems, and as a means for differentiating the influence of the three general items, operating expenses, released equipment and shop and carhouse space, Table II has been prepared.

This is based upon an assumed decrease of 10 per cent in running time, and the result of the faster schedule is expressed as the increase in service that could be made without increasing the operating expenses existing before the speed was changed. It indicates that, under the most favorable circumstances, an increase in service of more than 7 per cent will accompany a 10 per cent decrease in running time or, in the same proportion, an increase of 11 per cent with a 15 per cent reduction in the schedules.

The Skip Stop in Cleveland

BY PAUL E. WILSON

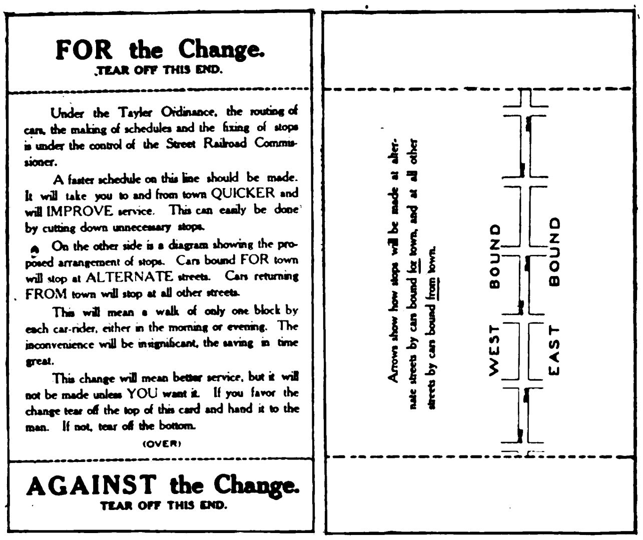
Secretary to the President, The Cleveland Railway

When the skip stop was established in Cleveland in 1912, the problem of introduction was, fortunately for the city, materially simplified. The ordinance under which the Cleveland Railway operates, generally known as the "Tayler Plan," gives the City Council the right to fix stops, and by exercising this right, under the advice of the city street railroad commissioner, the plan of eliminating every other stop on both in-bound and out-bound tracks was adopted.

A poll was taken on every line ("plebiscite" was the term used to describe the poll in which women as well as men were allowed to vote), and a good-sized majority in each case approved the change. The majorities ranged from a proportion of three to one up to eleven to one, the larger majorities coming from the longer lines where the saving of time was greatest. Of course, these plebiscites were not required by law, but they were inaugurated by the city street railroad commissioner to show the City Council the sentiment of the car riders and thus persuade the Council to exercise its power to fix stops at the alternate streets.

In the plebiscites, cards were distributed to all car riders of a given line as they boarded the cars. The cards set forth the fact that the council, through the city street railroad commissioner, had the power to make schedules and to fix stops, and that a faster schedule and better service could be maintained if cars stopped at alternate streets. The ends of the card were perforated for tearing and at one end bore the words, "For the change," and at the other, "Against the change." Car riders were invited to tear off one end or the other and thus vote.

As soon as each line had voted the city street railroad commissioner eliminated substantially every other stop in-bound and out-bound, making stops as far as possible at alternate streets with spaces between them of 700 ft. or 800 ft. However this was exclusive of the downtown district, or that territory within a radius of



FOR the Change.
TEAR OFF THIS END.

Under the Tayler Ordinance, the routing of cars, the making of schedules and the fixing of stops is under the control of the Street Railroad Commissioner.

A faster schedule on this line should be made. It will take you to and from town QUICKER and will IMPROVE service. This can easily be done by cutting down unnecessary stops.

On the other side is a diagram showing the proposed arrangement of stops. Cars bound FOR town will stop at ALTERNATE streets. Cars returning FROM town will stop at all other streets.

This will mean a walk of only one block by each car-rider, either in the morning or evening. The inconvenience will be insignificant, the saving in time great.

This change will mean better service, but it will not be made unless YOU want it. If you favor the change tear off the top of this card and hand it to the man. If not, tear off the bottom.

(OVER)

AGAINST the Change.
TEAR OFF THIS END.

Arrows show how stops will be made at alternate streets by cars bound for town, and at all other streets by cars bound from town.

CLEVELAND SKIP STOPS—FRONT AND REVERSE SIDE OF BALLOT about 1 mile from the Public Square, which is the heart of the city. The reason for non-elimination of stops in this district is, briefly, that this is the district of the short rider. Unless cars stop at every street intersection the intending passenger, in walking to the stop, makes up his mind to continue walking, and he is lost as a rider. This business should not be lost. Again, the destination of substantially all of the riders of any trunk line is within the downtown district, and it would be unfair to ask them to walk too far, assuming that at least half of them have had to walk some considerable distance to board the car. Third, within the downtown district, street car traffic is necessarily slow because of vehicular and pedestrian traffic, and as safety stops must be made at many intersections, the item of time saving is negligible in any event.

After the commissioner had ascertained the wishes of the car riders with respect to stops he submitted the results to the City Council with the recommendation that his arrangement of stops be officially fixed by the Council. This statement carried with it the result of the referendum which had been taken and the effect of the change on the number of stops. As the City Council approved the commissioner's action, the railway changed the usual stop signs to conform with the new plan and issued the necessary bulletin to its trainmen.

The plan has worked well from its inception. The distance between stops which was formerly short, is now in many cases more than 1000 ft. and averages for the system more than 700 ft. Nowhere is it under 500 ft. There have been eliminated 47 per cent of the stops, and the running time per half trip has been reduced on every line. The actual total saving in running time for the entire system attributable to the change cannot be definitely determined, because improvements in power and elimination of grade crossings were made on many lines coincident with the adoption of alternate stops. The city street railroad commissioner has estimated the saving at approximately 10 per cent. Comparisons of schedules before and after elimination of stops show a cut in running time that averages close to this figure, but it is impossible to say what part of the saving was made possible by the alternate stops and what part was due to changes in other operating conditions.

That the alternate stops have effected a saving, however, cannot be denied. Just how great this is depends entirely upon the individual line. To the company there is, besides the saving in platform expenses and in the use of power, the further economy in maintenance of equipment. To the car rider the saving in running time gives a faster service and a more reliable headway. In addition to this, the fact that the number of possible stops has been cut substantially in half makes the service seem even faster than it really is because cars are not continually stopping and starting. That this eliminates the extreme vexations and irritations of ordinary street car travel is indicated by the fact that ordinary routine complaints against trainmen have decreased during the last four years, and if that does not tend to prove that the public is well pleased, the entire absence of complaint against the plan itself on the part of the car riders should make it a certainty. In more than three and one-half years of operation under the new plan our records show less than a dozen complaints from car riders regarding the alternate stop plan.

From an operating standpoint there can be no question as to its benefits. It permits the giving of better, quicker and more reliable transportation without materially increasing the danger of accidents and with a substantial saving in the cost of that transportation. It is impossible to conceive of good service being given anywhere when stops are very close. Not that stops a long distance apart will, in themselves, give good service, but the spacing will give the street railway operator a chance to give better service than he possibly can give where his equipment and his men are at the mercy of too frequent stops. A comparison of service in the congested district and the outlying district of any city establishes that truth. The location of stops at even every third or fourth block instead of at every other block where the distance between streets, as in many cities, is short can work no hardship on the car riding public nor, indeed, real hardship on any one. This is proved conclusively by the Cleveland experience.

The only trouble we met with in eliminating stops was that given by property owners who believed their interests to be affected. As already stated, the car riders themselves registered no kicks and so marked is this absence of complaint that Peter Witt, the city street railroad commissioner, says, "I am positive that were we permitted to restore the old stops on any one line and return to the old running time, uncertainty of headway and general inefficiency, the car riders of that line would descend on the City Council or the street railway officials in a body." It is, therefore, the property owner and not the car rider who objects to the skip-stop plan, and the problem of introducing this plan is how to handle the property owner. Skip stops present no operating problem. On the contrary, they lighten the usual routine troubles of the transportation department. The skip-stop plan introduces no new problem in the treatment of the public served, for the public to which the railway owes a duty and for which it must formulate a policy favors the plan. How to give the riding public what it wants when the giving inures to the advantage of the railway as well as to the public advantage should present no problem. Theoretically, that should be the easiest thing to do. With our own experience in mind it is an easy thing to do, but the failure of the plan in Milwaukee and Detroit shows that it may be very difficult.

Comparisons are odious, and when applied to street railway systems they are quite apt to be valueless as well because of the local conditions which go to explain the whys of the many differences that are found. It has been said that "in Cleveland things are different." Perhaps they are. Many things are different in any city from any other, but the car rider is the same wherever he is found, so is the property owner. Business houses at or near stops which are eliminated are sure to think that the change will hurt their business. The owner of renting property is sure that his tenants will move if the stop nearby is moved, although, parenthetically, neither believes that the street railway company makes business good. This applies throughout the United States. No one should think that the Cleveland business man or property owner differs from his brother in Milwaukee or Detroit. The tobacconist or confectioner where daily papers are sold wishes the town-bound cars to stop at or near his store, and the grocer or butcher wishes the home-bound cars to discharge passengers in front of his place of business just as earnestly in Cleveland as elsewhere. Of course, the effect on any one man's business for any one year is absolutely nil. The passenger who desires a paper will go to the first corner beyond the store or must walk to the second corner. The same thing is true of the out-bound passenger. If he has it in mind to shop after he leaves the car his intention is not changed by the fact that he has to walk one block instead of getting off directly at the store. Show that passenger better service and actual saving in the time he must spend on the car, and any inconvenience to which he is put by a longer walk is forgotten in the advantage which he realizes has been purchased by that inconvenience.

Whenever an injustice is done by the change in stops it is not difficult to ascertain the fact and right it. The schedule of stops on no line in Cleveland is the same now as when originally fixed by the City Council. Some stops have been restored, some changed, some cut out. If it has been found in actual operation that the placing of a stop at a certain street discommodes a larger number of people than placing it at another street, a change is made. Throughout all the fixing of stops and in subsequent changes one thing has been kept in mind—the majority be served. But when protest against the change has been narrowed down to the protest of some one who is not a car rider, the complainants have been told that the stops on this system were not fixed for the convenience of the druggist or the grocer or for any merchant but for the convenience of the majority of the car riders.

Finally, if the Cleveland experience with skip stops tends in any way to solve the problem of skip-stop introduction, it is because the following facts have been demonstrated:

The promise of rapid transportation, contingent upon the adoption of the plan, is fulfilled in better service when the stops are eliminated. The fixing of stops is conditioned solely upon the public served. No individual can capitalize his friendship with the management or his political pull with the public authorities against a majority of the car riding public. In short, the stop elimination can be shown to be actually "for the good of the service."

Skip Stops for Rush-Hour Service

BY ELMER E. STRONG
Superintendent of Transportation, New York State Railways, Rochester Lines

The city of Rochester, N. Y., has but a single main thoroughfare, through which a large proportion of the cars in service on the various lines in the city must pass. Within the last few years the growth of the city, and the consequent increase in the number of cars needed to provide a satisfactory rush-hour service, has resulted in an excessive number of car movements through this street and conditions of extreme congestion have become the rule during the morning and evening rush hours. As a consequence, the New York State Railways, Rochester Lines, which operate the local service, placed in operation twenty-five center-entrance prepayment trail cars, the idea being that the use of trailers was the only practical means for providing increased service without increasing the number of car movements on the main street beyond the physical capacity of the tracks.

Each trail car had a seating capacity of sixty-two, while the average motor car in the regular city service seated forty-four people. Obviously, the two cars with a total of 106 seats running together as a single unit would tend to reduce congestion within the area of heaviest traffic as compared with two separate units each having forty-four seats. This was the primary reason for introducing trailer operation, but it was recognized at the same time that the larger units would move more slowly in the outlying districts of the city and that the trail cars would have to be introduced only with the idea of making such changes in stops and running time as might be found to be necessary in actual practice.

It was more or less manifest that a train which provided seats for more than 100 passengers would have to stop at practically every corner upon the line, while the single cars with their smaller loads would be able at least to pass an occasional street without stopping. In consequence, it seemed likely that the two-car trains would be unable to maintain the schedules that were laid out for the single cars, unless these schedules included a lot of slack—an improper condition which certainly should not be permitted to exert its detrimental influence upon operation. In actual practice it was found on lines where two-car trains and single cars were operated together that the trains consistently lost time with the result that single cars invariably followed the trains at close distances. The resultant irregularity of headway made it necessary that one of two things should be done. Either the running time for trains would have to be increased from 6 per cent to 10 per cent over that allowed for single cars, or else part of the stops made by the trailer trains would have to be eliminated.

Between the two alternatives it seemed that the elimination of stops was infinitely preferable from the standpoint of the company's patrons. The use of the two-car trains was absolutely necessary in order to permit operation of a sufficient number of cars through the main street during the rush hours. But an increase of the running time on the lines to which the trains were assigned would be the equivalent of moving the residences on those lines farther away from the business district of the city, and it seemed logical that a number of the residents would be willing to walk a distance of from 100 ft. to 200 ft. from the stopping point of the cars in order to reach their homes if, by so doing, the rapid service that had been given with the single cars could be retained, and at the same time an increased number of seats were being provided. Consequently, about the middle of November, 1913, the company announced to the public, through the press and through notices placed in the cars, that the skip-stop scheme of operation would be introduced during the rush hours on the several lines that were equipped with trailers. These notices outlined in detail the method that would be followed in the selection of the eliminated stops and stated at what streets cars would stop during the rush hours.

In the selection of the streets at which rush-hour stops were to be made every effort was devoted to placing them as nearly as possible at intervals of 500 ft. At the same time, an attempt was made to serve those streets that had the greatest number of residences contiguous to the street car lines. All of these details were fully explained to the public through the local newspapers, and about ten days after the notices had first been brought out the scheme was put in operation without any confusion and with very considerable popular approval.

At the present time two-car trains are operated regularly only during the morning and evening rush hours. In consequence, there have been practically no changes in stops during other hours. On the lines where the scheme is in operation the stopping points are marked by plain white bands painted upon nearby poles, and at those streets where cars do not stop during the rush hours the following notice is stenciled upon the white bands: "Cars do not stop here between 6 a. m. and 8.30 a. m.; and between 4.30 p. m. and 7 p. m. except on Sundays and holidays."

Very little popular opposition to the plan developed at any time, although when the skip stops were inaugurated a few protests against it were heard from some residents because their particular streets were omitted from the list of stopping points. However, after making a few adjustments subsequent to personal interviews with the complainants, these complaints generally disappeared, and now that the system is permanently established it has been found that the company was obliged only to replace about 10 per cent of the stops that were scheduled for elimination under the original plan. At the present time, it may be said, the skip-stop scheme is giving thorough satisfaction in every respect, both to the company and to its patrons. The elimination of the stops during the rush hours has made possible the operation of single cars and two-car trains on the same line without increasing the running time over that required when only single cars were operated, practically all of the cars making stops at the designated points during the rush hours whether operated as single cars or as trains. It appears, therefore, that the saving in time for the trains approximates 10 per cent.

Skip-Stops and Schedule Speed

BY J. V. SULLIVAN
Statistician Chicago Surface Lines

Dragging schedules benefit no one. On long routes, especially, they result in costly waste of time both to passengers and to the operating company. Steam and elevated railroads, having private right-of-way, usually can maintain headways with great regularity, but the street railway, especially in large cities, is held in check at all times by the frequency of stops and the interference of vehicles on the tracks. The modern remedy offered by students of the problem is the skip stop, supplemented by exclusion of other vehicles from the right-of-way.

That there is a definite relation between number of stops and schedule speed has been proved wherever stop elimination has been tried. Express trains on steam and elevated roads are a daily illustration of this fact, and even the modern skyscraper serves its "long-distance" riders best by providing express elevator service to the upper floors. However, the people in some communities still have to be convinced that this new phase of operation is in their interest. They recently voted it down in Milwaukee, while in the same week the street car patrons of St. Louis voted strongly in favor of its continuance. It is said to be in successful operation in Cleveland, Kansas City, Pittsburgh, Portland, Ore., Seattle and a few other places. Popular votes have frequently favored it, and competent engineers have recommended it in Detroit, Boston, Chicago and elsewhere.

Skip-stop practice is a comparatively recent feature of operation. About fifteen years ago Williston Fish, then connected with the Chicago Union Traction Company, made some preliminary studies to determine the relative importance of car stops and the saving that could be made by elimination of those which were least used. In January, 1910, his views on this method of increasing the efficiency of surface lines in large cities were first made public through an article in the ELECTRIC RAILWAY JOURNAL. This was followed next year by a practical try-out of alternate stops on certain lines of the Metropolitan Street Railway of Kansas City, Mo. The new departure in urban transportation was slow to take hold elsewhere, but through a gradual realization of its possibilities other companies began to experiment with it, and later, several of them put it into effect.

It has been proposed to adopt this plan on two long routes in Chicago, and to determine whether it would be worth while an investigation was made on the Broadway line. Stops were counted and timed, and the number of passengers boarding and alighting was ascertained. Each stop was timed in the interval between the slowing down and starting up of a car during which passengers safely boarded and alighted from it. The average time, counted in this way, was 11.4 seconds per stop. To this should be added several seconds consumed when the speed fell below the normal during the approach to and the departure from the stopping place. In other words, the signal for a stop meant that a car began to slow down, and before it reached its normal speed again, some fourteen or fifteen seconds had been lost.

It was found that duration of stops was affected by condition of street pavement, condition of rails, number of persons boarding or leaving car, number of passengers on car, street lighting, and by the sex and age of the passengers. The early morning traffic could be handled more quickly than the evening crowd, and stops were longest in the period of the day when women and children formed the principal part of the load. For instance, the morning rush-hour checks, when most of the passengers were men who were quick in boarding and alighting, showed an average time per stop of 9.51 seconds. The more leisurely crowd of women and children during the middle of the day required an average of 11.92 seconds per stop. Tabulation for the evening rush hour, when more persons were getting on and off, and when all stepped more carefully because of darkness, showed an average time of 11.77 seconds.

Stops were made at only 50 per cent of the regular stopping places, and yet the fact that a stop signal might be expected at any of the other 50 per cent of crossings held the motorman in check and did not give him the full benefit of time saving.

On the route in question, a distance of 10.7 miles, there were 127 places at which stops are required for safety or on signal. The number of actual stops per trip ranged from thirty-one to eighty. Outside of a congested district in which it was thought desirable to make all stops, it was found that 35 per cent of the stopping places were unimportant if judged by the number of passengers boarding and alighting from cars. It was realized, however, that all of these places could not be cut out because some of them come in groups, and the result of their elimination would be walks of too great a distance for the people wishing to get on or off cars in those districts.

On another route—Clark Street—there are 120 stopping places between Illinois and Howard Streets. In a count of 23,274 passengers boarding and alighting from cars, almost one-half of them, in a five-day check, got on or off at the eighteen transfer points. Of the 102 non-transfer stops, fifty-eight showed a count below the average, this being 57 per cent of the total.

In Chicago maps have been prepared to show the character of the stores or other property at the various corners, and these have been used to fix a tentative list of stopping places. One difficulty in selecting stops has been the fact that some important stopping places came close together while others are spaced as far as ten blocks apart—a good example of the fact that the present arrangement of stopping places in most cities is largely a matter of custom and is a survival of horse car days when running time was slow and distances were not great.

While the Chicago plan is, as yet, only one paper, sufficient results have been observed during the recent tests in Milwaukee and St. Louis to demonstrate the value of stop elimination. In Milwaukee the experiment was made on three routes where the original running times were twenty-nine, thirty and twenty-seven minutes respectively, the savings by cutting out certain unimportant stops were 14 per cent, 17 per cent and 11 per cent. There were formerly 12.7 possible stops to the mile, but the actual average was only 6.4. The company asked for designated stops averaging 9.4 to the mile, making an average additional walk for the small percentage of persons affected of 257 ft.

The test in St. Louis was made on two routes where the running time was forty-three and eighty minutes, respectively, and on these the skip-stop trial resulted in savings of 7 per cent and 7.5 per cent. That this economy was an item not to be overlooked by the public was indicated in the company's estimate that the general use of stop elimination on the system would, at 10 cents an hour, mean about $625,000 a year to the riders.

Local conditions, of course, should determine the advisability or inadvisability of adopting skip-stop operation. It should also fix the method, whether by the "odd-and-even" car number plan of Kansas City, the alternate-stop system of Cleveland, or the express and local car arrangement of Denver. Each of these deviations has its advocates, and the railway manager must consider the effect of the new plan on the stranger as well as on the local patron.

Inauguration of service of this kind should be conducted with care to hold the good-will of patrons. Any change which brings even slight inconvenience to the few will arouse opposition, and these few will not fail to agitate against the proposition while the many who are benefited will more likely be passive. Publicity is the necessary ally in this case. The public should be educated as to the benefits of the new plan, and a proper system of signs should be adopted so as to make clear the stop and non-stop points. It will be found that interested property owners or tenants whose places of business are not at the new stopping places will raise the strongest opposition. Patrons of the lines will be the beneficiaries, and it should be the strongest indorsement of the proposition that working people, who must through necessity live farthest from the city's center, will have a chance to save from five minutes to twelve minutes in getting to or from their work.

1916 Deliveries of Electric Cars and Parts

Manufacturers of Car Equipment Give Information Regarding Deliveries Which Should Impel Railway Managements to Place Orders Promptly

As was outlined in an editorial last week, 1916 deliveries of some parts of car equipment must necessarily be slow. To ascertain the facts as definitely as possible the ELECTRIC RAILWAY JOURNAL asked several manufacturers to state their views. The substance of some of the replies which were received from manufacturers are given below.

Chilled wheel manufacturers have not yet experienced any difficulty in securing the charcoal iron and scrap wheels necessary for the production of these wheels. It is suggested by one manufacturer that the fuel supply will be the first thing to affect the situation. Difficulty is already being experienced in securing prompt deliveries of coke, and prices for this article are advancing rapidly. Undoubtedly the wheel makers will have to take this fact into consideration in making deliveries of chilled wheels later on, even if they are not already handicapped by the condition of affairs as exists at the present time. George W. Lyndon, president Association of Manufacturers of Chilled Car Wheels, states that this industry is a flexible one. In case of renewed activity in car building, however, where new wheels are sold without exchange, an extraordinary demand for new material follows. In ordinary times the exchange wheels provide a certain percentage of the new ones, but when there is no exchange, increased quantities of pig iron are required. Mr. Lyndon believes that many manufacturers have anticipated this condition and feels that there need be no apprehension regarding deliveries of chilled wheels during 1916.

The secretary of an important company which makes steel wheels states that the demand for steel is so great that the company's capacity is taken up for a good portion of the coming year. He believes that deliveries in less than from three to four months will be difficult to arrange, although there may be exceptions where material is in stock. The limit of delivery, this maker thinks, is not set by the shortage in steel, but by the lack of capacity to get the wheels out rapidly enough to supply the demand.

H. P. Bope, first vice-president Carnegie Steel Company, states that in view of the very heavy demand that has occurred in the line of general steel products, deliveries of materials not yet ordered will be slow. So far as solid wheels are concerned it is doubtful if any new business could be taken for execution during the first half of the year. Mr. Bope states, however, that the regular electric railway trade will be cared for, and he assumes that other manufacturers have made similar provision.

W. H. Heulings, Jr., vice-president J. G. Brill Company, calls attention to the fact that the general limiting feature of car delivery will be the maximum date of delivery of any important element. His investigations indicate that there is an extraordinary situation regarding axles. Three weeks ago one of the larger makers of axles withdrew all quotations to his company, another promises delivery in from three to six months, and a fifth one, depending entirely upon billets, as he does not make his own, in from four to six months. One axle maker stated that he could turn out a few axles in from six to eight weeks.

The rolled steel wheel situation, according to Mr. Heulings, is a worse proposition than that of axles, as the steam railroads are having difficulty in getting the wheels which they require. One wheel maker states that his output is sold for the entire coming year. Prevailing promises for delivery of structural shapes are for from five to six months, with difficulty in fulfilling these promises. Bars are especially difficult to get, and spring steel is in the same class. Tubing delivery promises are also quite discouraging.

New Power House in Australia

A recent issue of the *Commonwealth Engineer* describes the progress made in connection with the Victorian Railway's Newport power house, which will supply energy for the Melbourne (Australia) Electric Railways. The 36-acre site of this station is situated near the Yarra River, the ground being covered with a basaltic rock, which has been used for concrete work in the foundations. The main building, measuring 310 ft. long and 415 ft. wide, is built with steel pillars and reinforced plaster walls, while the transformer and switch houses are of brick. Concrete has been applied to the walls by a compressed air apparatus, which projects the mortar into the required position. The first section of the power plant, consisting of six 10,000-kw. Parsons turbo-alternators and exciters, is being erected. Current will be generated at 3300 volts and stepped up to 20,000 volts for distribution to the substations. A wet air-cooling plant is being installed in the power plant and also two 350-kw. auxiliary turbines. Special arrangements to facilitate the testing of any steam electrical set are being provided in addition. Nine miles of cables for auxiliary plants are led through cement conduits in the foundations. An electrically driven 50-ton crane with a 5-ton auxiliary hoist is provided in the engine room. The assembling of the first twelve Babcock boilers and Green economizers has been practically completed.

One-Man Cars Becoming Popular

New Designs Introduced for Use in Tucson—Reports from Eight Other Companies Which Have Been Using One-Man Cars for a Longer or Shorter Length of Time—All Are Favorable Toward This System of Operation

ALTHOUGH the advantages of one-man car operation for lines of light traffic have been the subject of very active discussion during the past year, the idea is not new. The old "bobtail" car of horse car days was a one-man car, and it was not until the general introduction of electric traction that many city lines in this country, where the traffic was light, put a conductor on the car to collect fares. With the one-man horse cars, however, the entrance for the passenger was in the rear, although there may have been exceptions, the rear entrance probably being an inheritance from the omnibus. The passenger was expected to drop his fare in the box on entering the car, and if he did not do so the driver would rap on a window to attract his attention.

The early electric one-man near-side cars were simply standard cars with the rear door closed, but lately inventive genius has been devoted to the design of cars especially for one-man service. Several of these cars have been described in previous issues of this paper. A number of articles on one-man car operation have also been published, the longest probably being that on page 578 of the issue for March 29, 1913. Some interesting statistics of the roads using one-man cars were published in the 1915 report of the committee on passenger traffic of the American Electric Railway Transportation & Traffic Association. Below will be found a symposium of articles from managers who have had experience with one-man car operation.

Louisville, Ky.

By J. T. FUNK, General Superintendent Louisville Railway

Cars were operated by one man in Louisville and in no other way for more than twenty-five years and until the city reached a population of about 200,000. The system was then changed and larger cars were substituted for smaller cars, and then it was that two men were placed upon them. During the time of the operation of the cars by one man the average seating capacity per car was about thirty-two passengers. The entrance was in the center of the rear end and through a door which was opened by passengers and closed by the man who occupied the front platform of the car by a strap, there being no rear platform at that time. The system was very successful and was satisfactory to the traveling public. The passenger, after entering, deposited his fare in a conveyer, which could be reached from any seat in the car, and the fare was carried to a fare box which was placed in the front of the car convenient to the front platform. The motorman or driver, because in the early days horse cars were used, could see the fare plainly with very little inconvenience before he dropped it from the tilting plate into the lower part of the box. Transfers of passengers were made either through a station at certain points or from car to car, so that no transfer slips whatever had to be issued by the motorman. Our records show that during the entire time of the use of these one-man cars a smaller percentage was paid out for accidents and damages than at any other time during the history of the corporation.

The motorman in approaching railroad crossings would stop within a reasonable distance and look both ways for trains, and if there were none close by would cross over. He never left the platform to flag a car across, and during the time I have stated accidents at railroad crossings were almost unknown. The reason of this is there was no divided responsibility, and the man in charge was held strictly responsible. During recent years, since large cars have been substituted for the small ones and two men, a motorman and a conductor, have been on each car, the expense for accidents, claims and damages of various kinds has constantly increased, and one of the reasons, in my judgment, is the dividing of the responsibility between the two men. Since the introduction of the large cars and a change in the transfer system also, passengers are now transferred by slip and at almost every crossing in the city. The issue of these transfers would entail too much work for one man to run a car without assistance, but in any city having cars with a seating capacity no larger than thirty-six and with only a very limited number of transfers to issue, one-man cars can certainly be run successfully.

The type of car which I would recommend would be with a platform and controller on each end. The man in charge of the car, when changing ends, could carry the controller handle and the fare box with him. With only one employee on the car, he should not be required to assist passengers on and off the cars, in fact, even with two men the advisability of assisting people is doubtful, as a great many people seem to be offended when the conductor takes hold of them for that purpose, and the practice is a source of much litigation and many claims.

At present in this city we only have about eleven cars that are run by one man. They are run only between the hours of 1 and 5 A. M. Fare boxes are used on these cars, and during these hours no transfers are issued. This system seems to work satisfactorily both to the company and the traveling public. The schedule speed of the one-man cars is about 9 m.p.h.

Cape Girardeau, Mo.

By A. M. TINSLEY, General Manager Cape Girardeau-Jackson Interurban Railway

All of the cars on this line, four in number, are one-man cars. Two of them are equipped with the door-closing and step operating device of the American Car Company; the other two are simply fitted with fare boxes. They have been in operation for four years. The original franchise of the company called for two men on each car, but the City Council passed an ordinance permitting the company to run with one man, and there was no objection on the part of the public. The scheduled speed is 6 m.p.h. and 102 car-miles are run per day per car. The seating capacity is forty. Two of the cars are equipped with Brill fare boxes and two with Cleveland fare boxes. No fare registers are used. Transfers are issued by the motormen at transfer points only. An interesting feature of this system is that at times of heavy traffic, when the traffic originates at one point, as a ball park, fair grounds, etc., the company stations one man at the place where passengers board the car to help motormen in handling the crowds. At railroad crossings the motorman is required to get off the car and look up and down the tracks before the car passes over the crossing. This is a State law.

Tucson, Ariz.

By W. A. HALLER, Chief Engineer Federal Light & Traction Company, New York

The accompanying halftone engravings show a novel type of one-man car designed by the writer for operation on the Tucson property of the Federal Light & Traction Company and just completed at the Wason Works of The J. G. Brill Company. Although it is not the final word in one-man cars, it represents a sincere attempt to secure a light car of the double-end type suitable for one-man operation. Such a car, the writer believes, has an important future on railways in cities of small size, where the traffic is light.

The following are the main dimensions of the car:

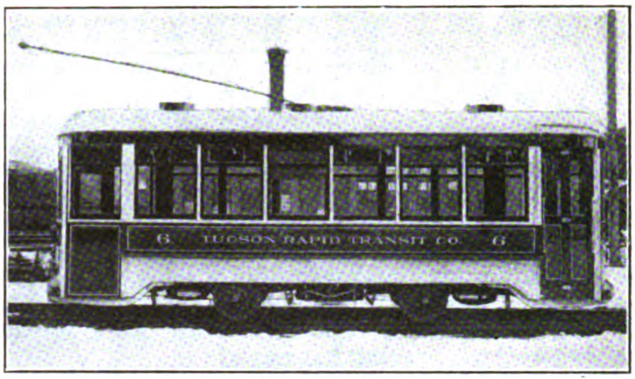
Length over buffers	27 ft. 6 in.
Length over vestibules	26 ft. 6 in.
Length over corner posts	18 ft. 6 in.
Length of each platform	4 ft.
Width over sills, including sheathings	6 ft. 3⅞ in.
Width of aisle	3 ft.
Height from top of rail to underside of side sills	23 3/16 in.
Height from top of rail to center of headlining	7 ft. 8 in.
Height from top of rail to platform	15½ in.
Height from platform to floor of car	9 in.
Rise of ramp from entrance of car to center of car	2 in.

The underframe is of steel, and the outside sheathing below the belt rail is of No. 18 gage aluminum. The floor is 13/16 in. Southern pine in single thickness, and there are no bulkheads. The window sash, which is in two parts, has the upper half stationary, while the lower half drops into concealed pockets in the side of the car. The ceiling and the wainscoting or paneling under the seats are of Agasote, enameled white. The seats are of mahogany slats with Wilton carpet upholstery, the seats being used bare in summer and covered with carpet in the winter.

The equipment on the cars consists of the following: Pantasote curtains, Electric Service Supply Company's 9-in. motorman's gong and push buttons, Golden Glow headlight with 46-watt mazda lamp, Hunter signs, Pyrene extinguishers, Dumpit sand boxes, Knutson trolley retriever, Rico hand straps, Garland ventilators and Commercial Truck Company's America type of truck with 8-ft. wheelbase and 26-in. wheels.

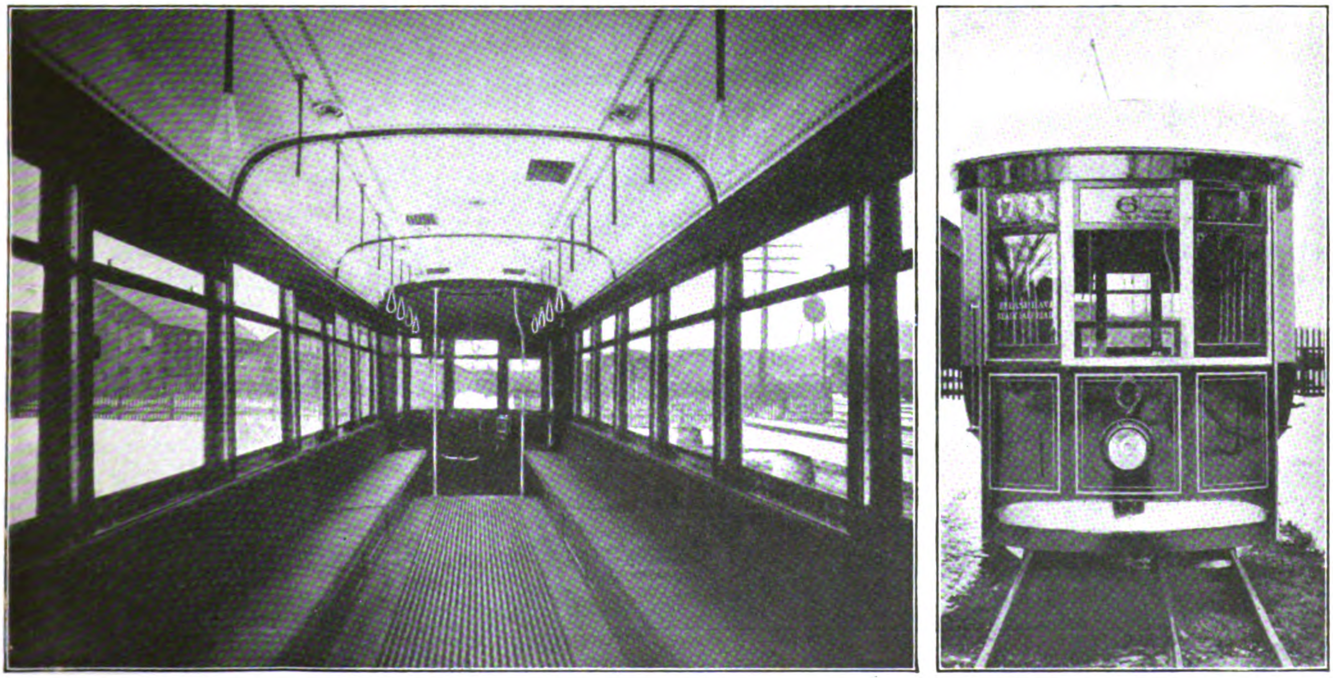
Perhaps the most novel features in the car are the motors and running gear, the control and the brakes.

The motors are the GE-1063 automobile type, wound for 250 volts and designed for individual wheel drive, so that there are four motors to the car. As each motor is of about 7 hp., the power capacity of the car is 28 hp. Each motor drives its wheel through a concentric gear which reduces the speed of the armature in the ratio of 10:1. The gear connection between armature and wheel is the same as that used in the electric drive of the vehicles of the Commercial Truck Company of America. In this design the motor armature pinion engages three spur gears which are carried by studs mounted on a spider integral with the driving shaft. These gears also have pinions which engage a single internal gear which is keyed to the gear case. This system of drive insures an equal distribution of load between the different driving gears as well as a continuous alignment of the gears. The motor itself is bolted to the inner side of the gear case, which, in turn, is bolted to the crossbars of the truck. The motors on opposite wheels are permanently connected two in series for a 550-volt circuit. The wheels are equipped with Timken roller bearings, and the armature journals with ball bearings.

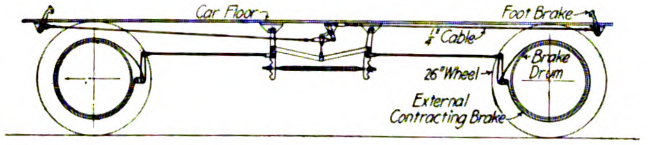


ONE-MAN CARS—SIDE VIEW, TUCSON CAR

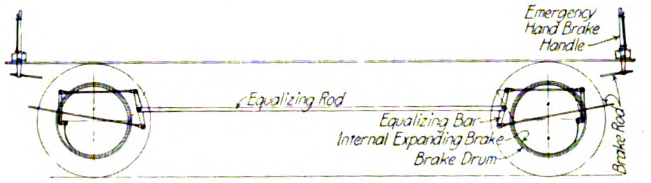
The brake is also of novel type, the design of the writer, and by mechanical means, the braking effected is as graduated and as easy of application for this type of car as with an air brake. There are really two separate and distinct braking systems, one for service stops and one for emergency stops, and each can be applied from either end of the car. A diagram of the system of levers used in each brake accompanies this article.



ONE-MAN CARS—INTERIOR AND END VIEWS, TUCSON CAR

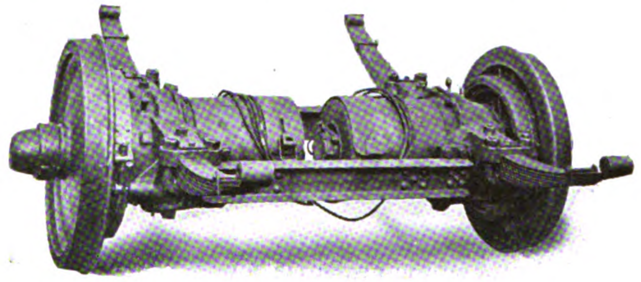

Car Floor
Foot Brake
¾" Cable
Brake Drum
26" Wheel
External Contracting Brake

ONE-MAN CARS—DIAGRAM OF SERVICE BRAKING SYSTEM, TUCSON CAR


Emergency Hand Brake Handle
Equalizing Rod
Equalizing Bar
Internal Expanding Brake
Brake Drum
Brake Rod

ONE-MAN CARS—DIAGRAM OF EMERGENCY BRAKING SYSTEM, TUCSON CAR

Both apply the pressure on an inside flange of the wheel, the service brake system operating a band on the outside of this braking flange and the emergency brake applying an expanding band or friction clutch against the inside of the braking flange.



ONE-MAN CARS—PAIR OF WHEELS WITH MOTORS, TUCSON CAR

The service brake is applied by means of a spring, which, when the car is in operation, is held extended by means of the brake cable, which is connected to a pedal on the platform. The brakes are set, therefore, by releasing the pedal, and the brake pressure is regulated by means of the pedal. The arrangement of levers is such that the brake can be applied from either end of the car. The emergency brake system is independent of the service brake system and is applied by a ratchet hand lever on the platform.

The controller was supplied by the Cutler Hammer Manufacturing Company and is of the drum form with series parallel connections. It is bolted to the underside of the middle of the car and is operated by a lever from either end of the car, and automatically goes to the off position if the operator's hand is removed from the controlling lever. The wheels are 26 in. in diameter with cast steel spider and rolled steel tire. Even the motorman's seat is novel. It is of pressed steel, similar in design to those used on harvesting machines, and weighs only about 1½ lb. It is mounted on an adjustable support and is arranged to fold back when not in use.

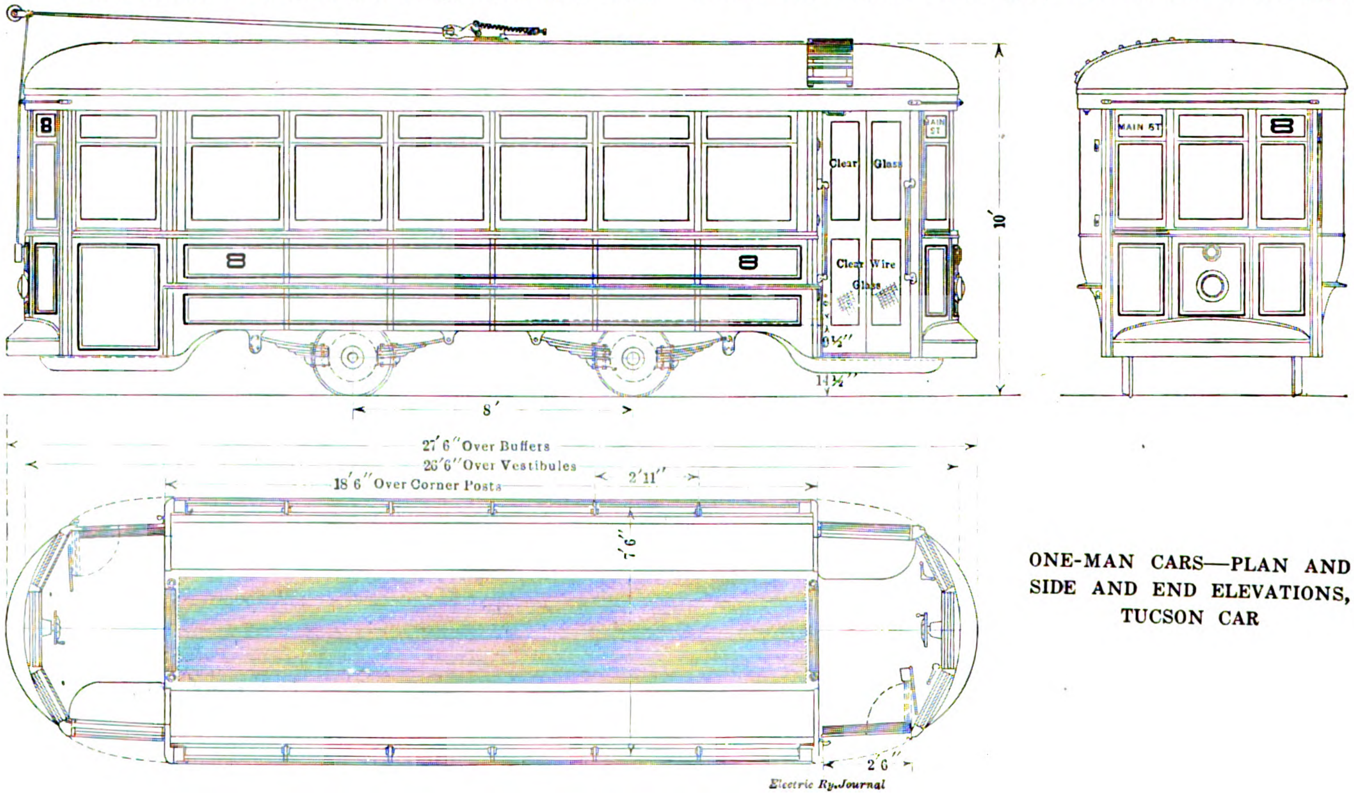
The approximate weight of the car is:

Car body	6000 lb.
Motor equipment and brake	4000 lb.
Rest of equipment, including wiring, circuit breaker, fare box, etc., approximately	1000 lb.

This makes a total of about 11,000 lb., but in a later car, even of this general type, the writer believes that this latter item could be cut approximately in half, or reduced to 500 lb. from 1000 lb.

Tests made with this car last week in Springfield, Mass., showed that it was very easy riding, due, in part, probably to the fact that the springs have lubricated pins. Moreover, in spite of the 8-ft. wheelbase, the car easily ran around a 28-ft. radius curve. This was probably owing to the independent drive of the wheels. The speed made with a normal load on level track was 20 m.p.h., and on an 8 per cent grade, 9 m.p.h. A higher speed, if desired, could be secured, of course, by the use of larger motors, such as would be obtained by the substitution of 10-hp. motors in place of the present 7-hp. motors.

Four of these cars are being built at the Wason Works for Tucson where they will receive a thorough


8
MAIN ST
Clear Glass
Clear Wire Glass
10'
9¼"
11½"
8'
27'6" Over Buffers
26'6" Over Vestibules
18'6" Over Corner Posts
2'11"
7'6"
2'6"
Electric Ry. Journal

ONE-MAN CARS—PLAN AND SIDE AND END ELEVATIONS, TUCSON CAR test so that the practical merits of their new features will be determined.

CENTER ENTRANCE TWO-MAN ONE-MAN CAR

The Federal Light & Traction Company has designed for future use on its other railway properties an improved type of car to be constructed principally of steel and aluminum with wood trim which will be suitable for either one or two man operation, and which it is believed will meet the traffic conditions and prove very economical in relatively large and also in small cities. This car is shown in plan and elevation on this page. This car has doors at the diagonal right hand corners, one of which is intended as both entrance and exit when one man operated, except at terminals or at points where inspectors are stationed, where the side door may be opened by the motorman to permit rapid unloading. Or the car may be operated with two men within congested areas, using the side door for both entrance and exit, or using the front door for entrance and the side door for exit. Under this plan of operation a conductor could be assigned to each car to accompany it through the congested districts and possibly across railroad crossings, if any, and then double back on a car going toward the city and thus effect a saving in platform labor.

In any plan of operation the arrangement of doors will permit rapid loading and unloading at congested points.

Perhaps the most striking feature of this car is that there are no drop platforms and the floor is on a continuous level. This greatly simplifies the system of levers for operating the brakes and controller. The steps are within the car, and of course those not in use are covered by a platform.

The car is double-ended, with controller and brake levers, sand box, etc., at either end, but at the end not in use this apparatus is arranged to be covered by a folding seat. Everything being inside the car, there are no exposed handles or steps on the outside of the car.

The frame of the car is of steel with aluminum panels and wooden doors and trim. By this construction it is hoped that a weight of not more than 7000 lb. can be secured for a car with a 30-ft. body and seating capacity of thirty-five. The same running gear, automatic brake and control are to be used on this car as on the Tucson cars already described.

From the standpoint of economy it is believed that this type of car and its method of operation offers a great opportunity to reduce operating expenses, and its attractiveness should tend to increase patronage also the gross and net earnings.

The following schedule of comparative operating costs is submitted:

TABLE SHOWING PERFORMANCE WITH TWO-MAN AND ONE-MAN CARS

Two Man Operation, with a ratio of 75 per cent single truck and 25 per cent double truck car operation, based on 1,000,000 car miles per annum.

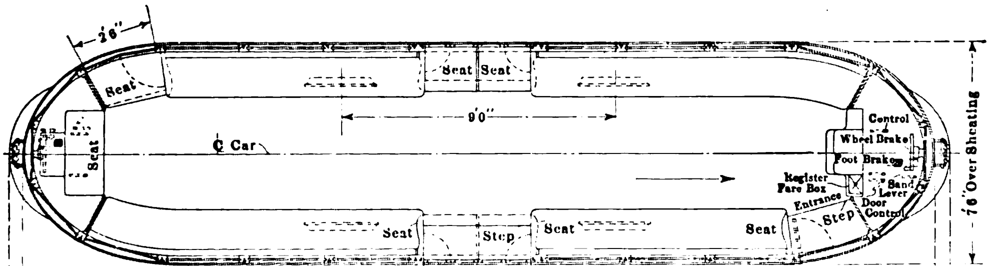
	Way and Structures	Equipment	Power	Traffic Expense	General and Miscellaneous	Total
Per cent of gross	6.0	6.8	10.6	26.0	18.6	68.0%
Cents per car mile	1.32	1.50	2.35	6.20	4.50	15.87c.
Per annum						$158,700

Combined One and Two Man Operation, based on 1,200,000 or 20 per cent increase in car miles per annum.

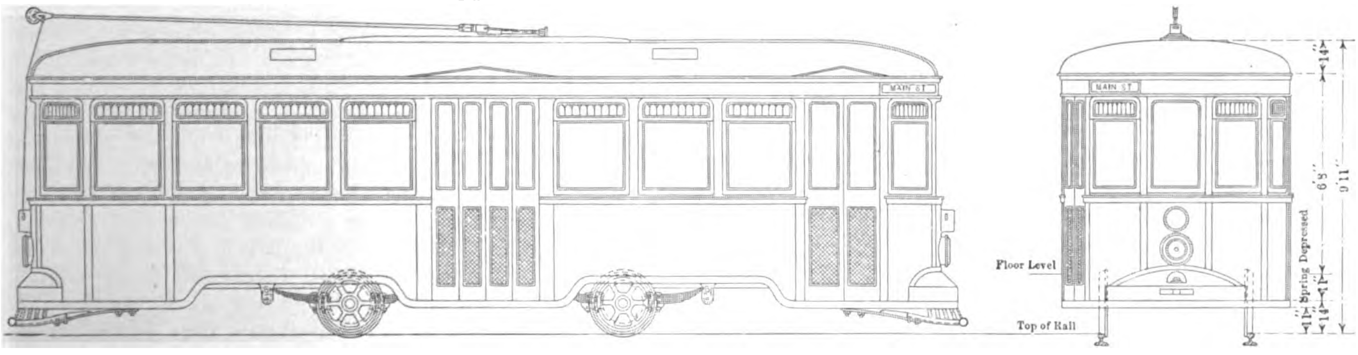
	Way and Structures	Equipment	Power	Traffic Expense	General and Miscellaneous	Total
Per cent of gross	3.76	5.85	4.46	18.45	16.88	49.4%
Cents per car mile	0.73	1.15	0.90	3.58	3.25	9.61c.
Per annum						$115,320
Estimated annual saving in operation						$43,380

Light efficient cars tend to reduce construction and operating costs in many ways, chief of which are the following:

1. Lighter and less expensive track required on account of less weight.
2. Less power station, conversion and transmission capacity required, amounting to from $1,000 to $3,000 per car.
3. Reduction in track maintenance cost, due to lighter weight and less pounding on special work and no slipping on curves.
4. Car maintenance cost reduced, due to smaller and better class of self lubricating apparatus.
5. Power consumption less, only 0.6 to 0.75 kw.-hr. per car mile against 1.25 kw.-hr. up for ordinary car equipment.
6. Platform labor less, due to employment less labor per car mile.
7. General and miscellaneous less, due to lower overhead charges, less insurance, less taxes, less supervision and accounting, and a marked reduction in the injuries and damages account, which expense has been shown



PLAN



SIDE ELEVATION FRONT ELEVATION

ONE-MAN CARS—PLAN AND SIDE AND END ELEVATION OF PROPOSED ONE-MAN, TWO-MAN CAR WITH SIDE DOOR, CONVERTIBLE FOR DOUBLE END OPERATION, FEDERAL LIGHT & TRACTION COMPANY to be less than one-third that of two men operated systems.

8. A car easy of ingress and egress and otherwise attractive, thus encouraging traffic.

Pine Bluff, Ark.

By BYRON C. FOWLES, Treasurer and General Superintendent Pine Bluff Company

The electric railway system at Pine Bluff, Ark., has just put in operation twelve one-man cars. The car-miles run per day per car are 150, the average number of passengers per car-mile is three, and the number of transfer passengers per car-mile is 0.17. The cars have a seating capacity of thirty-two and make a schedule speed of 8½ m.p.h. The Johnson fare box is used, and fares are registered. Railroad crossings are protected by flagmen, so that there is no difficulty at these points, and no trouble has been experienced with disorderly passengers. The company has had these cars in service only since Dec. 12, but knows no reason why they should not be a success.

Oklahoma City, Okla.

By GEORGE W. KNOX, Second Vice-President and General Manager Oklahoma Railway

The Oklahoma Railway uses one-man cars on three small divisions where the traffic is very light, one car on each division. It also operates one-man service on the far end of three of its other city divisions. On each of these lines the car which runs to the end of the line leaves the city terminal with a motorman and a conductor. The conductor stays on the car until he meets the other car at the half-way point on the line. He then changes cars, taking charge of the incoming car at the meeting point. He uses a separate trip sheet for each car. When the motorman is returning from the end of the line he does not collect any fares, but the conductor goes through the car and collects fares when he boards the car at the half-way point. As there are no transfers beyond the point where the conductor leaves the car the motorman is not required to issue any transfers. The cars used in this class of operation are double-truck, with a seating capacity of about forty-eight passengers, and are equipped with folding doors and folding steps. The traffic on these lines while considerably heavier than that on the strictly one-man car line, is such that no difficulty is experienced in maintaining the scheduled speed, which ranges from 6.7 to 9.6 m.p.h.

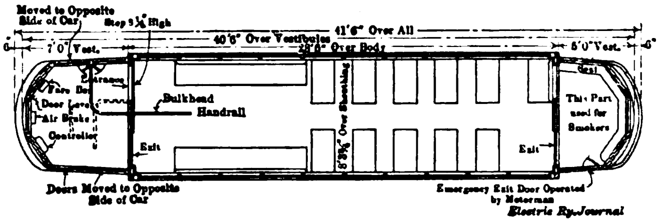
The cars on the one-man divisions were originally built for two-man operation. The only change made to them was the addition of folding doors and folding steps. They have been in operation about three years. The maximum speed is about 20 m.p.h., the scheduled speed is 5.6, 7.6 and 8.8 m.p.h. on the three lines. The average mileage per car per day is 135, and the average earnings 7 cents per car-mile. The seating capacity is twenty-eight. No fare box is used but the fares are recorded on a register. Transfers are issued at transfer points only. On one of the lines two men are used during the morning and evening rush hours, but on the other two lines one man only operates the car during the entire day. The motorman is instructed to announce the streets when the car is crowded or after dark, to help elderly or infirm passengers to board and alight and to extend the same courtesy and assistance as would be expected in two-man operation. The practice at railroad crossings is for the motorman to stop the car at a safe point, not less than 20 ft. from the crossing, take the controller handle with him and go ahead of the car to the middle of the track to ascertain if it is safe to cross. If he finds that this is the case he goes back and starts the car.

I consider one-man operation desirable only on lines having very light traffic, and, in general, the installation is not to be recommended where the success of the enterprise depends upon being able to operate with but one man to the car. However, with a line which was already built but found to be unprofitable with two-man operation, there is no good excuse for hesitating to operate with one man, as the cars may be operated safely and efficiently in that manner.

Lethbridge, Alta.

By ARTHUR REID, Commissioner of Public Utilities

All of the cars on the Lethbridge Municipal Railway, ten in number, are one-man cars. Some are single-truck and some are double-truck cars. They were originally of the pay-as-you-enter type designed for single-end operation, but they were changed for one-man operation by turning the car end for end and making the pay-as-you-enter platform the front end. The changes required are shown in the accompanying diagram, in which the solid lines represent the car as it is now and the dotted lines show the original position of the railings. As the platform which was formerly the rear platform is now the front plantform, the doors on each platform had to be transferred to the opposite side of the car. The door at the other end of the car, the small door, on what is now the rear end of the car, has been retained as an emergency exit door and is operated by the motorman. The cost of making the change was approximately $100 per car. The cars have been operating in this way eighteen months, and have a maximum speed of 25 m.p.h. and a scheduled speed of 12 m.p.h., and the average passengers per car-mile is 3.26.



Electric Ry. Journal

ONE-MAN CARS—PLAN OF LETHBRIDGE CAR

The entrance and exit doors are operated by levers in front of the motorman. At present the steps are rigid, but plans are under way for operating the step in connection with the door mechanism. A Coleman fare box is used on the platform to receive the fares, and transfers are issued at points when the passenger is leaving the car. Passengers do not pay their fare as they enter, but when they leave the car. No trouble has been experienced with disorderly persons or with operating the cars over railroad crossings. There is, however, only one railroad crossing on the system, and that is on a branch track. The motorman is instructed to help elderly and infirm passengers off the car, if necessary, but does not announce the streets.

At first the public was doubtful as to the value of the system, but the attitude is now very favorable. The operation of one-man cars is considered on the whole safer than two-man cars, because passengers when boarding or alighting from the car are always under the eye of the motorman. In fact, the railway has not had an accident to boarding and alighting passengers since the system was put in force. Undoubtedly, the schedule would be somewhat slower than with two-man cars if the traffic were dense, but the system is quite small, having only 11 miles of track and carrying on an average about 2500 passengers per day, with very few transfers. At times, however, the traffic is very much larger than this, and the railway has carried as many as 14,000 passengers a day for three days at fair time without accident and with very good success at maintaining schedule speed. Undoubtedly it is quite necessary to have a push button at every seat so that passengers may signal the motorman. The plan of passengers paying as they leave the car has the advantage of giving the passenger an opportunity to have his fare ready, but the disadvantage is that if a passenger gets off without paying, the fare is lost. Undoubtedly a transfer issuing machine would help the motorman to maintain his schedule, because the greatest amount of time now lost is that taken in issuing transfers.

Buffalo, N. Y.

By E. J. DICKSON, Vice-President International Railway

All of the city service in Lockport, N. Y., of the International Railway is performed by one-man near-side cars, and the saving in platform time is approximately one-half the cost of operation of double-end cars with two men. Eight cars are used, and they have been in operation since Dec. 29, 1912. They were purchased new for the purpose and were illustrated in the ELECTRIC RAILWAY JOURNAL at the time. The maximum speed is approximately 10 m.p.h., and the schedule speed is 7 m.p.h. The car-miles per car per day are 113, and the average number of passengers per car-mile is 3.2. Approximately 22 per cent of the total number of passengers are transfer passengers. The seating capacity of the cars is thirty-six each.

The cars are single ended but have an emergency rear door. The front platform is fitted with a folding door and step, mechanically operated, and a Dayton fare register and box are used. Transfers are issued when the fare is paid. No difficulty is experienced at railroad crossings, as all of the crossings are protected by flagmen. At first the attitude of the public was rather hostile, but now it is extremely favorable to one-man operation. The cars are run on a headway of fifteen minutes.

Atchison, Kan.

By J. W. WAGGONER, General Superintendent Atchison Railway, Light & Power Company

One-man cars have been operated on the railway system of the Atchison Railway, Light & Power Company for the past fifteen or sixteen years. They are the only cars we have and there are eight of them, all of the semi-convertible type and double-ended. In winter the doors on the rear platform are closed, and in summer the gates are closed, leaving only the front platform for entrance and exit. We have not found any other arrangements necessary to fit the cars for one-man operation. The schedule speed is 7 m.p.h. and the average number of car-miles run per day per car is 108. Each car has a seating capacity of twenty-eight, and the St. Louis Car Company's fare box, old style, is used, in connection with a regular fare register. Transfers are punched and issued at transfer points by the motorman. He also announces streets and is instructed to help elderly and infirm passengers off the car. We have a fifteen minute schedule which gives the motorman ample time to render any reasonable service to passengers. The passenger drops his fare, either ticket or cash, in the fare box as he enters the car, or if he has a transfer it is handed to the motorman. We have had no difficulty at railroad crossings, as the flagmen at those crossings flag the cars over. The public seems to be very well satisfied with the service. The only suggestion I have to make to any other company engaged in one-man car operation is that first-class motormen only should be employed. In one-man car service the operator should understand the operation of his car thoroughly

Greenville, Miss.

By R. B. CLAGGETT, General Manager Delta Light & Traction Company

The six cars regularly used on the lines of the Delta Light & Traction Company are all of the one-man type. They are double-ended, are mounted on single trucks, measure inside the body 16 ft. and were changed from double-end to single-end operation simply by the installation of a Tom Johnson fare box in each end of the car. The schedule speed made is about 8 m.p.h., although the cars are capable of running as fast as 14 m.p.h. Each car covers about 144 miles per day and averages 1.37 passengers per car-mile. Fares are rung up on a register, and but few transfers are issued. No trouble has been experienced at railroad crossings, as the motorman is instructed to use extreme care in going over them, and the important crossings have a railroad flagman. One-man operation has been used in Greenville ever since the line was started fifteen years ago.

Waco, Tex.

By R. B. STICHTER, Vice-President Southern Traction Company

At one time there were eighteen one-man cars in daily operation in Waco, this being the total number then in use. However, as traffic became heavier, a demand developed for larger cars and two-men operation in the more congested district. This resulted in some of the lines carrying two men in the business district and out to the last passing switch on the line. From this point out to the end of the line the car was operated by one man. Later practically all of the cars were changed over to two-man operation. It was our experience that one-man operation called for a little slower schedule; but not enough to be considered on lines requiring only three or four cars.

Our one-man cars had a seating capacity of twenty-four, twenty-eight and thirty-two passengers, and temporary seats providing for four additional passengers were placed in the rear vestibule, where smoking was permitted. Most of these cars were of the double-end type and were fitted with door and step control, operated by the motorman. Johnson fare boxes were used; these replacing the old Brill box, for which a double fare register was provided. Conductors were required to call streets and to give transfers when arriving at certain transfer points, no machine being used for the purpose. Passengers were required to pay fare as they entered the car by dropping it in the box.

I do not believe that we had any more trouble with disorderly passengers in the one-man operation than is ordinarily encountered with two-men operation. Our motormen were instructed to be of what assistance they could to old or infirm passengers; however, it is my belief that such passengers were acquainted with the fact that the cars were operated by one man, and generally provided assistance of their own when they used the cars. The motormen were instructed on approaching steam railroad crossings to bring the car to a full stop 50 ft. from the crossing so as to insure proper control of the car, then to approach within 10 ft. of the crossing, bring the car to a stop, look both ways, and if in the clear, to proceed.

The operation of one-man cars cuts the platform expense in half, and my experience leads me heartily to recommend this system of operation in the smaller cities and on pioneer lines in some of the larger ones. It is one of the resources that confront us in combatting the jitney service. With well-trained and experienced men, the one-man operation of cars is far safer and more reliable than the present jitney operation, and in my judgment the general public would so consider it.

Developments of the Future in Electrification

The Electrification of Steam Railroads Is Discussed by Engineers Prominently Identified with this Phase of the Electric Railway Industry from the Standpoint of Commercial Possibilities and of Impending Technical Developments in the Electric Locomotive and in Power Distribution

THE following series of articles deals with future possibilities of heavy electric traction from both the commercial and the technical sides. In regard to the former, the author who discusses it, A. H. Armstrong, writes in a distinctly optimistic vein, and is expectant of a considerable degree of activity in the immediate future in mountain-grade electrification. This field is considered the most promising not only because of the opportunity for attractive returns on the investment involved in electrification, but also because of the fact that here the physical limits of the steam locomotive have already been reached. On the technical side, an article by E. H. McHenry calls attention to the opportunities for improvements in the electric locomotive, this possibility of evolution, in fact, constituting one of the important indications of the extension of electric operation on steam railroads. The most important fundamental feature that is cited wherein the electric locomotive possesses an inherent advantage is that of its ability to handle heavy trains on fast schedules, and the author considers that but a very small part of the penalties now paid to attain express-service speed for freight trains apply to electric operation. On the subject of power distribution for heavy electric traction F. H. Shepard makes the important announcement that the present maximum contact-line voltage of 11,000 is likely to be subject to an increase in the near future, and outlines also some of the possible future considerations that have been brought to the front through experiences with the 5000-volt direct-current installation that was made last summer. In the following series of articles, therefore, each general phase of electrification has been discussed, and from the views expressed by the several authors there is ample evidence that the immediate future is going to see important changes as well as constantly increasing activity.

Some Aspects of Heavy Electric Traction

BY E. H. MCHENRY

McHenry & Murray, Consulting Engineers

It has been stated that when an art reaches a stage of development at which no further progress is possible, it does not remain stationary but disappears and is replaced by some other form or method which possesses greater inherent qualities of continued evolution. If the steam locomotive has now reached this stage, its ultimate replacement by some new form of motive power is certain, and with our present knowledge we must assume that this will be some form of electric traction.

In past years the steam locomotive has several times appeared to have reached the ultimate practical limits of growth in horsepower and tractive effort, but each time some new development in design or method has made further advances possible, and it would be too bold to predict that the limit has even now been reached. Nevertheless, there is good reason to believe that it is close at hand, if not already here, as indicated by the present tentative experiments with electric traction in practical operation and the increasing difficulties and cost of adapting steam traction to the ever-growing requirements. Further development of the steam locomotive is so severely handicapped by the space and weight limitations, which appear to be inherent in any form of prime mover, that it does not seem likely to survive in the end in competition with a simpler and more convenient form of motor, in which energy supplied from an outside source is simply converted into work at the point of application. This is more particularly the case under conditions which permit large reductions of dead weights and the distribution of the present excessive concentrations of weight and pressure over more space and points of support.

In current practice higher steam pressures, compounding and superheating have greatly extended the horsepower capacity of the steam locomotive, but until recent years a corresponding increase in tractive power has only been gained at a cost of very high concentrations of weight and pressure within the restricted limits afforded by the rigid wheelbase. Axle loads of 30,000 lb. in 1880 have risen to 60,000 lb. and 65,000 lb. in 1915, with an extreme maximum of 73,000 lb., making necessary great changes in track standards and corresponding increases in the cost of track and track maintenance.

In the same interval the weight of rail sections have been much increased, but the rails have not kept pace with the increasing axle loads in either strength or quality, with the result that economy has been sacrificed and the margin of safety has almost disappeared.

The development of the Mallet and triplex locomotive types affords a partial relief from the restrictions imposed by the rigid wheelbase by distributing the weight of the locomotive over more driving axles, but the evil effects of the precedents already established still survive and in the later engines of this class the newly-regained margin of safety is again nearly absorbed.

All of the above considerations tend to the conclusion that the possibilities of future growth of electric traction are much less sharply limited than in the existing steam service.

With electric traction the weight and space limitation of the steam locomotive are largely avoided, as it is not necessary to overload the driving axles nor even to assume that all driving axles must be concentrated into locomotive units, as the possibilities of multiple unit control now utilized in passenger service can obviously be also extended to freight service, and it is altogether probable that in future the motive power will be distributed in the length of the train in order to avoid excessive draft strains and concentrated stresses in bridge members.

It may be added that the uniform turning moment of the electric motor permits a higher utilization of the available adhesion, which also tends to a reduction of the present axle loads. The available horsepower capacity will also be very much enlarged, as the source of primary power may be regarded as unlimited so far as the requirements of any one train are concerned, and this will have the practical effect of eliminating many of the present limitations on train load and train speed.

Under favorable conditions, in which density is the chief factor, electric traction is already most economical in operation, but the general substitution of electric for steam traction will not depend so much upon its comparative economy under similar conditions as in its inherent and latent possibilities of future development and in its ability to occupy wider fields of usefulness. This point is strikingly illustrated in the development of electric street railways, in which the comparative cost and economy of electric versus animal traction were at first compared under similar service conditions, but in which the character of the service soon changed so greatly that no one to-day would even think of them as equivalents upon which economic comparisons could be based. Similarly, in the operation of standard railways it is probable that electric motive power will find applications in new fields still undeveloped in which the steam locomotive could not meet the requirements.

It is the writer's opinion that electric traction will find no rival in at least two fundamental features of high commercial importance. In light passenger service, the higher rates of acceleration, reduced weights and lower cost of train wages, fuel and repairs afford opportunities for more frequent train service than would be economically possible with steam traction, collaterally accompanied by higher gross and net earnings.

In freight service, the ability to operate heavy trains on fast schedules has a commercial value which is but little realized and which it would be difficult to overestimate. The higher rolling friction and wear of track and equipment form but a small part of the cost of high speed in freight service, which is principally due to the fact that the steam locomotive can rarely generate sufficient horsepower to utilize its tractive rating at speeds higher than 10 m.p.h. or 15 m.p.h., and only attains higher speeds at a sacrifice of train tonnage. This sacrifice is disproportionate to the gain in speed and may greatly increase the number of trains required to move the same tonnage, and as about one-half of the cost of operation varies directly with train mileage, it is evident that the cost per ton-mile will be much greater. In one case in the writer's experience, 4.6 trains were required to move the same tonnage at 35 m.p.h. as compared with one train at 18 m.p.h., thus more than doubling the ton-mile cost. This is not an unusual condition and it is safe to say that the train load of a great majority of all freight trains in the United States is less than that fixed by the resistance of the maximum grades.

The additional cost of high speed in express service and time-freight service is supposed to be compensated in the freight rates, but there must always be some rate of speed in each particular case above which a rate sufficiently high to compensate for the reduced train loading cannot be obtained, and below which a loss in traffic rates may be suffered. With electric traction but a very small part of this penalty for high speed need be paid, as the armature speed of the electric motor is almost independent of its weight and tractive effort, thus affording an opportunity to maintain full traction ratings at higher speeds than permitted by the limited horsepower capacity of the steam locomotives in common use. This is a fundamental distinction in favor of electric traction, as it is apparently possible to earn the higher rates now paid for fast service without added train mileage, with the result that the net earnings per train-mile will be much increased. In general, the commercial value of speed is less than that of its tractive equivalent, provided that it is sufficiently high to meet the requirements of the time schedules established for each particular class of service, and any available horsepower capacity in excess of such requirements may usually be converted with greatest profit into equivalent tonnage rather than into speed.

The fullest utilization of the inherent advantages of electric traction will not be obtained until the motor capacity can be more flexibly extended over a wider variable range of speed and tractive effort, in which respect the present motors of the series types are quite deficient. Their characteristics are such that the motor horsepower and speed rise and fall almost together, with the unhappy result that the available horsepower becomes less as the need for it grows greater.

In the operation of engine districts of relatively low resistance, with local sections of high resistance, which is the most common condition, the motors will be too heavy and too slow on the level sections; or, alternatively, too light to meet the tractive requirements on the sections with heavy grades. Under these conditions the electric motor is at a disadvantage when compared with the steam locomotive, which can always develop its full "adhesion rating" at lower speeds and constant horsepower without regard to the time or distance over which the maximum effort is exerted. This disability has already been overcome in some measure by special types of induction and series motors, which afford two or even more "steps" in speed at equal horsepower, and there is every reason to believe that a fuller development along the same lines will extend the range of practical application and afford a more nearly continuous gradation between the extremes of speed and tractive effort. The difficulty could also be met with the aid of some practicable form of mechanical gear changer, but the present prospects for such a development do not appear to be very encouraging.

The time factor is such an important element in the tractive rating of electric motors, that measurements of motor capacity in terms of continuous and hourly horsepower become almost valueless for practical use, and some method of service rating which recognizes the relation between horsepower capacity and the coefficient of adhesion of the weight on drivers would be most desirable.

In ordinary switching service, an electric locomotive can effectively utilize its full tractive weight on drivers with but one-fourth of the rated horsepower capacity in motors required to utilize the same tractive weight in service extending over much time and distance, as in the operation of long inclines. A rating of the kind suggested would simply express some time relation between the maximum and average values of the root-mean-square current as determined by the physical characteristics of the particular division or engine district to be operated, and would doubtless take the form of a coefficient to be applied to the continuous horsepower rating of the motor capacity. Means for correcting the lower power factor of systems using induction and single-phase motors, in order to reduce line losses and the first cost of apparatus, would be particularly desirable, and the possibility of accomplishing this result by locally supplying magnetizing current from the locomotive auxiliaries has been under consideration for some time past. A further extension of the same principle would apparently also afford local voltage regulation at the motors, which would be even more desirable and valuable than simple power factor correction.

Reference has already been made to the opportunities afforded by electric traction for reducing axle loads, which is necessary both in the interests of safety and economy. Under the old rule of the Baldwin Locomotive Works, and the more refined rule submitted by Gustav Lindenthal before the New York Railroad Club on May 21, 1915, which takes the modulus of the rail section into account, the safe axle load for rails of 100-lb. section does not exceed 45,000 lb., as compared with the higher loads previously noted. A further and more comprehensive investigation of safe loads for the different rail sections in common use should afford valuable results. Better methods will doubtless be devised for cushioning impacts arising from the heavy motor weights, which is an important feature as the destructive effect of uncushioned impacts on motors, gears, wheels and rails is very large.

That these aspects of electric traction have not been more generally recognized is not surprising, as they occur more particularly in heavy freight service which as yet is but little developed in the field of electric operation.

Opportunities for Electrification

BY A. H. ARMSTRONG
Chairman Electrification Committee General Electric Company

The striking economies resulting from the electrification of the Butte, Anaconda & Pacific Railway, which constituted the first practical demonstration that electric operation of steam railroads could be made to pay direct profits on the investment involved, have had a far-reaching effect. Prior installations had been undertaken only because of considerations which, like those of the smoke nuisance or improved suburban service, were entirely aside from the question of profit, and in consequence electrification was very generally regarded more as a costly luxury than as a means for decreasing operating expense. But now it is being recognized by the various railroads of the country that there are a great many instances wherein the investment involved by electrification will prove to be thoroughly advantageous upon financial grounds alone and will produce an attractive return in the direct form of operating economies. This makes it certain that a material increase in electrified mileage is going to take place in the immediate future.

Some of the increase will undoubtedly come from the electrification of large railroad terminals. The popular demand for smokeless operation is very much in evidence at present, and where the proper conditions exist, such as the opportunity to take advantage of multiple-level stations and increased capacity of individual tracks, the work is going to be carried out. It is probable, however, that in urban districts from which the steam locomotive is banished there will be considerable trackage on which the traffic is too light to warrant the economical installation of an electrical contact system, and for work under such circumstances the use of electric units that are capable of self-propulsion when necessary, seems likely. Obviously, the cost of the equipment of sidings such as house tracks that are used but once or twice a week constitutes a heavy and quite unnecessary burden upon electrification, which is, primarily, a means for delivering large amounts of energy to moving trains.

Because of this, in fact, mountain-grade electrification appears to be a more important field of opportunity at the present time than terminal electrification. Indeed, steam railroad operators are turning at last to electric operation for the very good reason that their growing demands for tonnage and speed have gone beyond the maximum physical capacity of the steam locomotive, and it may be safely said that there is hardly a heavy trunk-line mountain grade in the country where electrification is not being seriously considered. This does not mean that electrification of every grade will be undertaken at once, because there are numerous factors, notably the difficulty of raising funds, that have always to be considered before actual construction can commence. Nevertheless, there are to-day a number of very active grade electrification projects in view, and there seems to be good reason to expect that several will be actually authorized within the coming year.

The reason for classing mountain-grade installations as the most profitable field, and the one in which the greatest activity is imminent is, in general, because of the relatively high speed at which the electric locomotive can exert its full tractive effort and the economies that are consequent thereto. The limitations of the steam locomotive involve a material loss in hauling power when the speed is increased above 8 m.p.h. or 10 m.p.h., and there is, in addition, an indirect loss that is especially important on heavy grades because the great weight of the machine cannot be utilized for adhesion at higher speeds, thus acting as dead weight which must be deducted from the revenue train-load behind the tender. For example, the recently developed "triplex" type of steam locomotive is capable of even greater tractive efforts than the latest designs of electric engines, and it is obvious that speeds of say 15 m.p.h. could be obtained with it on ruling gradients by reducing the tonnage of the trains that it was called upon to handle. However, when this is done the tractive effort becomes only some 10 per cent of the adhesive weight and the result is a most inefficient hauling machine.

To make electricity a commercial competitor of steam it is necessary only for two favorable conditions to apply—(1) sufficient tonnage, and (2) available power facilities. For the latter it may be said that a straightaway feeding distance of 200 miles is reasonable for synchronous machinery and up to that limit hydroelectric or other foreign power may be purchased; otherwise power stations must be built for the individual use of the railway, and this is always a serious handicap.

Regarding tonnage, a very approximate minimum limit may be set on roads with heavy grades, amounting to 15,000 tons daily in one direction. With traffic of this order it will generally pay to electrify, and where there is more than this on single-track roads the proposition should become very attractive. For double-track roads the minimum should not be appreciably different because, whether a line is double or single track, no more copper need be installed, and the power facilities and number of locomotives required are dependent upon the schedules irrespective of whether they are maintained on one track or two. Clearly enough, this minimum makes electrification a practical possibility on every Eastern trunk line that crosses the Alleghenies and on practically every road crossing the Continental Divide in the Western States.

Included in the latter are the Transcontinental systems, and in the case of these roads there are considerations due to location and character of traffic that make electric operation particularly advantageous. In the first place, steam fuel is generally high in price and poor in quality, and at the same time the mountain rivers provide an adequate supply of hydroelectric power at well situated points. The consequent saving, which is the largest single item in the list, should normally run to fully half of the entire cost of steam locomotive fuel. Repairs constitute another very important item, these frequently exceeding 20 cents per mile for a steam engine having only about

60 per cent of the tonnage-moving capacity of the electric machine and making 35,000 miles per annum under the most favorable conditions. Electric locomotives of a size similar to those now in service on the Chicago, Milwaukee & St. Paul Railroad, and having 450,000 lb. on drivers, should cost about 10 cents per locomotive-mile to maintain, making an annual mileage of at least 60,000. The average increase in train speed to be expected under electric operation brings with it reductions in other operating expenses that are obvious, and this constitutes a third item of importance.

These considerations apply with special emphasis, of course, directly to those divisions where heavy grades are encountered, but as a measure of the mileage thus involved may be cited the fact that the mountain country extends for 800 miles on the Chicago, Milwaukee & St. Paul Railway, or nearly twice the length of the very extensive electrification now nearing completion.

Logically, electrification should be made continuous, and all of the sections with heavy grades could profitably be coupled together even though this might involve the electrification of an intervening low-grade engine division, thus eliminating the disadvantage of maintaining a steam engine division that is placed between two electric engine divisions, and here it may be said that, on the Chicago, Milwaukee & St. Paul Railway, it is the intention to combine two steam divisions into one electric engine run totaling 220 miles in length.

The extent of the savings from this source can hardly be estimated at the present time, but that they should be important cannot be doubted. Even in the light of present experience there is no longer any question but that in mountain-grade electrification the whole division that includes the grade should be equipped and the steam locomotives eliminated completely. Combined steam and electric operation does not pay, except under extraordinary circumstances, and such installations are made entirely from motives of expediency rather than because of the direct return upon the investment.

Regarding opportunities for profitable electrification other than mountain-grade installations there should be mentioned the possibilities inherent in low-grade freight lines and in large switching yards. Both of these general fields look exceedingly promising, but the expression of any opinion as to the extent of the available economies or the probability of their exploitation in the near future would be speculative, because of the existing lack of definite data upon which to base conclusions. Electric yard service would have every thing in its favor from an operating standpoint and should show excellent returns, provided that fixed charges are not made prohibitive by having to equip tracks that are used comparatively seldom.

With regard to low-grade freight lines there are equally great benefits to be secured without encountering the disadvantage of infrequently-used tracks, and there ought to be something done in the near future both on Eastern trunk lines and on the level divisions of transcontinental lines after they have had their mountain divisions equipped. However, the physical need for electric operation is not so great on level routes, even though the traffic may be heavy and the load factor high. Notwithstanding the fact that the returns might be quite as attractive as those from a mountain-grade project there is not the same physical incentive to make the change so long as the less economical steam locomotive is able to meet the requirements of the traffic, and this the steam locomotive seems capable of doing in a satisfactory manner for a number of years to come.

Considerations in Railway Power Distribution

BY F. H. SHEPARD
Manager Heavy Traction Division Westinghouse Electric & Manufacturing Company

The well-defined tendency toward constantly increasing train loads in steam-railroad practice, coupled with the demand for higher speed wherever electrification of freight traffic is considered, makes the problem of delivery of energy to the electric locomotive a continually recurring one. Literally enormous demands for power are being made on existing installations of heavy electric traction, and yet there can be no doubt that these will be exceeded in the immediate future. On the electric zone of the Norfolk & Western Railway, for example, drafts of 12,000 kw. for a single train are of common occurrence, and in the passenger service on the Philadelphia main-line electrification of the Pennsylvania Railroad, as many as four heavy motor-car trains in one section may synchronize their power demands during acceleration, calling for a total input of about 16,000 kw.

Although the distribution and collection of such amounts of power are well within the capabilities of equipment designed according to present standards, the margin for a possible future increase in the train load or in the train speed is by no means unlimited, and of late it has become increasingly evident that provision should be considered for further demands if the utmost advantage is to be taken of the benefits of electric operation. The most obvious step in this direction would be an increase in line voltage above the present generally accepted maximum of 11,000, and in fact, there has already been some definite expression of belief by engineers that such a change should be made.

Undoubtedly there is much to be gained by an increase in contact line voltage even under existing conditions. It is true that the difficulty of insulation increases about as the square of the voltage, and with insulators fouled by exhausts of steam locomotives—a condition which occurs on many electrified track sections—this difficulty is of no mean importance. On the other hand, such troubles are generally more impressive in prospect than in practice, as exemplified by the success of the great increase in contact line voltage that was made when 11,000 volts was introduced ten years ago. As a matter of fact, there is no particular reason, aside from the deterrent effect of present custom, why a trial of 16,000 volts should not be made, and if this turns out satisfactorily, it should be followed by another increase to 20,000 volts on the contact line. European practice has already sanctioned 15,000 volts, and now that the need for a higher tension is beginning to appear in this country, it is safe to say that its introduction is going to be a matter of the future.

For railroad transmission lines, however, a similar increase in voltage is not called for. With the exception of the St. Paul installation, electrifications have thus far covered distances that were too short, in view of the power requirements, to warrant transmission at anywhere near the maximum in use for industrial lines. On the Norfolk & Western and the Philadelphia electric zones, a transmission voltage of 44,000 was found to be ample, and no decrease in copper could have been effected by a higher tension without sacrificing mechanical strength, smaller wires than those used being too subject to breakage. Of course, for longer distances a higher voltage would obviously have been necessary, because with traffic of the importance of that which is involved in both cases, it would have been unwise as well as unnecessary to take liberties with voltage regulation, as evidenced by the relatively short intervals of about 10 miles between transformer stations.

Incidentally, it might be well to call attention here to the origin of the rather unfortunate custom of calling these buildings "substations." The latter term conveys at once the impression of skilled attendants and rotating machinery costing some $35 per kilowatt, because of the familiar application of the term in city and interurban railway work. Yet the transformer stations on the electrifications in question are as foreign to such a definition as the pole-transformers on 2300-volt lighting lines which serve a number of adjacent residences with low-voltage current. The power apparatus involved might, if desired, be installed out of doors, and the cost of the equipment, amounting to some $5 per kilowatt, makes it serve directly as a means for reducing the feeder cost. The term "transformer station" is infinitely more applicable to such an installation, because, unlike the "substation" which acts as an auxiliary to the power station for the production of direct current, it is not indispensable to power operations, but serves instead the dual purpose of voltage regulation and prevention of inductive disturbance. The spacing is not dependent upon power losses.

This is not the case with the direct-current substation, where the first cost of the machinery makes a maximum spacing greatly to be desired, and this reason, together with the problem of current collection at the pantograph, provides a definite incentive in railway work to increase direct-current voltages. The step that was made some years ago from 600 volts—so long standard for interurban railways—to 1200 volts, was a marked success. Nevertheless, the imposition of more than about 1500 volts on a single armature involves material difficulties, notably that of commutation.

The practical limit in voltage for motor armatures is analogous in some respects to that which was found in generator design when the first attempts were made to increase alternator voltages. This early difficulty was overcome by the ingenious conception of the stationary armature with a rotating field, and that permitted the extension of generator voltage to the desired point. Yet the original voltage limits for a rotating armature have remained unchanged to this day.

Forward steps in direct-current railway voltage, therefore, have been made by combinations of 1200-volt armatures, and the advance reached a record height last summer with the successful operation of the 5000-volt Grass-Lake line of the Michigan United Traction. This installation has been working regularly since that time, and it has shown very gratifying results. But, of course, it is still no more than an experiment, and its commercial success is subject to a great many factors which are as yet wholly unknown.

In this connection it may be said that the problem of earth current voltages is one of major if not of vital importance irrespective of inductive interferences, and although harmonious co-operation between railroad engineers and the engineers of telephone and telegraph companies has been a conspicuous feature of recent electrifications, definite knowledge regarding all phases of action of extreme high-tension direct-current circuits can come only through practical experience.

Certainly, if direct-current voltages are increased greatly and substations are moved far apart, there is a probability of very great differences in earth potential wherever heavy drafts of current are taken from the line. How these will appear, and what their effect will be can only be determined by the slow process of experiment. In the same way the matter of surges is bound to be important with great increases in voltage. Also, voltage fluctuations in railway circuits, as well as the shorts that are bound frequently to come in, are wholly different from any conditions that are found in ordinary transmission problems, and it cannot be said in advance just what is going to develop. In fact, direct-current installations of extreme high voltage like that at Grass Lake are in just the same place as were the single-phase installations ten years ago. Their problems are before them, and these will have to be worked out by experience before they can reach the condition of a definite and precise art in which single-phase operation is to-day.

Rhode Island Arbitration Award

Increases Granted to Second-Year, Third-Year and Older Blue-Uniformed Employees, but None for Shop, Power-House and Other Employees

INCREASES of wages for blue-uniformed employees in the second, third and subsequent years of their service were granted in a decision handed down on Dec. 23 by the arbitration board sitting in the case of the Rhode Island Company, Providence, R. I. No increases, however, were authorized for employees of less than a year's standing in the car service, for the board regarded these men as apprentices. Beginning on Jan. 1, 1916, the hourly wage of blue-uniformed men in their second year's service becomes 26.5 cents, as compared to 26 cents before the arbitration took effect. The wage of third-year men becomes 28.5 cents, as compared to the former rate of 27 cents, and the wage of men in their fourth and subsequent years becomes 30 cents, as compared to 28.5 cents. Blue-uniformed men in their first six months continue to receive 23 cents per hour, and in their second half-year, 24.5 cents per hour.

No change is made in the wages of shop, power-house and other employees. Under the award, however, extra platform men are guaranteed a wage of six hours per day, the work to be performed within fourteen hours. Allowances are made of 25 per cent extra for the first hour or fraction thereof over fourteen hours and of 35 per cent extra for the second hour or fraction thereof and after, over fourteen hours. All soliciting of runs from other employees is abolished by the finding.

By agreement between the company and the union, the award is retroactive to June 1, 1915, and terminates June 1, 1917. In awarding back pay on the former basis, however, the board sets the compensation of third-year men at 27.5 cents per hour and of fourth-year and later men at 29.5 cents per hour, these two intermediate rates terminating on Jan. 1 in favor of the rates first quoted.

COMPARISON WITH OTHER RAILWAYS

In rendering its decision the board stated that a living wage must be considered in connection with the particular employment concerned and that the test of a fair and reasonable wage was a comparison with the wages received by blue-uniformed employees of other street-car companies. It felt that the wages of carpenters, masons, blacksmiths and painters and the like are not helpful in arriving at the proper wage to be paid motormen and conductors and should not be used in determining such wages. The board held, too, that the financial condition of the company should be taken into account in fixing wages, and it was considered evident that the railway is in poor financial condition. The board's outline of the company's history showed that there is a net of $2,000,000 in stock on which no dividends are being earned and $3,500,000 in notes on which no interest is being paid. In 1915 there was no net income available for dividends but instead a deficit of $115,428, in part attributable to jitney competition in Providence and Pawtucket. The board, however, cited the Boston Elevated Railway and Bay State Street Railway arbitration findings as evidencing that financial condition should not be a bar to providing a fair and reasonable wage for the services performed.

The board felt that a fair and reasonable wage for a motorman and conductor working for the Rhode Island Company could best be determined by a comparison with neighboring companies of like character. The union contended that the wages of blue-uniformed men should be increased to a minimum of 30 cents per hour and to a maximum of 35 cents. The evidence contained an exhibit of comparative wages in thirty-two neighboring companies, twelve of which paid a higher rate than the Rhode Island Company. The lowest maximum wage paid by any of these roads was 30 cents per hour, while the maximum of the Rhode Island Company was 28.5 cents. Most of these roads did not reach their maximum until the sixth year, while the Rhode Island Company reached its maximum at the fourth year. The board decided that a fair and reasonable wage should not fall short of the lowest maximum of the twelve companies in Massachusetts paying a higher rate than the Rhode Island Company. It realized that the stockholders and the public both have certain rights and that the city of Providence has a keen interest in the situation, but none of these considerations ought to militate against the motormen and conductors being paid a fair and reasonable compensation.

MISCELLANEOUS EMPLOYEES

While a comparison of the shop, power-house and other employees with outside trades ordinarily would be more helpful than in the case of the blue-uniformed men, from the evidence before it, the board found that it could not intelligently make such a comparison. There are 105 classifications in the company shops and miscellaneous departments. Of the thirty-seven classifications recognized by the Bay State Street Railway, twenty-two bear the same name as those of the Rhode Island Company. Thirty-one of the fifty-eight Boston Elevated Railway classifications are the same as at Providence, and on the Middlesex & Boston Street Railway five classifications are the same. While the board was of the opinion that the wages for these miscellaneous employees should not be reduced, it did not find from the evidence that they are not receiving a fair and reasonable wage and therefore made no change in their compensation.

The company at present pays no guaranteed wage. As a result, a practice has arisen which prevails in few if any other companies, *viz.*, of soliciting work from the regular men. This practice is not favored by the company because it allows favoritism among the men. A popular man may thus obtain much more work than one who is less popular, although his senior in service. From the union point of view also it is undesirable because a spare man often boards a car and argues with the regular man to induce him to lay off a few hours so that the spare man may get a job. The board was of the opinion, therefore, that the need of a minimum wage had been clearly shown.

FUTURE NEEDS OF COMPANY

In conclusion the board pointed out that the company's condition is critical. If it is to emerge successfully from its present position, it will require the active and earnest co-operation of the men and the active and earnest support of the public. The men, the board said, can be of great assistance in co-operating with the company at this difficult point in its career, and the public also can do its share. From 1912 to 1915 the receipts from transportation did not show the gain that was to be expected from the growth of the territory served and the extensions made. While the normal increase in transportation receipts should be about 6 per cent yearly, in 1913 the gain was less than 5.5 per cent, and in 1914 1.5 per cent, while in 1915 there was a loss. The board stated that the transfer system is to-day showing a continual increase in the percentage of transfer over revenue passengers and a consequent decrease in the number of revenue passengers, but as to whether the transfer privilege is being misused, it of course could not say.

After the publication of the award, the trustees of the company issued a statement commending the faithful and intelligent work of the arbitrators but expressing regret that they did not find it possible to give greater weight to the financial condition of the company. The trustees said that the company would do its best to carry the additional burdens placed upon it, in the bearing of which it hoped to have the co-operation of the city of Providence. The officers of the union issued a statement to the effect that the award gives to some of the blue-uniformed employees about $128,867 for the two years of its duration. About 800 men, or one-third of the union employees, are in the miscellaneous class, according to this statement and are not advanced in pay by the award.

Trade Directory of Central America and the West Indies

A complete revision and detailed classification of the names of importers and merchants in Central America and the West Indies, made by the American consular officers in co-operation with the bureau of foreign and domestic commerce, has been published as a section of a new edition of the World Trade Directory. The lists have been brought up to date and are presented in uniform style, with a finding index.

A new feature is the listing, so far as the information could be obtained, of (1) the American and other foreign agents of Central American and West Indian importing firms, and (2) of the names of the parent firms of branch houses located in various Central American and West Indian cities.

The directory does not aim to include the names of the exporters, nor are the names of manufacturers given, except those who are, or seem likely to become, purchasers of American materials or merchandise. The publication is a directory of Central American and West Indian buyers for use by exporters and manufacturers in the United States.

The directory is in octavo form, bound in buckram, and is sold at 60 cents per copy, to cover partially the cost of printing. Those who desire copies of the directory should communicate with Superintendent of Documents, Government Printing Office, Washington, D. C.

The Springfield (Mo.) Traction Company recently assisted in the moving of a cottage. The company supplied a work car which pulled the house along the tracks for three blocks. An employee of the company rode on the roof of the house cutting wires when necessary and repairing them immediately after the obstruction had passed the cut section.

New Electric Railway Track Built in 1915

Reports Received From Different Railway Companies Show a New Electric Mileage of 1044.22 Constructed During the Past Year—Falling Off in New Track Built, but Marked Increase in New Electrified Mileage

THE single-track mileage of new track built or electrified and placed in operation during 1915 by city systems, interurban lines and electrified steam lines is tabulated in the accompanying lists. The statistics are compiled from reports received from the railway companies themselves and the record is complete, except in the case of a few of the small lines whose replies were not received in time for inclusion in the list.

The following summary, compiled from the past annual statistics of the ELECTRIC RAILWAY JOURNAL, shows the single-track mileage of new track built, steam line electrified, and total new electric mileage placed in operation since 1907 in the United States and Canada:

	New Electric Railway Track Built	Electrified Steam Line	Total New Electric Mileage
1907	......	....	1,880.0
1908	1,174.5	84.0	1,258.5
1909	774.7	112.4	887.1
1910	1,204.8	192.4	1,397.2
1911	1,105.0	86.5	1,191.5
1912	869.4	80.8	950.2
1913	974.9	119.0	1,093.9
1914	716.5	229.9	946.4
1915	596.0	448.2	1,044.2

The total mileage of new track, 596 miles, shows a decrease of 17 per cent from that recorded last year. This decrease, however, is offset by the high record electrified mileage during 1915 of 448.2 miles, which makes the total new electric mileage placed in operation 1044.2 miles, or a 9 per cent increase over the similar figure for last year.

Montana heads the list of States with 162.34 miles reported, 160.65 miles of which is included by the Chicago, Milwaukee & St. Paul Railway's recently opened main line electrification between Three Forks and Deer Lodge, Mont. Pennsylvania ranks second with 119.88 miles of track, 93.60 miles of which was contributed by the Philadelphia-Paoli electrification of the Pennsylvania Railroad. Michigan is third with 115.25 miles, which consists mostly of 58.33 miles of the Michigan Railway's new interurban line between Cooper, Plainwell, Martin, Shelbyville, Bradley, Wayland, Moline, Corinth and Fisher, and 40.65 miles of electrification of the Michigan Central Railroad's former steam line between Battle Creek and Allegan, making a total of 98.98 miles for this company. The second greatest new mileage placed in operation by any interurban railway was 80 miles constructed in Utah by the Ogden, Logan & Idaho Railway. This mileage included 74 miles between Brigham City, Honeyville, Deweyville, Collinston, Summit, Mendon, Wellsville, Hyrum, Logan, Smithfield, Richmond, Lewiston and Preston, Idaho, and 6 miles between Idlewild and Huntsville.

The total mileage of electrified steam lines is recorded at 448.2, as compared with 229.9 last year, or an increase of 95 per cent over 1914. Owing to the unusual number of companies which electrified track this year, a special list of these companies is given below. These railways are also included in the comprehensive table of companies below this text matter.

Electrified Line	Miles
Chicago, Milwaukee & St. Paul Ry.—Between Three Forks and Deer Lodge, Mont	160.65
Norfolk & Western Ry.—Between Bluefield and Vivian	94.82
Pennsylvania Railroad—Between Philadelphia and Paoli	93.60
Michigan Ry.—Electrification of Michigan Central R. R. between Battle Creek and Allegan	40.65
New York, New Haven & Hartford R. R.—Yards and sidings	28.00
London & Port Stanley Ry.—Between Westminster, Glanworth, Yarmouth, St. Thomas and Port Stanley	24.00
Southern Oregon Trac. Co.—Electrification of Rogue River Valley Ry. between Jacksonville and Medford	6.50
Total	448.22

The electric railways of Canada placed in service 54.73 miles of new track as compared with 59.67 miles in 1915, or a decrease of 8 per cent.

ARIZONA

	Miles.
Birmingham Ry., Light & Power Co	1.10
	1.10

ALABAMA

Phoenix Railway Co. of Arizona	4.00
Tucson Rapid Transit Co	1.50
	5.50

ARKANSAS

Pine Bluff Co	.50
	.50

CALIFORNIA

Fresno Interurban R. R.—Fresno and suburban	4.50
Pacific Electric Ry.—Riverside-Corona extension	11.04
Peninsular Ry.	.23
Riverside, Rialto & Pacific R. R.	.41
San Francisco Municipal Ry	4.16
San Jose Railroads	.10
Visalia Electric R. R.	2.20
	22.64

COLORADO

Denver Tramway	.14
	.14

CONNECTICUT

New York, New Haven & Hartford R. R.	28.00
Connecticut Co.	2.88
	30.88

DELAWARE

Wilmington & Philadelphia Traction Co	.25
	.25

DISTRICT OF COLUMBIA

Washington Railway & Electric Co	2.18
	2.18

FLORIDA

	Miles.
Central of Florida Ry.	1.00
Jacksonville Traction Co.	1.83
Miami Traction Co	3.50
Pensacola Elec. Co	.24
Tampa Electric Co	.47
	7.04

GEORGIA

Savannah Electric Co	.12
Georgia Ry. & Power Co	1.00
	1.12

ILLINOIS

Centralia Traction Co.—Between Centralia and Wamac	.02
Chicago & Interurban Traction Co.—Harvey	.91
Chicago Surface Lines	18.00
City Ry.—Mt. Vernon	1.00
Evanston Rys.	.15
Metropolitan-West Side Elevated Ry	1.50
Peoria Ry.	.85
Public Utilities Co.—Evansville	2.12
Rockford City Traction Co	1.00
Sterling, Dixon & Eastern Elec. Ry.—From Dixon to new State Colony Grounds	2.00
Tri-City Ry.	1.43
	28.98

INDIANA

Gary, Hobart & Eastern Traction Co	.50
Indianapolis Trac. & Term. Co	1.60
	2.10

IOWA

Charles City-Western Ry.—Between Niles and Colwell	8.00
Iowa City Electric Ry	1.00
Sioux City Service Co	.50
Waterloo, Cedar Falls & Northern Ry	2.00
	11.50

KANSAS

	Miles
Arkansas Valley Interurban Ry.—Between Burrton and Hutchinson	24.00
Hutchinson Int. Ry.	.80
Kansas City, Kaw Valley & Western Ry.—Between Bonner Springs, Linwood and Lawrence	24.00
Salina Street Ry.	1.00
Topeka Ry.	.50
	50.30

KENTUCKY

Louisville Ry.	3.02
	3.02

LOUISIANA

Orleans-Kenner Elec. Ry.—Between Southport, Shrewsbury and Harrahan City	11.50
	11.50

MAINE

Bangor Ry. & Elec. Co.	.05
	.05

MASSACHUSETTS

Bay State Street Ry.—Tewksbury	.15
Boston Elevated Ry.	.37
Springfield Street Ry.—Between Springfield and Westfield	.57
	1.09

MICHIGAN

Detroit United Ry.—Between Almont and Imlay City, 8.12 miles; Detroit, 4.05 miles; Flint, 3.31 miles	15.48
Grand Rapids Ry.	.39
Michigan Ry.—New electric line between Cooper, Plainwell, Martin, Shelbyville, Bradley, Wayland, Moline, Corinth and Fisher, 58.33 miles; electrification of Michigan Central R. R. between Battle Creek and Allegan, 40.65 miles	98.98
Michigan United Traction Co.	.40
	115.25

MINNESOTA

Duluth Street Ry.	1.90
Electric Short Line Ry.—Between Moline, Lyndale, Watertown and Winsted	22.00
Minneapolis, St. Paul, Rochester & Dubuque Elec. Traction Co.—Main line cut-off into city of Minneapolis	17.86
Wisconsin Ry., Light & Power Co.—Lacrosse, Wis.	2.00
	43.76

MISSISSIPPI

Hattiesburg Traction Co.	.34
	.34

MISSOURI

Metropolitan Street Ry.—Kansas City	9.92
Mexico Investment & Construction Co.—Between Molino and Santa Fe	7.00
	16.92

MONTANA

Anaconda Copper Mining Co.	1.39
Chicago, Milwaukee & St. Paul Ry.—Between Three Forks and Deer Lodge: 110 miles of main track; 50.65 miles of side tracks and yards	160.65
Missoula Street Ry.	.30
	162.34

NEBRASKA

Lincoln Traction Co.	2.00
	2.00

NEW JERSEY

Bucks County Interurban Ry.	.27
Public Service Ry.—Parkhurst St., Clinton Ave. to Broad St., Newark, .23 miles; Carteret extension, private right-of-way near Walnut St. to Carteret Ave and Woodbridge Ave., Roosevelt Borough, 1.47 miles	1.70
	1.97

NEW YORK

Black River Traction Co.—Watertown	.95
Brooklyn Rapid Transit System—3.88 miles of elevated third tracking; 9.47 miles of elevated extensions	13.35
Central New York Southern R. R.	.86
Hudson Valley Ry.—Saratoga Springs, .12 miles; Glens Falls, 1.36 miles	1.48
Interborough Rapid Transit Co.—Queensboro Subway	2.58
International Ry.	1.00
Ithaca Traction Corp.	.63
Manhattan & Queens Traction Co.	.50
New York State Railways	.56
Schenectady Ry.—Nott St. and Grand Blvd. extension	1.52
United Traction Co. of Albany	1.42
	24.85

NORTH CAROLINA

Atlanta & Carolina R. R.	11.00
Durham Traction Co.	2.10
Goldsboro Elec. Ry.	1.00
	14.10

OHIO

Cleveland, Alliance & Mahoning Valley R. R.—Between Newton Falls and Leavittsburg	6.00
Cleveland Ry.	15.00
Hocking-Sunday Creek Traction Co.—Between Chauncey and Athens	6.50
Northern Ohio Traction & Light Co.—City extensions	3.50
Portsmouth Street R. R. & Light Co.—Portsmouth	2.20
Springfield Ry.	2.50
Toledo, Bowling Green & Southern Traction Co.—Findlay	2.00
	37.70

OKLAHOMA

	Miles
Bartlesville Interurban Ry.	2.00
Cushing Traction Co.—Between Cushing and Drumright	17.00
	19.00

OREGON

Pacific Power & Light Co.	1.00
Southern Oregon Traction Co.—Electrification of Rogue River Valley Ry. between Jacksonville and Medford	6.50
Willamette Valley Southern Ry.—Between Oregon City and Mount Angel	32.00
	39.50

PENNSYLVANIA

Hershey Transit Co.—Between Hershey and Elizabethtown	10.00
Lehigh Traction Co.—Relocation of track approaching Finland	.50
Mahoning & Shenango Ry. & Light Co.—New Castle, 3147 ft.; Leavittsburg, 600 ft.	.79
Lewisburg, Milton & Watsontown Passenger Ry.	.19
Pennsylvania R. R.—Electrification of Philadelphia-Paoli Division	93.60
Philadelphia Rapid Transit Co.	.30
Scranton & Binghamton R. R.—Extension to Brooklyn	10.00
South Fork-Portage Ry.—Between Wilmore, Summer Hill and Portage	4.00
Warren Street Ry.	.50
	119.88

RHODE ISLAND

Newport & Providence Ry.—Extension with steel bridge to grounds of U. S. N. Training Station, Newport	.18
Rhode Island Co.	.80
	.98

SOUTH CAROLINA

Columbia Ry., Gas & Elec. Co.	1.00
	1.00

TEXAS

Corpus Christi Ry. & Light Co.—City extension	2.00
Northern Texas Traction Co.—1.23 miles of city track; 1.68 miles of second track added along Dallas-Fort Worth interurban line	2.91
San Antonio Trac. Co.	.59
	5.50

UTAH

Ogden, Logan & Idaho Ry.—74 miles between Brigham City, Honeyville, Deweyville, Collinston, Summit, Mendon, Wellsville, Hyrum, Logan, Smithfield, Richmond, Lewiston and Preston, Idaho; 6 miles between Idlewild and Huntsville	80.00
Salt Lake & Utah R. R.—Between Springville and Spanish Fork	10.60
	90.60

VIRGINIA

Newport News & Hampton Ry., Gas and Elec. Co.	1.20
Lynchburg Traction & Light Co.	.67
Roanoke Ry. & Elec. Co.	.50
	2.37

WASHINGTON

Lewiston & Clarkson Transit Co.—Between Lewiston, Idaho & Clarkson, Wash.	2.15
Puget Sound Traction, Light & Power Co. (Seattle Division)	.28
Yakima Valley Transportation Co.	1.00
	3.43

WEST VIRGINIA

Monongahela Valley Traction Co.—Branch at Rivesville to coal mines	1.50
Morgantown & Wheeling Ry.—Between Cassville and Price	8.00
Norfolk & Western Ry.—Electrification of Bluefield-Vivian section	94.82
	104.32

WISCONSIN

Milwaukee Elec. Ry. & Light Co. and Milwaukee Light, Heat & Traction Co.—Milwaukee, 1.03 miles; Racine, .83 miles	1.86
Sheboygan Ry. & Elec. Co.	1.00
Chicago, Harvard & Geneva Lake Ry.	.42
	3.28

WYOMING

Sheridan Ry.	.59
	.59

CANADA

Brandon Municipal Ry.	1.27
Brantford Municipal Ry.	1.25
Cape Breton Elec. Co.	.01
Chatham, Wallaceburg & Lake Erie Ry.	.09
London & Port Stanley Ry.—Electrification between Westminster, Glanworth, Yarmouth, St. Thomas and Port Stanley	24.00
Montreal & Southern Counties Ry.—Between St. Cesaire and Granby, Quebec	15.00
Montreal Tramways	6.60
Peterborough Radial Ry.	.04
Port Arthur Civic Ry.	.12
Sandwich, Windsor & Amherstburg Ry.	.50
Three Rivers Trac. Co.	3.00
Toronto Civic Ry.	.75
Winnipeg Elec. Ry.	2.10
	54.13
Grand Total, United States and Canada	1044.22

Electric Rolling Stock Ordered in 1915

A Tabulation Showing the Number, Type, Over-All Length and Character of Construction of All Cars Built During the Year—Compiled from Official Returns Made by the Railway Companies

The tables below show in detail the number of cars of all kinds, as well as electric locomotives, which were either purchased by electric railways or built in the company's shops during the past year. The list does not include freight trail cars for other than city or interurban lines, nor those used for interchange service. The total number of rolling stock equipments of all kinds ordered is 2782, a decrease of approximately 8 per cent from the number listed for the previous year. The tables, in accordance with the usual procedure, have been made up from the orders noted from week to week in the rolling stock columns of the Electric Railway Journal and from a canvass made at the close of the year of all the electric railways of the United States and Canada. These figures were checked against reports received from practically all of the car builders. This year about 90 per cent of all the electric roads in the country and practically all of the larger ones furnished data on blanks provided by the Journal for that purpose. The size of the percentage of replies for any canvass which has to be conducted by letter and has to end on a definite date will be realized by all who have ever had to conduct similar inquiries, and for the co-operation of all the companies who thus furnished assistance the editors of this paper are deeply grateful.

The greatest number of cars ordered by any electric railway during 1915 was for 803 cars by the Interborough Rapid Transit Company, including 323 subway passenger cars, 478 subway car bodies and two dump cars. These combined orders rank second in number to only one other yearly total of orders ever placed by an electric railway, *i.e.*, that of the Philadelphia Rapid Transit Company in 1912 for 1000 cars. For 1915 the Pittsburgh Railways rank second with a total of 215 cars ordered, including 200 city and fifteen interurban cars. The Detroit (Mich.) United Railway stands third with 156 cars ordered, including 150 city and two interurban passenger cars and four miscellaneous cars.

The number of electric locomotives ordered was only forty-three, as against seventy-eight in the preceding year. The total number of cars of all kinds built in company's shops was 165 as against 228 in 1914. The chief work of this kind was done by the Twin City Rapid Transit Company, which built fifty-three cars and by the Public Service Railway which built fifty passenger cars.

The number of cars ordered by Canadian electric railways in 1915 was fifty-two compared with ninety-seven in the preceding year, or a decrease of 46 per cent. American car builders reported having received orders for seventeen cars from foreign electric railways, including fifteen for South America, one for Cuba and one for the Corregidor Islands. This foreign equipment included two closed passenger cars, eleven open passenger cars, three electric locomotives and one freight gondola car.

The number of one-man passenger cars ordered during the year was recorded at 77. As this figure includes only newly built cars, it is by no means an adequate measure of the increased popularity of the one-man car, owing to the fact that many cars already in service were reconstructed in 1915 into the one-man type.

Articulated cars are not included in the table, as they involve only slight remodeling of old cars with the addition of a new center section. The Boston Elevated Railway ordered forty-eight center-sections for this purpose; the Brooklyn Rapid Transit System, one center-section.

Purchases of six automobile trucks and four automobile buses, not included in the rolling stock statistics, were reported by the railways.

The following summary shows the records in condensed form for the past nine years, and gives the number of cars, classified in accordance to the service in which they are used, from 1907 to 1915:

Year	City Cars	Interurban Cars	Freight and Misc. Cars	Total
1907	3,483	1,327	1,406	6,216
1908	2,208	727	176	3,111
1909	2,537	1,245	1,175	4,957
1910	3,571	990	820	5,381
1911	2,884	626	505	4,015
1912	4,531	783	687	6,001
1913	3,820	547	1,147	5,514
1914	2,147	384	479	3,010
1915	2,072	336	374	2,782

Railway Company	*No.*	*General Type*	*Motor or Trailer*	*Length Over All*	*City or Int.*	*All-steel Semi-steel or Wood*	*One-Man?*
Alberta & Great Waterways Rys.	2	Gasoline	Motor	55 0	Int.	All-steel	No
Albuquerque Trac. Co.	7	Ps. Clsd.	Motor	.....	City	Semi-steel	Yes
Anaconda Copper Mining Co.	1	Ps. Clsd.	Motor	51–4	City	......	No
	5	Ps. Clsd.	Trail	45–10	City	......	....
Androscoggin Elec. Co.	2	Ps. Clsd.	Motor	46–8	Int.	Semi-steel	No
	1	Express	Motor	36 3	Int.	Semi-steel	....
Anniston Elec. & Gas Co.	2	Ps. Clsd.	Motor	....	City	Steel	....
Arkansas Valley Int. Ry.	1	Ps. Clsd.	Motor	....	Int.	......	....
	1	Express	Motor	48 0	Int.	Semi-steel	....
	2	Express	Trail	42–0	Int.	Semi-steel	....
Ashtabula Rapid Transit Co.	1	Ps. Clsd.	Motor	38–4	City	Wood	No
Atlanta & Carolina R.R.	1	Gasoline	Motor	......	....	Wood	....
	1	Ps. Clsd.	Trail	......	....	Wood	....
Austin Street Ry.	3	Ps. Clsd.	Motor	30–1	City	All-steel	No
Bartlesville Int. Ry.	1	Ps. Conv.	Motor	30–0	City	Semi-steel	Yes
Beaumont Trac. Co.	7	Ps. Clsd.	Motor	28–3½	City	All-steel	....
Binghamton Ry.	7	Ps. Clsd.	Motor	42 0	Int.	All-steel	No
	13	Ps. Clsd.	Motor	37–0	City	All-steel	....
Boston & Worcester St. Ry.	5	Ps. Open	Motor	45–0	Int.	Semi-steel	No
	5	Ps. Clsd.	Motor	48 2	Int.	Semi-steel	No
Boston Elev. Ry.	25	Ps. Clsd.	Trail	48-2½	City	Semi-steel	No
	1	Flat	....	40–0	City El.	All-steel	....
	3	Sn. Plow	....	42–0	City	Semi-steel	....
	2	Sweeper	....	41–10	City	Semi-steel	....
	3	Side-dump	....	41–½	City	All-steel	....
Brantford Munic. Ry.	3	Ps. Clsd.	Motor	....	City	......	....
	1	Sweeper	Motor	28 3	City	Semi-steel	....
Bridgeton & Millville Trac. Co.	1	Pass.	Motor	43 2	Int.	Semi-steel	No
Bristol & Plainville Tramway	3	Ps. Conv.	Motor	36 0	City	Semi-steel	No
Brooklyn Rapid Transit Co.	16	Sweeper	Motor	29–8	City	Semi-steel	....
Brownsville St. & Int. Ry.	2	Ps. Clsd.	Motor	23 –0	City	Steel	Yes
Buffalo & Lake Erie Trac. Co.	10	Ps. Clsd.	Motor	45–1½	City	Semi-steel	No
Buffalo, Lockport & Rochester Ry.	1	Express	Motor	50–0	Int.	All-steel	No
Butler & Grove City Ry.	2	Internal Comb. Loco.	....	.....	..	......	....
Butte, Anaconda & Pacific Ry.	1	Ft. Loco.	Motor	80-Ton	..	......	....
Carolina, Clinchfield & Ohio Ry.	1	Concrete Mixing Car	Gasoline Motor	.....	..	......	....

Railway Company	*No.*	*General Type*	*Motor or Trailer*	*Length Over All*	*City or Int.*	*All-steel Semi-steel or Wood*	*One-Man?*
Carolina Pwr. & Lt. Co.	3	Ps. Clsd.	Motor	.. ...	City	Steel	....
Carolina & Yadkin River Ry	1	El. Loco.	Motor	.. ...	..	......	....
Centerville, Albia & Southern Ry	1	El. Loco.	Motor	41-6	..	Semi-steel	....
Central of Florida Ry	1	Ps. Clsd.	Motor	32-0	Int.	Semi-steel	....
	1	Pass.	Trail	28-0	..	......	....
	1	Ps. Stor. Batt.	Motor	.....	..	......	....
Centralia Traction Co.	2	Pass.	Motor	30-1	City	Both	No
Charleston Consol. Ry. & Ltg. Co	6	Ps. Clsd.	Motor	41-0	City	All-stee	No
Charleston Int. R .R.	2	Ps. Clsd.	Motor	.....	City	......	Yes
	2	Express	Motor	45-0	Int.	......	....
	2	Ps. Clsd.	Motor	47-3	Int.	All-steel	No
Charles City-Western Ry	2	Ps. Clsd.	Motor	.....	..	......	....
	1	Pass. and Bagg.	Motor	48-0	Int.	......	....
	1	Gasoline	....	55-0	Int.	All-stee	....
	1	El. Loco.	....	35-ton	Int.	All-steel	....
	3	Flat	....	36-0	..	Wood	....
	1	Sn. Plow	....	36-0	..	......	....
	1	Sweeper	....	28-0	City	Semi-steel	....
	1	Gasoline Work	....	.....	..	......	....
Chattahoochee Valley Ry	1	Ps. Clsd. Stor. Batt.	Motor	32-9	Int.	Semi-steel	....
Chattanooga Traction Co	2	Pass.	Trail	35-0	Int.	Semi-steel	....
Chicago & Joliet Elec. Ry	1	Line	....	.....	..	Semi-steel	....
Chicago & Milwaukee Elec. R. R	15	Ps. Clsd.	Motor	55-11	Int.	Semi-steel	No
Chicago & West Towns Ry	1	Ps. Clsd.	Motor	45-0	City	Semi-steel	....
Chicago, Harvard & Geneva Lake Ry	2	Sn. Plow	Motor	....	Int.	Steel	....
Chicago, Milwaukee & St. Paul R. R	9	El. Loco.	Motor	260-Ton	..	......	....
	2	El Loco.	Motor	70-Ton	..	All-steel	....
Chicago, Waukegan & Fox Lake Trac. Co	1	Ps. & Bagg. Gasoline Motor	....	55-0	Int.	All-steel	....
Cleburne Street Ry	6	Ps. Clsd.	....	.....	City	....	....
Cleveland & Eastern Trac. Co	1	Ps. & Bagg.	Motor	54-6	Int.	Steel	....
	1	Pass.	....	.....	..	......	....
Cleveland & Erie Ry	2	Ps. Clsd.	Motor	51-0	Int.	All-steel	No
Cleveland Ry	130	Ps. Clsd.	Motor	51-1	City	Semi-steel	No
	2	Sweeper	Motor	28-3	City	Semi-steel	....
	3	Work	Motor	.....	City	......	....
	6	Work	Trail	.....	City	......	....
Cleveland, Painesville & Eastern R. R	1	Ps. Clsd.	Motor	50-0	Int.	Semi-steel	No
Cleveland, Southwestern & Columbus Ry	4	Hopper Bottom	....	.....	..	......	....
	4	Bagg. and Express	....	52-0	Int.	......	....
Columbia Ry., Gas & Elec. Co	4	Ps. Clsd.	Motor	45-0	City	......	No
Columbus Ry., Pwr. & Light Co	1	Street Flusher	....	40-0	City	Semi-steel	....
Connecticut Co	46	Ps. Conv.	Motor	44-6	City	Semi-steel	No
	46	Ps. Conv.	Motor	44-6	City	All-steel	No
	1	Express	Motor	41-0	Both	Semi-steel	....
Corpus Christi Ry. & Lt. Co	8	Ps. Clsd.	Motor	.....	City	......	Yes
Cumberland County Pwr. & Lt. Co	1	Pass.	Motor	46-4	Both	St'l Un. Fr.	No
Cushing Traction Co	2	Ps. Clsd.	Motor	45-0	Int.	All-steel	No
Dayton, Springfield & Xenia Southern Ry	1	Flat	....	33-0	..	......	....
Dayton Street Ry	1	Snow Sweeper	Motor	28-3	City	St'l Un.Fr.	....
Des Moines City Ry	1	El. Loco.	Motor	60-Ton	Int.	Steel	....
	1	Sweeper	Motor	28-3	City	Semi-steel	....
	40	Ps. Clsd.	Motor	.....	City	Semi-steel	No
Detroit United Ry	2	Ps. Clsd.	Motor	58-3½	Int.	Semi-steel	No
	50	Ps. Clsd.	Motor	46-10	City	All-steel	No
	100	Ps. Clsd.	Trail	46-8¾	City	All-steel	No
	2	Line	Motor	38-10	Int.	Semi-steel	....
	1	Construc.	Motor	48-0	Int.	Semi-steel	....
	1	El. Loco.	....	32-7½	Int.	Semi-steel	....
Durham Traction Co	3	Ps. Clsd.	Motor	26-0	City	Semi-steel	Yes
	3	Ps. Clsd.	Motor	31-0	City	Semi-steel	Yes
East Liverpool Trac. & Lt. Co	15	Ps. Clsd.	Motor	45-0	City	All-steel	No
Eastern Pennsylvania Rys	1	Dump				Steel	
	1	Ps. Conv.	Motor	46-0	Both	Semi-steel	No
Easton Transit Co	3	Ps. Conv.	Motor	48-0	Int.	All-steel	No
Empire United Rys.	1	Parlor	Trail	52-6	Int.	Wood	No
	1	Sweeper	....	28-3	City	Wood	....
Ephrata & Lebanon Trac. Co	5	Dump	....	.....	....	......	....
Florida-East Coast Ry	1	Ps.Gas-Elec.	Motor	70-0	Int.	All-steel	....
Ft. Dodge, Des Moines & Southern Ry	3	Ps. Clsd.	Motor	50-0	Int.	Steel	No
	2	Ps. Clsd.	Motor	32-0	City	Semi-steel	Yes
	2	Ft. Loco.	Motor	60-Ton	..	Steel	....
Goldsboro Elec. Ry.	2	Ps. Clsd.	Motor	30-0	City	Wood	Yes
Grand Rapids, Holland & Chicago Ry	1	Express	Motor	52-0	Int.	All-steel	No
Hagerstown & Frederick Ry	2	Ps. & Smo.	Motor	48-1	Int.	Semi-steel	No
	1	Ps. Conv.	Motor	31-6¾	City	Semi-steel	Yes
	2	Ft. Loco.	Motor	.....	..	All-steel	....
Halifax Electric Ry.	6	Ps. Clsd.	Motor	29-8	City	......	....
Hammond, Whiting & East Chicago Ry	4	Pass.	Motor	.. ...	City	Semi-steel	No
Hawkinsville & Florida Southern R. R	2	Gas-Elec.	Motor	.....	Int.	......	....
Hershey Transit Co	2	Ps Conv.	Motor	41-8	Int.	Semi-steel	No
Hocking-Sunday Creek Traction Co	8	Ps. Clsd.	Motor	.....	Int.	Semi-steel	No
Huntington R. R.	1	Sn. Plow	Motor	30-2¾	Int.	Semi-steel	....
Huntsville Ry., Lt., & Pwr. Co	4	Ps. Clsd.	Motor	.....	City	Steel	....
Hutchinson Int. Ry	1	Gasoline	....	.....	..	......	....
	2	Ps. Clsd.	....	.....	..	......	Yes
Illinois Traction System	50	Hopper Bottom	....	.....	..	......	....
Indiana Rys. & Lt. Co.	1	Sweeper	Motor	28-3	City	Semi-steel	....
	2	Ps. Clsd.	Motor	25-0	City	Steel	Yes
Indianapolis Trac. & Term. Co	2	Sweeper	Motor	28-3	City	Semi-steel	....
Inter-Urban Ry	1	El. Loco.	Motor	60-Ton	..	......	....
Interborough Rapid Transit Co. (also 974 trucks and 962 motors for composite cars transferred from subway to elevated)	12	Ps. Clsd.	Motor	51-½	Sub.	All-steel	No
	478	Ps. Car-bodies	Motor	51-½	Sub.	All-steel	No
	234	Ps. Clsd.	Motor	51-½	Sub.	All-steel	No
	77	Ps. Clsd.	Trail	51-½	Sub.	All-steel	No
	2	Dump	....	28-11	Sub.	All-steel	....
Iowa City Elec. Ry	4	Ps. Clsd.	Motor	28-0	City	Semi-steel	Yes
Iowa Ry. & Lt. Co	1	El. Loco.	Motor	50-Ton	Int.	......	....
	2	Ps. Clsd.	Motor	32-0	City	Semi-steel	Yes
Ithaca Trac. Corp	1	Sprinkler	Motor	19-0	City	Wood	....
Jackson Lt. & Traction Co	5	Ps. Clsd.	Motor	25-0	City	All-steel	Yes
Jamestown, Westfield & Northwestern Ry	1	El. Loco.	Motor	45-Ton	..	......	....
Jefferson City Bridge & Transit Co	6	Ps. Clsd.	Motor	.....	..	......	....
Kansas City, Clay County & St. Joseph Ry	4	Ps. Clsd.	Motor	59-0	Int.	All-steel	No
	2	Side-dump	....	40-0	..	Steel	....
	1	Ditcher	....	.....	..	......	....
Kansas City, Kaw Valley & Western Ry	3	Ps. Clsd.	Motor	50-0	Int.	All-steel	No
	3	Express	Motor	.....	Both	Semi-steel	....
	6	Gondola	....	.....	Both	Semi-steel	....
	3	Flat	....	.....	Both	Semi-steel	....
	1	Sn. Plow	....	.....	Both	Semi-steel	....
	4	Work	....	.....	Both	Semi-steel	....
Lake Erie & Northern R. R	8	Ps. Clsd.	Motor	61-0	Int.	Semi-steel	No
	3	El. Loco.	Motor	60-Ton	Int.	......	....
Lake Shore Electric Ry.	3	Ps. Clsd.	Motor	60-0	Int.	All-steel	No
Laredo Ry. & Elec. Co.	3	Ps. Clsd.	Motor	.....	City	......	....
Lehigh Traction Co	10	Ps. Clsd.	Motor	47-2	City	All-steel	No
Lehigh Valley Transit Co	2	Box	Trail	43-10	Int.	Semi-steel	....
Lewiston, Augusta & Waterville Street Ry	2	Box	Motor	40-0	..	Stl. Un.Fr.	....
	2	Box	Trail	36-0	..	Wood	....
	20	Flat	....	36-0	..	Wood	....
Lincoln Traction Company	1	Sweeper	Motor	28-3	City	Semi-steel	....
London & Port Stanley Ry	5	Ps. Clsd.	Motor	61-0	Int.	All-steel	No
	3	Ps. Clsd.	Trail	61-0	Int.	Wood	No
	1	Express	Motor	61-0	..	Wood	....
	3	El. Loco.	Motor	37-0	..	All-steel	....
	4	Box	....	34-0	..	Wood	....
	4	Flat	....	35-0	..	Wood	....
	3	Caboose	....	36-0	..	......	....
London Street Railway.	1	Flat	....	30-0	City	Semi-steel	....
Long Island R. R	45	Ps. Clsd.	Trail	64-4	Int.	All-steel	....
	1	Sweeper	Motor	28-3	City	Semi-steel	....
Marshall Traction Co	3	Ps. Clsd.	Motor	33-3	City	All-steel	Yes
Maryland Electric Rys.	1	El. Loco.	Motor	46-Ton	..	......	....
McConnellsburg & Ft. London Ry	2	Ps. Clsd.	Trail	44-0	Int.	Stl. Cork Lined	....
Menominee & Marinette Lt. & Trac. Co	1	Ps. Clsd.	Motor	36-0	City	Semi-steel	Yes
	1	Ps. Clsd.	Trail	35-0	City	All-steel	Yes
Metropolitan Street Ry.	50	Ps. Clsd.	Motor	44-10	City	Semi-steel	No
	2	Sweeper	Motor	28-3	City	Semi-steel	....
Miami Traction Co	4	Ps. Clsd. Stor. Batt.	Motor	26-1½	City	Wood	No
Michigan Ry	2	Ps. Clsd.	Motor	67-6	Int.	Steel	No
	10	Box	....	50-0	Int.	Steel	....
Minneapolis, St. Paul, Rochester & Dubuque Elec. Trac. Co	12	Ps. Clsd.	Trail	57-4	Int.	Semi-steel	No
	2	Gas-Elec. Ps.	Motor	.....	Int.	......	No
	3	Gas-El. Loco.	Motor	.....	Int.	......	....
	45	Box	Trail	36-0	Int.	Stl.Un.Fr.	....
Mobile & Ohio Ry	1	Ps. Clsd.	Motor	.....	Int.	Wood	Yes
Monongahela Valley Trac. Co	3	Ps. Conv.	Motor	32-0	City	Wood	No
	3	Express	Trail	30-0	Int.	Wood	....
Morgantown & Wheeling Ry	1	Box	....	35-6	Int.	Wood	....
Mount Vernon Ry	3	Ps. Clsd.	Motor	40-0	Int.	Semi-steel	No
Muscatine & Iowa City Ry	4	Ps. Gas-Elec.	Motor	.....	Int.	......	....
Nassau County Ry	1	Ps. Conv.	Motor	33-4	City	Semi-steel	Yes
New York & Long Island Trac. Co	6	Ps. Clsd.	Motor	42-5	Int.	Semi-steel	No
New York Municipal Rys	100	Ps. Clsd.	Motor	67-0	Sub.	All-steel	No
New York Rys	1	Sweeper	Motor	61-0	City	......	....
New York State Rys.	1	Ps. Clsd.	Motor	50-0	City	Semi-steel	No
New York, Westchester & Boston Ry	10	Ps. Clsd.	Motor	72-0	Int.	All-steel	No
	5	Ps. Clsd.	Trail	72-0	Int.	All-steel	No

Railway Company	*No.*	*General Type*	*Motor or Trailer*	*Length Over All*	*City or Int.*	*All-steel Semi-steel or Wood*	*One-Man?*
Northern Ohio Traction & Light Co.	1	Bagg.	Motor	60–0	Int.	Semi-steel	....
	1	Line	....	40–0	Int.	Semi-steel	....
Northwestern Elev. R. R.	122	Ps. Clsd.	Motor	48–0	City El.	Steel	No
Norton & Taunton St. Ry.	7	Ps. Clsd.	Motor	30–1	City	......	No
	1	Sn. Plow	....	41–0	..	......	....
Norwich & Westerly Traction Co.	1	Flat	Motor	44–0	..	......	....
Ogden, Logan & Idaho Ry.	12	Ps. Clsd.	Motor	61–8	Int.	All-steel	No
	6	Ps. Clsd.	Trail	61–8	Int.	All-steel	No
	2	El. Loco.	Motor	50-Ton	Int.	......	....
Ogdensburg Street Ry.	4	Ps. Clsd.	Motor	32–0	City	......	Yes
Ohio Electric Ry.	1	Ps. Clsd.	Motor	60–0	Int.	Semi-steel	No
Ohio River Elec. Ry. & Pwr. Co.	6	Ps. Clsd.	Motor	40–0	City	Wood	No
Ohio Valley Traction Co.	4	Ps. Clsd.	Motor	54–7½	Int.	Stl. Fr.	No
	2	Express	Motor	50–0	..	......	....
	1	El. Loco.	Motor	....	..	......	....
Oklahoma Ry.	8	Ps. Clsd.	Motor	40–11	City	All-steel	No
Otsego & Herkimer R. R.	1	Express	Motor	50–0	Int.	Wood	....
Parkersburg, Marietta & Interurban Ry.	2	Pass. and Bagg.	Motor	53–0	Int.	All-steel	No
Pennsylvania & Ohio Ry.	1	Sweeper	......	.....		......	....
Petauma & Santa Rosa Ry.	1	Box	....	36–0	..	Wood	....
	2	Flat	....	36–0	..	Wood	....
Philadelphia & Western Ry.	3	Flat	....	35–0	..	Wood	....
	1	Sn. Plow	....	47–0	Int.	Wood	....
Phoenixville, Valley Forge & Strafford Elec. Ry.	2	Ps. Conv.	Motor	31–6½	Int.	Semi-steel	Yes
	1	Ps. Open	Motor	45–10	Int.	Wood	No
Pittsburgh Railways	150	Ps. Conv.	Motor	45–0	City	Steel	No
	50	Ps. Conv.	Trail	45–0	City	Steel	No
	15	Ps. Clsd.	Motor	52–8	Int.	Steel	No
Port Arthur Civic Ry.	1	Sn. Plow and Sweeper	Motor	31–0	City	Semi-steel	....
Portsmouth St. Ry. & Lt. Co.	1	Ft. Loco.	Motor	50-Ton	..	......	....
Princeton Power Co.	2	Pass. & Bagg.	Motor	43–0	Int.	All-steel	No
Public Service Ry.	20	Ps. Open	Motor	48–8	City	Semi-steel	No
	1	Ps. Clsd.	Motor	51–6	City	Semi-steel	No
	29	Ps. Clsd.	Motor	47–0	City	Semi-steel	No
Rhode Island Co.	2	Work	....	34–1	..	......	....
	1	Work with Hoist	....	41–6	..	......	....
	1	Crane	....	42–6	..	......	....
Rio Grande Ry.	1	El. Loco.	Motor	12-Ton	..	......	....
Saginaw-Bay City Ry.	1	Work	....	.....	..	......	....
Salina Northern R. R.	2	Int.Comb. Loco.	....	.....	..	......	....
Salina St. Ry.	2	Ps. Clsd.	Motor	.....	City	......	....
Salt Lake & Ogden Ry.	6	Ps. Open Excur.	Trail	.....	Int.	All-steel	No
Salt Lake & Utah R. R.	2	Ps. Clsd.	Motor	60–0	Int.	All-steel	No
	2	Pass.	Trail	61–0	Int.	All-steel	No
	1	Express	Trail	42–0	Int.	All-steel	....
San Francisco Municipal Ry.	1	Work	....	.....	..	......	....
Sandwich, Windsor & Amherstburg Ry.	2	Ps. Clsd.	Motor	34–0	City	......	....
Sapulpa & Oil Fields Ry.	2	Ps. Clsd.	Motor	.....	..	......	....
	1	Ft. Loco.	....	.....	..	......	....
Scioto Valley Traction Co.	1	Ps. Clsd.	Motor	59–0	Int.	All-steel	No
Scranton Ry.	1	Sprinkler	Motor	32–8	City	Wood	....
Scranton & Binghamton R. R.	4	Ps. & Smo.	Motor	48–1	Int.	Wood	No
Seattle Municipal Street Ry.	1	Express	Motor	40–0	City	Semi-steel	....
Sheboygan Railway & Lt. Co.	2	Ps. Clsd.	Motor	.....	City	Steel	....
	3	Gondola	....	.....	..	......	....
	1	Sweeper	Motor	28–3	City	Semi-steel	....
Sheridan Ry.	2	Flat	....	34–0	..	Wood	....
Shore Line Electric Ry.	10	Ps. Clsd.	Motor	46–5	Int.	Semi-steel	No
	1	Dump	....	.....	..	......	....
Sioux Falls Traction System	2	Ps. Clsd.	Motor	.....	..	......	....
Slate Belt Electric Street Ry.	1	Dump	....	.....	..	......	....
Somerset Traction Co.	1	Box	....	40–0	Int.	Semi-steel	....
South Covington & Cincinnati St. Ry.	1	Sweeper	Motor	27–8	City	Semi-steel	....
Southern Pacific R. R.	4	El. Loco.	Motor	60-Ton	..	......	....
Southern Public Utilities Co.	7	Ps. Clsd.	Motor	26–0	City	Steel	Yes
	6	Ps. Clsd.	Motor	40–0	City	Semi-steel	....
Southwest-Missouri R. R.	3	Ps. Clsd.	Motor	44–0	Int.	All-steel	No
Southwestern Gas & Elec. Co.	3	Ps. Clsd.	Motor	42–0	City	Semi-steel	No
	3	Ps. Clsd.	Motor	32–8	City	Semi-steel	No
Springfield (Ohio) Ry.	1	Sweeper	Motor	28–3	City	Semi-steel	....
Springfield (Mass.) Street Railway	1	Ps. Conv.	Motor	44–4½	City	Semi-steel	No
	2	Dump	....	44–5	..	Steel	....
Steubenville & East Liverpool Ry. & Lt. Co.	1	Service	....	36–0	..	......	....
Steubenville Ry.	3	Ps. Clsd.	Motor	44–2	Int.	Semi-steel	No
Terre Haute, Indianapolis & Eastern Trac. Co.	1	Ps. Clsd.	Motor	47–6	Both	All-steel	No
Three Rivers Trac. Co.	6	Ps. Clsd.	Motor	32–2	City	Semi-steel	Yes
	1	Sweeper	Motor	.....	City	Semi-steel	....
Tidewater Power Co.	3	Ps. Clsd.	Motor	31–0	City	Semi-steel	....
Tiffin, Fostoria & Eastern Elec. Ry.	2	Ps. Clsd.	Motor	54–9	Int.	All-steel	No
	2	Ps. Clsd.	Trail	47–0	Int.	All-steel	No
Toledo, Bowling Green & Southern Trac. Co.	1	Rail Bonding	....	.....	..	......	....
Toledo & Western R. R.	1	Express	Motor	51–0	Int.	All-steel	No
	1	El. Loco.	Motor	60-Ton	Int.	All-steel	No
Toronto Civic Ry.	4	Ps. Clsd.	Motor	34–0	City	Semi-steel	No
	1	Sweeper	Motor	28–3	City	Semi-steel	....
Toronto Suburban Ry.	6	Ps. Clsd.	Motor	55–0	Int.	......	No
Tucson Rapid Transit Co.	4	Ps. Clsd.	Motor	26–6	City	......	Yes
Tuscaloosa Ry. & Utilities Co.	1	El. Loco.	Motor	.....	..	......	....
Twin City Rap. Tran. System	50	Ps. Clsd.	Motor	....	City	......	No
Union Pacific R. R. (Kearney, Neb.-Stapleton Branch)	1	Gasoline Bagg. Mail & Express	Motor	70–0	Int.	Steel	....
	1	Pass.	Trail	70–0	Int.	Steel	....
Union Traction Company, Coffeyville, Kan.	1	Express	Motor	40–0	Int.	Semi-steel	....
Union Trac. Co. of Indiana	2	Sweeper	....	.....	..	......	....
United Railroads of San Francisco	1	Ps. Clsd.	Motor	47–0	City	Semi-steel	No
United Trac. Co. of Albany	15	Ps. Clsd.	Motor	33–4	City	Semi-steel	No
	3	Sweeper	Motor	28–3	City	Semi-steel	....
Valley City St. & Int. Ry.	1	Ps. & Bagg.	Motor	52–0	Int.	Semi-steel	No
Walnut Ridge & Hoxie Lt., Pwr. & Transit Co.	1	Ps. Clsd.	Motor	.....	..	......	....
Warren & Jamestown Street Ry.	1	Comb. Ps., Bagg. & Smoker	....	43–11½	Int.	Stl. Fr.	No
Washington, Baltimore & Annap. Elec. R. R.	5	Ps. Clsd.	Motor	....	Int.	All-steel	No
Water, Light & Transit Co. of Carrollton, Mo.	1	Pass.	....	38–0	Int.	Steel	No
West Penn Traction Company	2	Ps. Clsd.	Motor	58–0	Int.	All-steel	No
	1	Sweeper	Motor	28–3	City	Semi-steel	....
Wilmington & Philadelphia Trac. Co.	31	Ps. Clsd.	Motor	41–0	City and Sub'n	Steel	No
Woodstock & Sycamore Trac. Co.	1	Ps. Clsd.	Motor	.....	Int.	Wood	Yes
Wilkes-Barre & Hazleton Ry.	10	Ps. Clsd.	Motor	52–3½	Int.	All-steel	No
Wisconsin-Minnesota Light & Pwr. Co.	1	Ps. Clsd.	Motor	34–0	City	Semi-steel	....
Worcester Consol. St. Ry.	1	Dump	....	44–5	Both	All-steel	....
Youngstown & Southern Ry.	1	Comb. Ps., Bagg. & Smoker	....	54–7½	Int.	Stl. Fr.	....

Accidents from Automobiles

The following statistics were compiled by Frederick Rex, of the Municipal Reference Library in Chicago, from the United States Census Bureau records. They were prepared for use in connection with the preparation of a municipal ordinance and show the total number of deaths from automobile accidents in cities of the United States having a population of 300,000 and over for the years 1913 and 1907, with percentage of increase in total for year 1913 over 1907, also the number of deaths from automobile accidents in Germany for the year 1912.

AUTOMOBILE ACCIDENT STATISTICS

City	Population in 1913	Number of Deaths from Automobile Accidents		Per Cent Increase in Number of Deaths from Automobile Accidents in 1913 Over 1907
		1913	1907	
New York City	5,198,888	305	55	454.5
Chicago	2,344,0·8	123	15	720.0
Philadelphia, Pa.	1,631,956	52	11	372.7
St. Louis, Mo.	723,347	45	5	800.0
Boston, Mass.	722,465	40	9	344.4
Cleveland, Ohio	622,699	44	5	780.0
Baltimore, Md.	574,575	18	3	500.0
Pittsburgh, Pa.	557,773	35	10	250.0
Detroit, Mich.	520,586	66	8	725.0
Buffalo, N. Y.	446,889	29	7	314.3
San Francisco, Cal.	440,995	32	15	113.3
Milwaukee, Wis.	408,683	17	3	466.6
Cincinnati, Ohio	398,452	16	5	220.0
Newark, N. J.	379,211	20	5	300.0
Los Angeles, Cal.	412,466	69	5	1,280.0
New Orleans, La.	355,958	12	1	1,100.0
Washington, D. C.	348,077	16	3	433.3
Minneapolis, Minn.	333,472	9	1	800.0
Total	16,420,510	948	166	471.0
Germany (1912)	64,925,993	442	..	....

Receiverships and Foreclosure Sales

Mileage Placed Under Receivership During 1915 Was the Largest in Five Years—Increase in Foreclosure Sales During the Same Period Did Not Show Such a Marked Tendency

HOWEVER well electric railways in general have been able to weather the storm of financial and business depression during 1915, it is to be expected that in such a period some companies, because of the accumulated burdens of regulation, of unrestricted jitney competition, of long continued deficits from operation in poor territory and of various inherent weaknesses of organization, should have gone down. Hence it is not surprising to find that the number of electric railways, or twenty-seven, whose finances in 1915 became involved to the point of receivership, was the largest in the last five years, although the year 1912 was a close second with twenty-six companies. The mileage involved in 1915, however, was more than double that of 1911, the most severe of the four years preceding, but the capitalization showed a much smaller increase. The record of receiverships for 1915 compares with the preceding four years (with certain minor adjustments therein for information only now available) as follows:

	Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1911	19	518.90	$29,533,450	$38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375

The accompanying table shows the details of receiverships for 1915. An attempt was made at all times to take the figures from the most up-to-date sources, with a selection of the highest figures in some cases where financial authorities absolutely disagreed and no definite company information was ascertainable. It will be noticed from a glance at the table that eleven of the companies were small ones operating 10 miles of single track or less, and that the total for the year owed its size to the inclusion of several large companies. In regard to such companies, it may be said that at least two underwent receivership because of conditions not directly connected with the depression of the year. The Des Moines City Railway, for example, was placed in receiver's hands as a result of action by the bondholders to protect their interests pending a settlement of the franchise question. Now that the franchise is granted, it is expected that the receivership will be soon dissolved and money raised to rehabilitate the property. According to an official statement, this should not be difficult to do in view of the excellent showing which the company will be able to make as to earnings and equity. The other case was that of the Kansas City, Clay County & St. Joseph Railway, the receivership of which was ordered to protect a judgment for $1,500,000 damages to the Interstate Railway for the taking of right-of-way on which it held options. The company appealed from this verdict, and it was recently reported that the receivership would soon be discharged.

As to causes of certain other receiverships, it was stated that the Atlantic City & Shore Railroad was forced into such condition by unregulated and unrestricted jitney competition, in spite of appeals to the city for a fair protection, and the Gary & Interurban Railroad suffered losses on account of jitney competition and a 3-cent fare. The demise of the Clarksville & Dunbar Cave Railway, said never to have been profitable, was attributed to "Ford cars." The receivership of the Southeastern Ohio Railway, Light & Power Company finally resulted from the loss of revenue caused by the destruction of the bridge in Zanesville during the 1913 flood and the resultant interruption of through traffic. The proceedings in the case of the Empire United Railways, Inc., were friendly ones for the purpose of reorganizing the financial management of the company, adjusting the interest charges and providing money for future capital expenditures. The receivership of the Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad, two financially distinct organizations operated under the same management, contemplated the consolidation of the properties and the issuance of new securities. The Fairmount Park & Transportation Company proceeding, also amicable, involved a reorganization and scaling down of capital.

ELECTRIC RAILWAY RECEIVERSHIPS IN 1915

	Mileage	Outstanding Stock	Outstanding Funded Dept
Aberdeen Railway	7	$90,400	$20,000
Albuquerque Traction Company	5.5	250,000	116,000
Ardmore Electric Railway	4.7	200,000*	....
Atlantic City & Shore Railroad	48.17†	1,000,000	950,000
Atlantic Shore Railway	95.16	1,000,000	2,535,250
Buffalo & Lake Erie Traction Company	168	7,154,100	10,518,500
Clarksville & Dunbar Cave Railway	5.5	50,000	25,000
Cleburne Street Railway	8	65,000	12,500
Cleveland, Youngstown & Eastern Railway‡	23.5	152,500	52,000
Choctaw Railway & Lighting Company	23.26	2,000,000	1,144,000
Des Moines City Railway	85	1,305,000	2,720,000
Empire United Railways, Inc.	246.22	11,600,000	9,832,400
Fairmount Park Transportation Company	10	1,750,000	750,000
Gary & Interurban Railroad	85	4,720,850	2,480,225
Kansas City, Clay County & St. Joseph Railway	83.6	4,000,000	3,135,000
Lima-Honeoye Light & Railroad Company	4.6	5,000	....
Mt. Vernon Railway	9	10,000	40,000
North Branch Transit Company	30	500,000	532,500
Norton & Taunton Street Railway	21.2	297,000	296,000
Otsego & Herkimer Railroad	65.66	500,000	1,164,000
Southeastern Ohio Railway, Light & Power Company	16.34	600,000	600,000
Southern Iowa Railway & Light Company	10	120,000	340,000
Southern Traction & Power Company	7	200,000	200,000
Syracuse & South Bay Electric Railroad	26.56	1,000,000	561,000
Syracuse, Watertown & St. Lawrence River Railroad	6.35	40,000	200,000
Taunton & Pawtucket Street Railway††	18.6	100,000	200,000
Youngstown & Southern Railway	38.18	1,588,200	948,000
Total	1,152.10	$40,298,050	$39,372,375

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*Authorized amount; outstanding amount not ascertainable.

†Includes 2.6 miles leased and 40.47 miles operated under trackage agreements.

‡Receivership covered only the Chagrin Falls & Eastern Railway division from Chagrin Falls to Garrettsville.

††This company is not itself in receivership, but receivers have been appointed for all property covered by the old $200,000 mortgage of the predecessor Bristol County Street Railway, now held to be a valid lien assumed by the successor corporation. This mortgage is said to cover all the mileage of the present company.

Although the foreclosure sales of electric railways, 1915, numbered nineteen with a single-track mileage of 308.31 miles and thus ran far ahead of 1914 with eleven companies and 181.26 miles, the record was only a little worse than 1913, with seventeen companies and 302.28 miles, and decidedly better than 1911, with twenty-five companies and 660.72 miles. The following table shows the complete comparative figures for the last five years:

	Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1911............	25	660.72	$91,354,800	$115,092,750
1912............	18	267.18	14,197,300	10,685,250
1913............	17	302.28	15,243,700	19,094,500
1914............	11	181.26	26,239,700	44,094,241
1915............	19	308.31	30,508,817	16,759,997

The detailed foreclosure sales during 1914 are published in the accompanying table. As in previous years, it has been found that some electric railways for which receivers had been appointed or against which foreclosure suits had been brought, were able to carry out reorganization plans without offering the property at public sale. All the various forms of reorganization, readjustment and change in ownership without formal foreclosure sales have been passed over. Regarding some of the companies included, however, certain points should be mentioned. The Pittsburgh, McKeesport & Westmoreland Railway was sold in February, 1913, but the purchaser did not make the required payments and consequently the company was again sold by the same receiver in June, 1915. The Warren, Brookfield & Spencer Street Railway, after four previous attempts, was finally sold in April, and the Fort Wayne & Springfield Railway, after being offered six times and sold twice (deposit forfeited in each case), was finally sold to the trustee in December. The sale of the Tri-State Railway & Electric Company properties covered about 15 miles of owned and controlled lines, the larger lines formerly leased by the company having been surrendered for separate operation. The properties of the Idaho Railway, Light & Power Company were sold under foreclosure with the exception of the 21-mile Boise Railroad, which was turned back to the former owners. The line of the Southern Traction & Power Company was bought at foreclosure by the city of Alexandria at an agreed-upon price and is now the Alexandria Municipal Railway.

ELECTRIC RAILWAY FORECLOSURE SALES IN 1915

	Mileage	Outstanding Stock	Outstanding Funded Debt
Aberdeen Railway	7	$90,400	$20,000
Albuquerque Traction Company.	5.5	250,000	116,000
Birmingham, Ensley & Bessemer Railroad	32.8	4,153,000	2,650,000
Clarksville & Dunbar Cave Railway	5.5	50,000	25,000
Cleburne Street Railway.......	8	65,000	12,500
Cleveland, Youngstown & Eastern Railway*	23.5	152,500	52,000
Fairmount Park Transportation Company	10	1,750,000	750,000
Fort Wayne & Springfield Railway	22.85	668,467	298,997
Idaho Railway, Light & Power Company	64	16,092,600	7,743,000
Lincoln Railway & Light Company	5.5	150,000	55,000
Mansfield Railway, Light & Power Company	21.06	1,000,000	942,000
Minneapolis & Northern Railway	18	500,000	....
Oklahoma Union Traction Company†	5	100,000	60,000
Pittsburgh, McKeesport & Westmoreland Railway	9	428,150	477,000
Southern Traction & Power Company	7	200,000	200,000
Tri-State Railway & Electric Company	15	2,575,800	668,000
Warren, Brookfield & Spencer Street Railway	20.1	150,000	145,000
Washington Interurban Railway	8.5	500,000	232,000
Washington-Oregon Corporation	20	1,632,900	2,313,500
Total	308.31	$30,508,817	$16,759,997

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*Sale covered only division from Chagrin Falls to Garrettsville (see Table of Receiverships), which was scrapped. The remaining division from Chagrin Falls to Cleveland is now operated as the Cleveland & Chagrin Falls Railway.

†Only the 5-mile city section of this company was sold under foreclosure to the Tulsa Traction Company. The 15-mile interurban line under construction still continues under the Oklahoma Union Traction Company.

Mr. Prouty on Government Ownership

Considers It Doubtful Whether Regulation Will Give Latitude of Operation and Rate of Return Sufficient to Attract Private Funds

CHARLES A. PROUTY, director of the Interstate Commerce Commission division of valuation, in speaking on Dec. 28 before the Pan-American Scientific Congress, said that time alone would tell whether, under the present strict supervision of railroads by the government, enough private capital could be found for the transportation needs of the future. He stated that when the great private investments that now supply sinews for the American transport system were made government regulation did not exist, and he asked whether under regulation these investments of private capital ever would have been made. He confessed that he could not answer his own question.

Continuing, Mr. Prouty said:

"In the future large sums, perhaps as large as or larger than the present investment, must be had for the further development of public utilities. Can that money be obtained? Will private investors have sufficient confidence in the future of their investment to make it? Will the commission give the owners of a utility sufficient latitude in its operation, and will it allow a sufficient return so that the needed private funds can be had? This is the doubtful point, and the doubt can only be solved by actual experience.

"This much is certain, the rate of return must be very much in excess of the rate at which the government itself could borrow money for providing the same utility, and the question may finally be, 'Can the people afford to regulate their utilities, or is it better that the government furnish the service at first hand?'

"Experience shows that the only way in which the public can be protected and exact justice done to the utility is by prescribing in advance the conditions of the service, and the charge at which it shall be rendered. It finally has been determined after much discussion and litigation that this method of regulation may be employed. The legislature may prescribe the rule and the rate by direct enactment, or it may create a commission and invest it with that authority, but as a matter of fact most states and the federal government have used the commission form of regulation."

Copper Shortage in Germany

Germany's present shortage in copper may be remedied by government confiscation of copper used for distribution purposes on electric railway in the German empire, thus providing copper enough to last five years, according to an interview with A. S. Wertheim, a Hamburg merchant, appearing in a recent issue of the Norwegian trade journal *Farmand*. Mr. Wertheim is quoted as saying: "As far as copper is concerned, it is true that there is no abundance in Germany, and that is the reason why the German government, foreseeing a long duration of the war, is voluntarily buying household copper. If, however, there should really ensue a scarcity of copper the government need only turn to the street car systems in the provincial towns, which, with some little inconvenience to the public, would alone yield more copper than Germany could consume for army purposes and industries in five years."

The Prospect of the Jitney

The Writer Urges Railway Managers to Find the Reasons which Have Kept the Jitney On the Streets, in Spite of Its Manifest Drawbacks and Lack of Profits—After These Are Found Future Action Can Better Be Determined

By H. S. COOPER
Secretary Southwestern Electrical & Gas Association

NOW that the fever-flush of the jitney has passed and the street railway fraternity has the opportunity to draw a long breath, sit down and compare results, it might be as well to employ that interval in a calmer survey of the past and the present and a more careful consideration of its probable effects in the future. To say, as some do, that there will be no lasting results of any great importance is to ignore all principles of cause and effect. No such radical irruption of a new transportation factor into—and against—long established and approved transportation methods can occur and then vanish like a fog and leave no tangible results. And this is particularly true when that factor contains inherent merits which, no matter how much they may have been perverted in the past, are of a character that seem advantageous to the public at large.

The primary thought in all this matter must be the full realization of the fact that the public, the people as a whole, are the judge, jury and counsel of the court of last resort. That which the public as a whole desires it will obtain, and it will do so without any regard for the commercial or financial equities. If the conditions of urban and suburban transportation become such as will abolish every mile of street car track in the country, those miles will be quickly abolished without regard to the consequences to employees or security holders. In this respect the public is merciless. That which serves it best at the present moment is that which it will demand, and its demand is always a command.

This is a fixed condition, a stone wall of fact, and he who spends his time in butting it gets only a sore head for his efforts. The wise one will test the stability of that wall and, having satisfied himself as to that, will spend his efforts in surmounting it or going around it—if either is possible.

The jitney, while sudden in its effects, should not have been an entirely unlooked-for phenomenon. Many years previously the bicycle had given a lesson as to the possible effect of individual rapid self-transit, the motorcycle had begun demonstrating its long-distance possibilities, and, just previous to the jitney irruption, the private motor car had shown its appreciable diminishing effect on gross earnings. It needed only the additional stimuli of cheap motor cars and general unemployment to complete the necessary factors for the phenomenal rise of the jitney—to make it, like Minerva, full grown and armed at birth.

Public utilities are a trustful tribe, and they fully showed this trait in the jitney emergency. They trusted in precedent; in the supposed inertia of the public; in the inability of the jitney owner to sustain his fixed-charges losses; in municipal ordinances, State legislation, commission rulings or judicial decision; in getting the public to take the viewpoint of the street railways; in the idea that the jitney was entirely a fair weather plant, which rains, frosts and snow would kill; that it was a novelty of which the public would soon tire; that good times and re-employment would relegate it to limbo—anything at all but that it might remain or become a permanent competitor to be seriously reckoned with.

One especial point that should have opened the eyes of the street railways was the peculiar fact that to none of the three parties most vitally concerned was it a financial betterment, or, to put the case more correctly and strongly, it was a financial detriment to the jitney owner, the public and the street railway. Reliable data prove that most of the jitney owners made only scant wages, the while they were steadily eating up their principal. The public spent a great deal more for its total of local transportation than it ever did before and received therefor no financial benefit. And, as for the railway, its losses have been cried to the house tops!

Such an unparalleled condition called for instant and careful analysis. If there were no financial reason for the jitney there must be another one or ones, there must be some underlying cause, some one or more of the constituents of personal transportation—safety, comfort, convenience or pleasure—that made the public not only take to the jitney but made an important portion of it stick to it.

And here, again, the street railways showed their unwise hopefulness—"the wish was father to the thought." They said: "It is the novelty of the thing; the fact of being able to ride in an automobile; of riding in the open; of the comparative high speed and decrease of time of journey length. As soon as the novelty wears off, as soon as the bad weather comes, as soon as proper regulation of the jitney is attained, then will the public flock back to the 'old reliable' and the jitney will be a thing of the past!"

Inadequate and imperfect reasoning! Because it takes into account only the present imperfect manifestation of the jitney and leaves out of the reckoning all its possibilities. With a vehicle costly to buy, maintain and operate; a vehicle designed and built for an entirely different purpose and use and sold at an extortionate profit, using as a propelling power a substance high in cost and limited in both natural and artificial supply, operated by owners unskilled in transportation operation and accounting, and having no commercial precedent or experience in the business, the jitney has not only made deadly inroads on the street railway earnings, but it has established for itself a place in the local transportation scheme that only needs a very little favorable change in its operative conditions to make it a strong, a lasting, and, perhaps, a deadly competitor of the street railway.

Let us look at some of these "favorable changes."

1. Lessened first-cost of vehicle.
2. Simplified construction.
3. Perfect adaptability to use.
4. Cheaper propelling power.

As to item No. 1, it is well known that the costs of manufacture and distribution of the automobile bear no reasonable commercial relation to the purchase price. These manufacturing and distributing costs are too well known, directly—or may be inferred indirectly from announced profits—to say that the present price of the vehicles cannot be decreased from 40 per cent to 65 per cent. The ability to maintain the present prices depends on patents, on designs and on constructive and selling organization. But patents expire or are legally annulled, and constructive designs can be closely followed or copied, as can constructive, sales and delivery organization.

Items Nos. 2 and 3 are closely allied. The present automobiles were designed and built to be operated at fairly high speeds for long periods. While their mechanism allows them to be stopped, to reverse their direction and to run at lower speeds, it is of such character that any large use of it for these purposes (vitally necessary in jitney work) decreases its efficiency and increases its operating and maintenance cost in cumulative ratio. Also, the passenger carrying or weight carrying capacity of the automobiles has hitherto been gaged or limited by the average character of the roads it traverses and by the comfort and pleasure of its passengers.

Is it beyond possibility that the genius that evolved the automobile to its perfect adaptability for private use will not be able to evolve an equally perfect vehicle for public use on proper roadways—a vehicle of greater carrying capacity, of more simple construction, adapted to start, stop and run at lower speeds with efficiency?

Item No. 4 has been called an impossibility, or a possibility so remote as not worth figuring on. Is it? With the gigantic strides in every phase of invention and discovery, is it reasonable to rest supinely on a belief in the impossibility of a cheap substitute for gasoline as a motive power for the automobile? With every public need has come some fulfillment of that need, not always the perfect one but nearly always a presently sufficient substitute, and there is now manifesting itself a need — and a crying need — for a substitute, and a cheaper substitute, for motor gasoline; a substitute that shall not depend on purely natural sources for its supply, a substitute which it shall not be in the power of any combination or monopoly to control. Who is to say that alcohol or some similar substance, cheaply manufactured from hundreds of waste materials, may not be modified or adapted to equal or more efficient use as propulsive power for the automobile? Not only is such within the bounds of possibility, but, under the present and increasing demand for such, it would be no great surprise if next year or next month or the next instant it were put on the market.

It will therefore be seen that it is no far and distant cry to an improvement on the jitney that will make it a much more economical and efficient vehicle, and one that will be perfectly adapted to its uses.

Outside of the jitney vehicle itself lie other factors now inimical to its success, and which the hopefulness of the street railways has regarded as immovable obstacles. These are:

1. Vehicular congestion and its objectionableness.
2. The inability of the jitney to run successfully on unpaved streets.
3. The inability or unwillingness properly and economically to control or regulate the jitney.

The answer to all three of these items is: Whatever the public desires and demands, that same it will have and not count the cost. If it makes up its mind to jitney transportation it will endure much greater vehicular congestion that at present, and will find some method of obviating that portion which it will not endure. Likewise, if the public desires and demands jitney service to the suburbs, and lack of proper roadways hinders the fulfillment of that desire or demand, the public will itself build the necessary roadways and laugh at the cost. Similarly, if proper control or regulation of the jitney is a necessity to give the public the service it desires and demands, that control and regulation will come as inevitably as it has come to the street railways and to other public utilities.

In view of all the above it will be the part of wisdom for the street railways to place their ears very close to the ground and endeavor to locate the direction of the jitney movement. Before any measure of change in standard street railway practice is made, it is necessary to predicate in what direction, to what extent and how forceful and continuous that jitney movement will be. It will be little good for the street railway to point to the calamity that will overcome its security holders if its losses continue. The public will paraphrase the reputed Vanderbilt saying, and reply, "The security holders be damned!" It will be little good to spend long columns of print trying to prove to the public that its street railway is an economic necessity for the prevention of population congestion, the voting and taxpaying portion of the population will answer: "We will take care of that!"

What must be done is unbiasedly to find out the reason back of the jitney and so to change the street car, or its service, as to forestall the permanent installation of the jitney as a dangerous competitor to the street car. Nothing else will avail at this time, and the longer the street railway shuts its eyes and sits down and trusts to its hopes the harder will be its task to save itself. There are many who benefit by the present imperfect jitney; there are many more who would benefit by the perfect jitney, and among them are those who—in numbers, financial standing and brains—are not far behind those in the street railway business; among them are those who are "ag'in the public service corporations"—many of them sincerely so; among them are those who "vote as they feel," and who feel, wisely or unwisely, that the jitney supplies to them, in some way, a long-felt want. So that the street railway has, as factors against it, a large portion of those from Missouri, who must be shown by physical results if they are to be convinced, and it also has against it many whose interests lie, and will lie, parallel with the jitney, especially with the perfect or more perfect jitney.

If such proper investigation of the subject tends to show the worst—that the day of the present street railway is coming to an end—is it not better voluntarily to ascertain that fact and make preparation for it than blindly to ignore it and have it come as an unprepared-for catastrophe? If such investigation discloses that the jitney is a straw bogey, soon destined for the scrap heap, is it not better to be certain of that fact before extraordinary expense and needless changes are made in car equipment, routeing and schedules?

If the investigation proves that the jitney, in mild form, will be a permanency, will it not be best to have that fact settled in the minds of the street railway companies and for them to fix it in the minds of the public by action which recognizes the fact?

Any way that it is looked at, is it not better to change the attitude of nearly the whole street railway industry toward the jitney; to abstain from inspired legislation which cannot be enforced in extenso and which only leads to reprisals; to pretermit the useless appeals to the public on matters which it will not understand and about which it does not care even if it should understand them? Would it not be better to stop fighting the jitney by methods which affect it not at all, or else make a hero or a martyr of it, and to bend all present efforts to find out why it is and what it can be, and all future efforts to make the street car so efficient a substitute for it that there will be no further public desire or demand for the jitney except as an occasional and local adjunct of the street railway service? This is a contingency that will always exist in some localities, and of which a tactful handling by the street railway will always enable it to be controlled and will often enable it to be made a helpful adjunct to the railway.

COMMUNICATIONS

General Staff Considering Electric Railways in Preparedness Plans

H. M. BYLLESBY & COMPANY, INC.
NEW YORK, Dec. 27, 1915.

To the Editors:

Your excellent editorial of Nov. 20 on "Preparedness in Transportation" is as seed fallen on fertile soil.

The plans of the General Staff of the Army with respect to the rapid mobilization of troops and war material have been based upon the availability of standard steam roads with occasional use of electric transportation, but it is now certain that a complete survey of all lines must be made. There cannot possibly be anything approximating negligence in a matter so important. Your editorial and certain relevant suggestions are in the hands of the military authorities and will surely receive prompt attention.

As to the present degree of co-operation necessary, I will send you information at the earliest practicable date. GEORGE H. HARRIES, Vice-President.

The Lighting of Interurban Cars

THE TRAVELERS PROTECTIVE ASSOCIATION OF AMERICA
SAN FRANCISCO, CAL., Dec. 21, 1915.

To the Editors:

The fact that the interurban electric railway systems of the United States have been of great benefit to the commercial travelers of the country cannot be denied, and the further fact that the several electric lines are endeavoring to provide every comfort for their patrons is patent to every person using this means of transportation.

The commercial traveler is fully aware of the fact that the electric railway is rapidly being improved with every new electrical device tending toward the comfort of the traveling public as quickly as such new improvements are found to be practical.

There is one particular feature of electric railway transportation which I desire to bring to the attention of the electric railway companies of the United States through the medium of the ELECTRIC RAILWAY JOURNAL on behalf of the commercial travelers of the country and that is the present inadequate lighting facilities in use. This is particularly true on those lines employing the third-rail system. Every time the car passes a break in the third rail the light goes out. All cars which use the carbon system of lighting have a flickering, unsteady light.

The proposition of correct lighting of some of the roads in question has been under discussion by the commercial travelers, and it is the rule among them to refrain in a great many cases from patronizing electric lines at night if possible. The present methods of lighting employed are not satisfactory inasmuch as a passenger is unable to read and the strain caused by the flicker is complained of. In our opinion this could be avoided at a small cost to the electric lines if they would install some such sort of storage system as is in use by the steam lines.

Another annoyance to the passenger is the fact that in case of any interruption to the current, as now used for lighting, the car is plunged in darkness, whereas if a storage system of lighting were adopted the car would be lighted for a time at least, even though the supply of current was stopped for any reason.

The above is a suggestion advanced by the Travelers Protective Association of America to the electric lines, and we respectfully ask its serious consideration.

D. V. GELDER, National Chairman,
Railroad Committee Trans-Continental
Association District.

[NOTE.—Several plans, based on the use of storage batteries, as suggested by Mr. Gelder, have been tried, but, so far as we know, none has been successful or at any rate is in extended use at present. This letter, however, offers a suggestion to inventors.—EDS.]

The Causes of Rail Corrugation

SPRINGFIELD, MASS., Dec. 27, 1915.

To the Editors:

I have read with much interest the article entitled "Curved Heads for Girder Rails in Brooklyn," written by R. C. Cram, together with editorial comment which appeared in your issue of Dec. 25, 1915, but regret that neither Mr. Cram nor the JOURNAL has seen fit to refer to the fact that this subject was fully treated in an article written by the undersigned and published in your issue of Sept. 30, 1911, page 528, with editorial on page 520 of the same issue. A subsequent letter to the JOURNAL, in reply to the editorial comment, was published in your issue of Oct. 10, 1911, page 701.

It is, of course, gratifying to learn that the observations of Brooklyn Rapid Transit Company's engineers confirm the writer's theory which was based upon his own experiments, experience and observations in connection with rail corrugation in this country and abroad. While it is not my desire to seek personal advertisement, it would only seem fair to me that my article of Sept. 30, 1911, should have attention called to it. G. E. PELLISSIER.

[NOTE—Neither Mr. Cram in his article nor we in our editorial made any attempt to go into the history of the advocacy of rails with curved heads except to say that there was nothing novel at the present time in the idea. The most valuable feature of the Brooklyn test, in our opinion, was its practical demonstration, on an extended scale, of the advantage of the curved head in reducing corrugation. Nevertheless, we are glad to print the communication of Mr. Pellissier and to give him credit for his interesting exposition four years ago of the relation of the shape of the rail head to the extent of rail corrugation.—EDS.]

Clearing House for Safety Literature

FITCHBURG & LEOMINSTER STREET RAILWAY
FITCHBURG, MASS., Dec. 29, 1915.

To the Editors:

Your editorial in the issue of Dec. 25, relative to "Clearing House for Safety Literature," strikes a responsive chord in my heart, for it has been one of my pet ideas for several years, that the Claims Association should have a central agency through which it might give to each and every member company the benefit of what is being done in the line of public safety of all kinds and act as a clearing house for ideas along all lines that would conserve the interests of member companies.

Safety work is the foundation on which we are all building to-day, but some are going at it hit or miss without a definite goal in view, and my idea is, that the Claims Association could well have a central agency for this very purpose, and it could be run with little expense to any particular company, by a pro rata charge to each member company.

H. K. BENNETT, Claim Agent.

ASSOCIATION NEWS

Lists of Committee Chairmen for the Current Year Have Been Completed and the Transportation Committee Has Been Appointed—Secretary-Treasurer's Financial Statement Has Been Audited—Important Safety Code Conferences Are Coming

Committee Chairman for the Cnrrent Year

Secretary E. B. Burritt has just completed the list of chairmen of committees, with the exception of the Accountants' Association, as given below.

AMERICAN ASSOCIATION

Aera advisory board: H. C. Donecker, assistant general manager Public Service Railway, Newark, N. J.

Anthony N. Brady medal: Arthur W. Brady, president Union Traction Company of Indiana, Anderson, Ind.

Award of bronze medal for best paper presented before a company section: H. R. Fehr, president Lehigh Valley Transit Company, Allentown, Pa.

Company membership: George W. Knox, vice-president and general manager Oklahoma Railways, Oklahoma City, Okla.

Company sections and individual membership: Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J.

Compensation for carrying United States mail: (To be appointed).

Constitution and by-laws: George H. Harries, president Arkansas Valley Railway, Light & Power Company, Omaha, Neb.

Education: H. H. Norris, associate editor ELECTRIC RAILWAY JOURNAL, New York, N. Y.

Electrolysis: Calvert Townley, assistant to president Westinghouse Electric & Manufacturing Company, New York, N. Y.

Federal relations: Arthur W. Brady, president Union Traction Company of Indiana, Anderson, Ind.

Insurance: A. H. Ford, vice-president and general manager Cumberland County Power & Light Company, Portland, Me.

Midyear meeting and dinner: B. I. Budd, president Metropolitan West Side Elevated Railway, Chicago, Ill.

Operation of motor vehicles: B. I. Budd, president Metropolitan West Side Elevated Railway, Chicago, Ill.

Public relations: C. Loomis Allen, president Newport News & Hampton Railway; Gas & Electric Company, Hampton, Va.

Recommendations in president's address: Arthur W. Brady, president Union Traction Company of Indiana, Anderson, Ind.

Standards for car loading: S. W. Huff, vice-president Brooklyn Rapid Transit System, Brooklyn, N. Y.

Subjects: L. S. Storrs, president the Connecticut Company, New Haven, Conn.

Taxation matters: Henry S. Lyons, secretary Boston Elevated Railway, Boston, Mass.

Valuation: J. N. Shannahan, vice-president and general manager Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

ENGINEERING ASSOCIATION

Block Signals for electric railways (joint): J. M. Waldron, signal engineer Interborough Rapid Transit Company, New York, N. Y.

Buildings and structures: C. F. Bedwell, assistant engineer Public Service Railway, Newark, N. J.

Electrolysis: Prof. A. S. Richey, Worcester (Mass.) Polytechnic Institute.

Engineering-Accounting (joint): L. P. Crecelius, electrical engineer Cleveland (Ohio) Railway.

Equipment: W. G. Gove, superintendent of equipment Brooklyn (N. Y.) Rapid Transit System.

Heavy electric traction: E. R. Hill, consulting engineer Norfolk & Western Railway, New York, N. Y.

Life of railway physical property (joint): Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J.

Power distribution: C. L. Cadle, electrical engineer, New York State Railways, Rochester, N. Y.

Power generation: J. W. Welsh, electrical engineer Pittsburgh (Pa.) Railways.

Special committee on use of association standards: H. H. Adams, superintendent of shops and equipment Chicago (Ill.) Surface Lines.

Standards: H. H. Adams, superintendent of shops and equipment Chicago (Ill.) Surface Lines.

Subjects: F. R. Phillips, superintendent of equipment, Pittsburgh (Pa.) Railways.

Transportation-Engineering (joint): Paul Winsor, chief engineer of mechanical and electrical engineering, Boston (Mass.) Elevated Railway.

To represent association at good roads congress, Pittsburgh, Feb. 22-25, 1916: J. M. Larned, engineer maintenance of way Pittsburgh (Pa.) Railways.

Way matters: C. H. Clark, engineer maintenance of way, Cleveland (Ohio) Railway.

CLAIMS ASSOCIATION

Employment: B. B. Davis, claim adjuster Columbus Railway, Power & Light Company, Columbus, Ohio.

Subjects: H. G. Winson, general claim agent Tacoma Railway & Power Company, Tacoma, Wash.

Ways and means: J. S. Kubu, claim agent New York State Railways, Utica, N. Y.

TRANSPORTATION & TRAFFIC ASSOCIATION

Block Signals (joint): J. W. Brown, assistant general superintendent Public Service Railway, Newark, N. J.

Develop uniform definitions: J. V. Sullivan, statistician Chicago (Ill.) Surface Lines.

Express and freight traffic: F. D. Norviel, general passenger and freight agent Union Traction Company of Indiana, Anderson, Ind.

Fares and transfers: C. S. Ching, chief instructor Boston Elevated Railway, Roxbury, Mass.

Passenger traffic: J. K. Punderford, general manager The Connecticut Company, New Haven, Conn.

Rules: C. E. Morgan, general superintendent Michigan United Traction Company, Jackson, Mich.

Rush-hour service: J. V. Sullivan, statistician Chicago (Ill.) Surface Lines.

Schedules and timetables: Edward Dana, superintendent of traffic Boston (Mass.) Elevated Railway.

Standards: L. H. Palmer, United Railways & Electric Company of Baltimore, Baltimore, Md.

Subjects: M. C. Brush, second vice-president Boston Elevated Railway, Boston, Mass.

Transportation-Accounting (joint): E. B. Peck, vice-president and comptroller Indianapolis Traction & Terminal Company, Indianapolis, Ind.

Transportation-Engineering (joint): W. A. Carson, general manager Evansville (Ind.) Railways.

Training of transportation employees: N. W. Bolen, general superintendent of Public Service Railway, Newark, N. J.

1916 TRANSPORTATION COMMITTEE

W. O. Wood, master of transportation, president New York & Queens County Railway, Long Island City, N. Y.

H. G. McConnaughy, director of transportation, Dearborn Chemical Company, 165 Broadway, New York, N. Y.

New England: R. M. Sparks, general passenger agent Bay State Street Railway, Boston, Mass.

New York State (exclusive of New York City): W. H. Collins, president Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.

New York City: J. P. Kineon, superintendent Long Island Railroad, Far Rockaway, L. I.

New Jersey, Pennsylvania, Delaware and Maryland: W. B. Rockwell, manager Eastern Pennsylvania Railways, Pottsville, Pa.

D. C., Kentucky, Virginia and West Virginia: J. N. Shannahan, vice-president Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

Indiana, Ohio and Michigan: R. P. Stevens, president Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.

North and South Carolina, Georgia and Florida: W. H. Glenn, vice-president and operating manager Georgia Railway & Power Company, Atlanta, Ga.

Tennessee, Mississippi and Alabama: F. W. Hoover, second vice-president Chattanooga Railway & Light Company, Chattanooga, Tenn.

Texas, Oklahoma, Arkansas and Louisiana: L. C. Bradley, assistant district manager Stone & Webster Management Association, Texas District, Houston, Tex.

Colorado, Utah, Arizona and New Mexico: F. W. Hild, general manager Denver (Col.) Tramway.

Illinois and Wisconsin: G. T. Seely, assistant general manager Metropolitan West Side Elevated Railway, Chicago, Ill.

Minnesota, North and South Dakota, Iowa and Manitoba, Can.: J. J. Caufield, superintendent Twin City Rapid Transit Company, Minneapolis, Minn.

Missouri, Kansas and Nebraska: J. R. Harrigan, general manager Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

Montana, Idaho, Oregon and Washington, and British Columbia: F. I. Fuller, vice-president Portland Railway, Light & Power Company, Portland, Ore.

California: G. H. Harris, general superintendent San Francisco-Oakland Terminal Railways, Oakland, Cal.

Eastern Canada (Ontario, Quebec, Nova Scotia): R. J. Fleming, general manager Toronto (Ont.) Railway.

Chicago Elevated Section

Four hundred and fifty members and guests attended the Christmas meeting of the Chicago Elevated Railroad Section held Dec. 14, 1915. G. T. Seely, assistant general manager, gave a short talk on "Subway Construction in the Eastern Cities." This paper dealt with the financing of subways rather than the actual construction details and showed, with the aid of lantern slides, the cost of subways in New York, Boston and Philadelphia, by whom the cost was borne, the manner in which the money was raised and the rate of return paid. Mr. Seely compared the physical conditions in the Eastern cities with those in Chicago. The remainder of the program was given over to entertainment, following which refreshments were served. A large Christmas tree appropriately decorated and illuminated gave a touch of the holiday spirit to the meeting and President H. A. Johnson and G. T. Seely were recipients of interesting gifts.

Coming Electrical Safety Code Conferences

W. J. Harvie, chairman of the association delegation to the conferences on the proposed national electrical safety code which is being promulgated by the National Bureau of Standards, has called a conference for Jan. 6 and 7 at the association headquarters in New York. He greatly desires to have in hand at that time constructive suggestions from electric railways. Communications should be mailed to him at once in the care of Secretary E. B. Burritt.

On Jan. 12 a conference will be held at the Bureau of Standards in Washington to receive particularly comments relating to overhead construction.

Secretary-Treasurer's Financial Statement

On account of the change in the fiscal year of the association, which now closes on Oct. 31, and of the time required for auditing, the financial statement of Secretary-Treasurer E. B. Burritt has just become available. This statement covers a period of thirteen months. It is given below with the amounts stated in even dollars:

CASH STATEMENT

RECEIPTS

(Thirteen Months Ended Oct. 31, 1915)

Cash in bank Oct. 1, 1914	$5,176
Admission fees	160
Company annual dues	53,002
Associate membership dues	14,625
Interest on bank deposits	385
Sale of annual reports	773
Sale of rule books	218
Sale of classifications	11
Sale of pamphlets	86
Sale of associate members' badges	228
Refund account midyear conference	200
Contribution account accountants' prize	25
Convention refund	70
Convention location bonus	3,000
Index bureau	732
Petty cash	602
Refund telegrams and telephones	22
Contribution to Fare Bureau	2,500
Aera advertising and cuts	10,417
Aera subscriptions	235
Sale of *Aera* binders	32
Accountants' course tuition fees	3,765
Sale of engineering manual and binder	297
Miscellaneous	107
ELECTRIC RAILWAY JOURNAL	344
Rules committee refund	41
Aera refund	6
Receipts during thirteen months ended Oct. 31, 1915	$91,884
Total cash, including balance of Oct. 1, 1914	$97,060

EXPENDITURES

(Thirteen Months Ended Oct. 31, 1915)

Salaries	$14,389
Printing and stationery	3,948
Postage	2,339
Miscellaneous office expenses	825
Rent of office	4,524
Telephone, telegraph and messengers	848
Express, freight and cartage	1,229
Travelling expenses, secretary	395
Travelling expenses, executive committee	922
Travelling expenses, other committees	1,383
Miscellaneous general expenses	2,033
1914 convention	704
1915 convention	2,783
1915 convention publicity	245
Annual report	1,214
Return of active membership dues	158
Return of associate membership dues	30
Furniture and equipment	1,104
Exchange	84
Accountants' Association, annual report	652
Accountants' Association, other expenses	737
Engineering Association, annual report	2,558
Engineering Association, other expenses	4,560
Claims Association, annual report	581
Claims Association, other expenses	981
Transportation and Traffic Association, annual report	1,249
Transportation and Traffic Association, other expenses	2,408
Membership pins	224
Petty cash fund	400
Rule books	31
Index Bureau	871
Accountants' course tuition fees	2,695
Aera	19,536
Fare Bureau	7,078
Washington representative	550
Badges	1,021
Engineering manual	716
Total expenditures for thirteen months ended Oct. 31, 1915	$86,004

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electrical Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Freeing Manholes of Gas

BY G. H. MCKELWAY
Line Engineer Brooklyn Rapid Transit System.

Practically always where conduit lines have to be built in streets in which gas mains have been laid, or even when the street containing the conduits does not contain a main but intersects other streets in which mains have been installed, there is trouble due to gas which escapes from the mains and finds its way into the conduits and manholes.

The gas company will, of course, claim that the pipes were in good condition at first and were damaged by electrolysis due to stray currents from the tracks of the railway company, but it is seldom true that the escape of gas is due entirely to the corrosion of the pipes caused by electrolysis. In nearly all cases the odor of gas will be noticed on the first opening of the streets for laying tracks or ducts, showing that it is already leaking from the pipes. However, whatever may have caused the leaks, they are almost certain to be found and to cause trouble in systems of conduits laid near gas mains. Measures must, therefore, be taken to keep the gas out of the manholes and to expel it after it has entered.

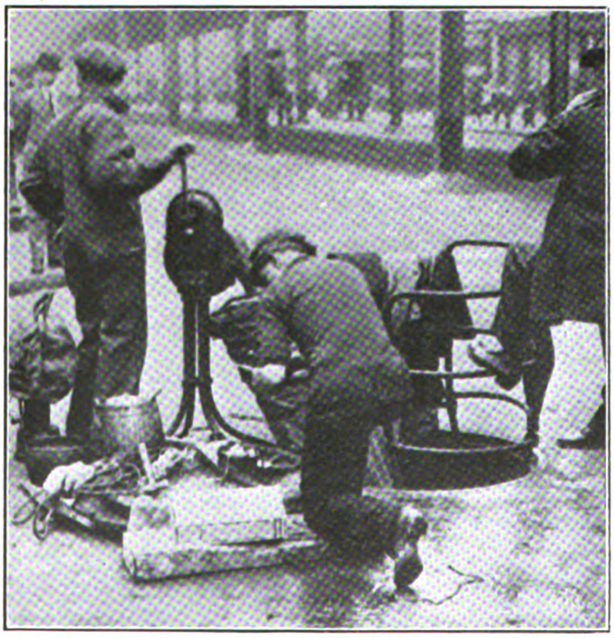
When the gas does get into the holes it not only hampers the linemen in their work, occasionally "knocking out" one or more of them, but sometimes explosions of gas in the holes blow off the manhole covers, endanger the lives of persons passing and damaging the cables.

A few years ago there was such an epidemic of gas explosions in manholes in New York City that the authorities ordered that all holes be ventilated and forbade the use of water-tight covers except in places where the conditions in regard to flooding were so bad as to make it useless to install any other kind. In the same city one explosion not only damaged the holes and all the cables in them, but tore up the street between the holes and killed several children who were playing there.

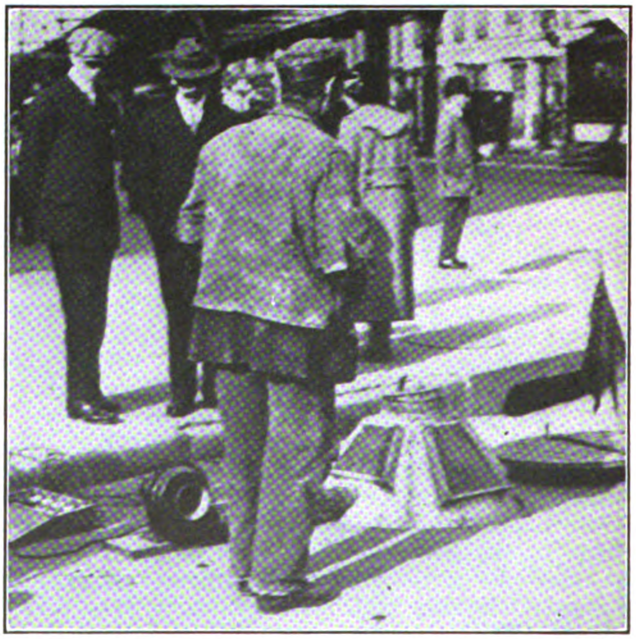
It might be supposed that if manholes were carefully built and the ducts surrounded by a heavy layer of well-made and well-placed concrete it would be impossible for the gas to get into the system, however strongly impregnated might be the earth outside. The writer has yet to learn of any such impervious systems, especially after they have been in operation for a few years, have been tunneled under for sewers and have had the concrete chipped away in places to permit of the installation of water or gas mains, to say nothing of holes broken in the concrete by picks or bars in the hands of careless workmen.

A number of years ago companies in several cities attempted to keep their conduit lines free from gas by connecting them with the chimneys of abandoned power stations, on the theory that the draft up the chimney would suck the gas out of the conduits. In practice the plan did not work out as well as had been expected, as it was found that although the gas was drawn up the chimneys out of the ducts, yet the same partial vacuum also drew in more gas from the earth surrounding the distribution system.

The induced-draft plan having proved a failure, the reverse of this, or the forced-draft system, is now being used, and with success. Its application to individual manholes is neither recent nor uncommon; instead, it is a standard practice with many companies. In its simplest form, which is the only one in which power in some form is not required, a blanket, coat, or other piece of cloth is hung over the manhole guard on the side away from the wind, thus forming a baffle which



FREEING MANHOLES OF GAS—HAND-DRIVEN BLOWER AT WORK



FREEING MANHOLES OF GAS—MANHOLE HOOD FOR USE IN PUTTING MANHOLE UNDER AIR PRESSURE changes the course of the air slightly and forces it down into the manhole. While not a very effective method of clearing the gas from the hole this is better than none.

A much better plan involves the use of a fan to drive the air through a tube down into the hole. An accompanying illustration shows one of these blowers, a hand-driven one, at work. Whenever electric power is obtainable it is better to use a motor-driven fan, as man power is more expensive and less effective.

There are manholes so gassy that even a motor-driven blower alone will not suffice to drive out the gas fast enough to insure safety and comfort to men working in them. The best additional appliance for such cases is the cover shown in another illustration. This is simply a skylight or monitor made with an iron frame holding glass panes through which plenty of light can enter the hole, but through which the air from the fan, entering through a tube, cannot escape. The workmen in the hole work under a slight air pressure, as if in a caisson, although the pressure is very much less. The gas is thus driven from the hole and escapes through the ducts to other holes.

When the gas has to be expelled from an entire conduit system instead of a single hole the forced-draft system consists of a much larger fan and motor installed in a power house or substation and always forcing air into the ducts radiating from the station. This makes a very satisfactory arrangement, and, under favorable conditions, a slight movement of air can be noticed in manholes as far as a mile away from the station. The ordinary ventilated covers are unsuited for such a system as they permit too much air to escape. Where such covers have already been installed some of the holes in them should be plugged with bolts and washers.

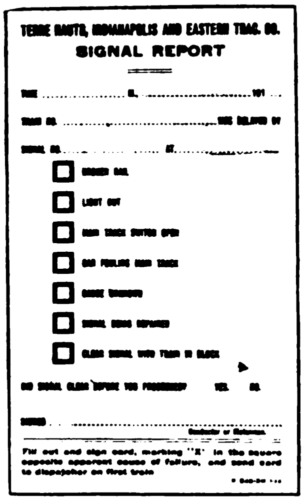
Line Crews Maintain T. H., I. & E. Light Signals

BY A. SCHLESINGER

Superintendent of Distribution and Substations Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

Widely separated territory protected by light signals on the various divisions of the Terre Haute, Indianapolis & Eastern Traction Company's lines made special supervision impractical and too expensive, and the work is being done by men from the regular line forces trained during the period of signal installation. At the present time there are thirty-eight light signals and nineteen indicators in operation. The protected territory includes 12½ miles on the LaFayette division, 13.8 miles on the Martinsville division, 3.2 miles on the Eastern division and 14.45 miles on the Brazil division. During the installation period men from the regular forces maintaining the overhead lines on these divisions were detailed to work with the contractors' gangs to familiarize themselves with the equipment. Since that time these men have acted as signal maintainers and a relatively high per cent of efficiency of signal operation has been obtained.

In all there are now in operation 43.95 miles of protected territory. On the Brazil division between Indianapolis and Terre Haute there are sixteen signals and eight indicators. The regular line force, including a foreman and two linemen, maintains this 50 miles of overhead and the signals. On this division the foreman was detailed to familiarize himself with the signal equipment, and is held responsible for its maintenance. On the Eastern division, including 76 miles of interurban railway and 11 miles of city lines, the regular maintenance force is made up of one foreman and three linemen. The length of this division necessitated a line car to transport the tools and the men to and from their work. During the installation of the two signals and one indicator on this division, one of the linemen was detailed to work with the contractor installing the signals. One foreman and one lineman on the Martinsville division, which includes 27 miles of interurban track, maintain the overhead lines and signals. Both men are familiar with the equiment, which includes twelve signals and six indicators. On the LaFayette division, with 86.5 miles of overhead lines and signals, one foreman, two linemen and one helper make up the regular maintenance force. The signal equipment on this division includes eight signals and four indicators.



TERRE HAUTE, INDIANAPOLIS AND EASTERN TRAC. CO.

SIGNAL REPORT

☐

☐ LIGHT OUT

☐

☐

☐

☐

☐

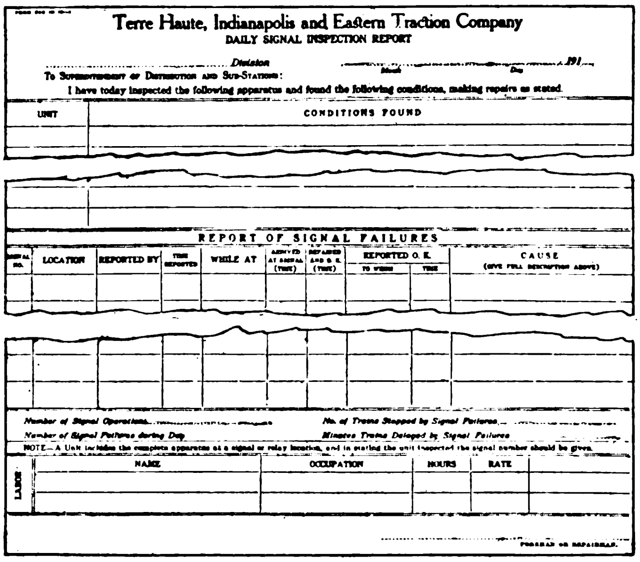
Conductor or Motorman.

Fill out and sign card, marking "X" in the square opposite apparent cause of failure, and send card to dispatcher on first train

TRAINMEN'S SIGNAL FAILURE REPORT

At least once every two weeks the signal maintainers are required to walk the protected territory and inspect bonds and signal mechanisms. On these trips the maintainer makes such repairs as he can with the tools and materials he carries with him, but when parts must be replaced they are ordered by telephone so that the signal may be restored to service promptly. Aside from what the maintainers may find, any signal trouble observed by the train crews is reported to the dispatcher, who in turn advises the maintainers. All trainmen are supplied with signal report cards, a reproduction of which is shown in one of the accompanying illustrations. This is filled in and mailed to the dispatcher in addition to telephoning him about the trouble. The regular line forces, and particularly the maintainers, keep in constant touch with the dispatchers so that in case of trouble they may be advised and proceed promptly to make repairs. As a check on the work of the signal maintainers, from time to time check cards are deposited in the mechanism cases by the motormen instructors or the division superintendents.

To keep the superintendent of distribution and substations informed regarding signal conditions, the daily



Terre Haute, Indianapolis and Eastern Traction Company

DAILY SIGNAL INSPECTION REPORT

.... Division ....Month ....Day ....191....

To Superintendent of Distribution and Sub-Stations:

I have today inspected the following apparatus and found the following conditions, making repairs as stated.

UNIT	CONDITIONS FOUND

REPORT OF SIGNAL FAILURES

Signal No.	LOCATION	REPORTED BY	TIME REPORTED	WHILE AT	ARRIVED AT SIGNAL (TIME)	REPAIRED AND O. K. (TIME)	REPORTED O. K.		CAUSE (GIVE FULL DESCRIPTION ABOVE)
							TO WHOM	TIME	

Number of Signal Operations..........

Number of Signal Failures during Day..........

No. of Trains Stopped by Signal Failures..........

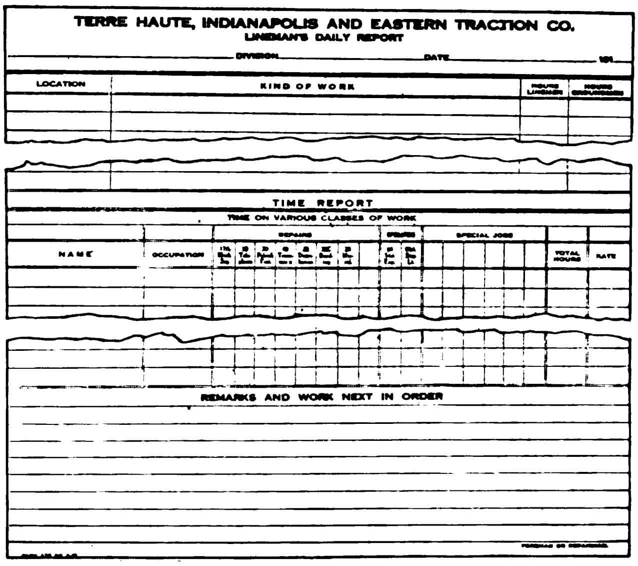
Minutes Trains Delayed by Signal Failures..........

NOTE—A Unit includes the complete apparatus at a signal or relay location, and in stating the unit inspected the signal number should be given.

LABOR	NAME	OCCUPATION	HOURS	RATE	

.... Foreman or Repairman.

T. H., I. & E. LIGHT SIGNAL MAINTENANCE—SIGNAL REPAIRMEN'S REPORT



TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION CO.
LINEMAN'S DAILY REPORT
DIVISION DATE 191

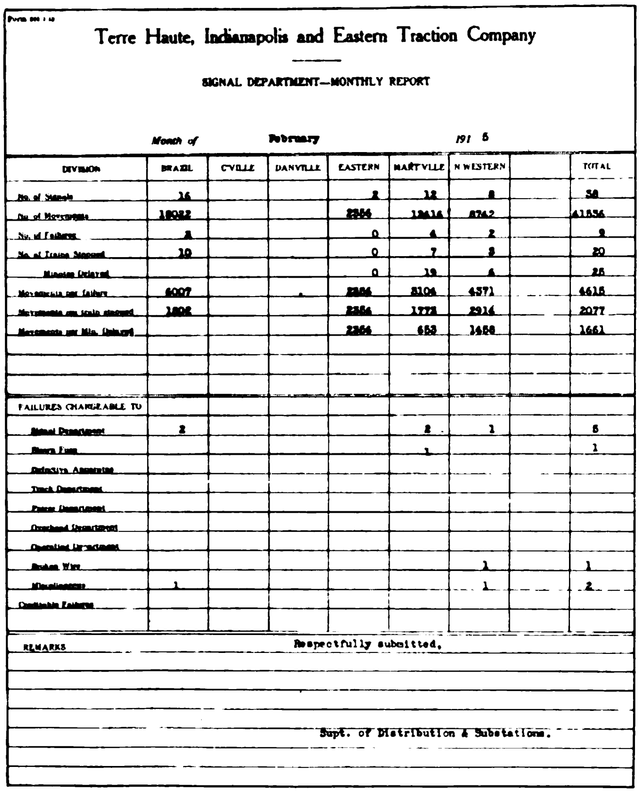
LOCATION	KIND OF WORK	HOURS LINEMEN	HOURS

TIME REPORT
TIME ON VARIOUS CLASSES OF WORK

NAME	OCCUPATION	REPAIRS	SPECIAL JOBS	TOTAL HOURS	RATE

REMARKS AND WORK NEXT IN ORDER

T. H., I. & E. LIGHT SIGNAL MAINTENANCE—LINE FOREMAN'S REPORT



Terre Haute, Indianapolis and Eastern Traction Company

SIGNAL DEPARTMENT—MONTHLY REPORT

Month of February 191 5

DIVISION	BRAZIL	C'VILLE	DANVILLE	EASTERN	MART'VLLE	N WESTERN		TOTAL
No. of Signals	16			2	12	8		38
No. of Movements	18022			2356	12416	8742		41536
No. of Failures	3			0	4	2		9
No. of Trains Stopped	10			0	7	3		20
Minutes Delayed				0	19	6		25
Movements per failure	6007			2356	3104	4371		4615
Movements per train stopped	1802			2356	1772	2914		2077
Movements per Min. Delayed				2356	653	1458		1661
FAILURES CHARGEABLE TO								
Signal Department	2				2	1		5
Blown Fuse					1			1
Defective Apparatus								
Track Department								
Power Department								
Overhead Department								
Operating Department								
Broken Wire						1		1
Miscellaneous	1					1		2
Creditable Failures								

REMARKS Respectfully submitted,

Supt. of Distribution & Substations.

T. H., I. & E. LIGHT SIGNAL MAINTENANCE—TYPICAL MONTHLY REPORT ON SIGNALS

Classification of Signal Failures for February, 1915

Brazil Division

Signal Department.	One failure on the 6th at shops caused by maintainer working on signal at Torr's. One failure on the 8th at Dilleys on account of both green lamps burnt out.
Miscellaneous......	One failure on the 11th at Boys' School, evidently due to switch-box contacts not working properly at west end of Dilleys. Probably switch box is out of adjustment.

Eastern Division

No failures reported.

Martinsville Division.

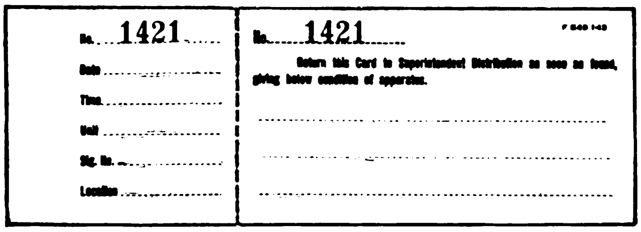
Blown fuses.......	One failure on the 24th at Centerton was due to blown fuse on stick relay energy.
Signal department..	One failure on the 3d at Bethany due to linemen working on signal at Centerton. One failure on the 4th at Martinsville on account of green lamps burnt out.
Broken wire.......	One failure on the 15th at Riverside due to broken control wire caused by train losing trolley pole.

Northwestern Division.

Signal Department.	One failure on the 24th at Gravel Pit, due to green lamps burnt out.
Miscellaneous	One failure on the 23d at Eldridge, due to broken impedance bond terminal at Whitestown preliminary.

signal inspection report form shown is filled out and mailed to him by the maintainer. All maintainers are required to send in these reports each day, regardless of whether there are any signal failures or not. In cases of line trouble, the dispatcher also fills out a form of report which is reproduced herewith. The line foreman is required to sign this dispatcher's report as a check on the information it contains and copies are furnished to the superintendent of distribution and substations, the division and general superintendents. In addition to the information regarding signal operation, this form also reports line trouble and defective telephones. Aside from this report the line foremen make out regular daily reports, a sample of which is illustrated. Besides containing the location and character of work done each day, this report also serves as a daily time sheet, containing a distribution of the time against the various accounts, and from these the time charged to signal maintenance is obtained.

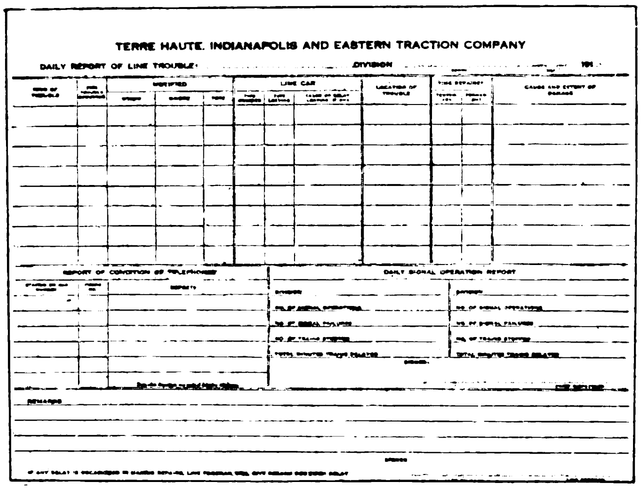
From these various daily reports the superintendent of distribution of substations compiles a monthly report of signal operation on the entire system. A typical report on this form is reproduced on this page. To inform all parties interested, copies of this monthly report are sent to the general superintendent, the company that furnished the signals, the division maintainers and the roadmasters. Accompanying the report is an explanation of the various kinds of failures indicated. In this connection it has been the practice of this company to charge as failures any interruption to signal operation. Some consideration has been given to the desirability of changing the term "failures" to "signal interruptions," and include a special item to show only signals that have failed to give the proper indication. It is considered that the only time a signal actually fails is when it does not perform the functions for which it was designed.



No. 1421
Date
Time
Unit
Sig. No.
Location

No. 1421
Return this Card to Superintendent Distribution as soon as found, giving below condition of apparatus.

T. H., I. & E. LIGHT SIGNAL MAINTENANCE—FORM USED TO CHECK MAINTAINERS



TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY
DAILY REPORT OF LINE TROUBLE DIVISION 191

		NOTIFIED	LINE CAR	LOCATION OF TROUBLE	TIME REPAIRED	CAUSE AND EXTENT OF DAMAGE

REPORT OF CONDITION OF TELEPHONES
DAILY SIGNAL OPERATION REPORT
REMARKS

T. H., I. & E. LIGHT SIGNAL MAINTENANCE—DISPATCHER'S REPORT OF LINE TROUBLES

Although the method of maintaining light signals has been largely one of repairs rather than maintenance, the results have been satisfactory. In other words, the scattered territory and the few men required to maintain the signals have made it impossible to anticipate all trouble. It is contemplated, however, that as the territory grows and becomes continuous, a special signal organization will be formed. On the other hand, it is not believed that as high efficiency can be obtained on the average electric railway as on a steam railroad, because the installations are usually more complicated and the service much more frequent. Aside from these, however, the fact that the lines controlling the signals are usually placed on the same poles as the trolley and transmission lines, subjects them to greater hazards resulting in more frequent line disturbances.

Another interesting point arising in connection with the signal maintenance and operation on the Terre Haute, Indianapolis & Eastern Traction Company's lines is the question of when should a signal be charged with a failure. It has been decided that one defect can be the cause of only one failure, and, therefore, only one failure is reported against a signal until the repairman has had an opportunity to clear the defect. This plan was adopted because it was often necessary for several trains to pass a defective signal before a repairman could get to it to clear the trouble. This resulted in numerous recorded failures which were not a correct measure of the efficiency of the signals. In other words, poor maintenance would tend to reflect on the efficiency of a perfectly good signal mechanism when it should be charged to another cause. A typical monthly report and an explanation of the failures recorded are given on page 46.

Portland Weed Burner

BY F. P. MAIZE

Master Mechanic Portland Railway, Light & Power Company, Portland, Ore.

The Portland Railway, Light & Power Company completed last June a gasoline weed burner which was built upon an old flat car. The burner was operated as a trailer. On the floor of the car were carried one air and five gasoline tanks. The gasoline was supplied to the burners at a pressure of 60 lb. per square inch through the medium of a National AA1 compressor. From the tanks supply pipes led to the fifty-one burners. These burners were set in two double rows in a center platform and in two wings of sheet metal which extended for a couple of feet on each side of the rails. The wings were hinged so that they could be lowered to any desired angle in conformity with that of the embankment. The center platform can also be raised to any desired height, either for inspection or clearance.

Preliminary tests were made at the speeds of 5 m.p.h. and 2 m.p.h. respectively. We found that it was practically impossible to burn off the weeds immediately as long as the stalks were green, even when the car was operating at only 2 m.p.h. We found it better to go over the ground first merely to singe the stalks. This singeing caused them to dry up and die within three or four days, according to temperature conditions, after which they burned up at once, even when the car was run over them at 5 m.p.h.

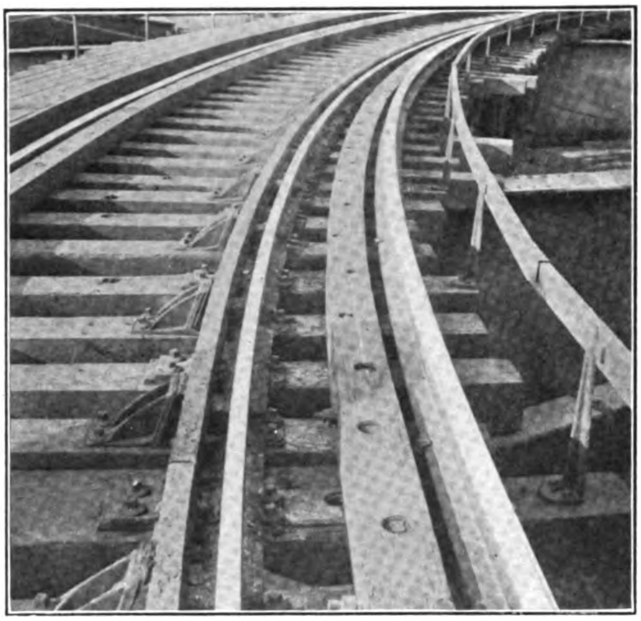
Engineers from England have been for some time in Sao Paulo studying the possible electrification of the Santos branch of the Sao Paulo Railway. Nothing has been decided, however, as yet. The abundance of waterfalls along the route would seem to assure the ultimate adoption of this power for the line.

Titanium-Treated Rails in Boston

The Boston Elevated Railway has been using ferro-titanium rails on its rapid transit and subway lines since 1911. The standard running rail for the rapid transit service at Boston is the 85-lb. A. S. C. E. section, with the following chemical composition specified: carbon, 0.80 to 0.95 per cent; manganese, 0.65 to 0.90 per cent; silicon, 0.10 to 0.20 per cent; phosphorus, not more than 0.04 per cent. To this composition is added 0.1 per cent metallic titanium.

Previous to making use of the titanium element, the Boston Elevated Railway considered it advisable to require a 20 per cent discard in order to insure sound rails for its service. Since making use of the titanium element, the company has accepted the standard discard of 9 per cent.

Rails are furnished in 33-ft. lengths, and the drop test required is a fall of 15 ft. by a 2000-lb. tup on a test rail not more than 6 ft. long, placed head upward on supports 3 ft. apart. About 4101 tons of ferro-titanium rail have been purchased for the rapid transit lines in the past four years.



CURVE ON RAPID TRANSIT LINE, BOSTON ELEVATED RAILWAY, AT HAVERHILL AND CAUSEWAY STREETS

Ferro-titanium rails are used on both tangent and curved track on the rapid transit system but not for guard or contact rails. Since the opening of the elevated service at Boston, in 1901, special study has been given to rail wear on account of the severity of service. Manganese steel rails are still in service on certain curves where the life of ordinary commercial rail was formerly less than two months. Manganese steel is also used for frogs, crossings and other special work, and both cast and rolled manganese steel rails are used in main line special work.

The comparative first cost of 85-lb. A. S. C. E. rails per foot as lately purchased by the company is:

Open-hearth untreated, 45.2 cents.

Open-hearth ferro-titanium, 43 cents.

Frictionless ferro-titanium rail (to match the 85-lb. A. S. C. E. rail), 43.3 cents.

Manganese rail, $6.82.

With the exception of a rolling of open-hearth steel rail received in 1908, open-hearth steel rails treated with ferro-titanium wear much longer than untreated open-hearth rails when subjected to the same traffic.

The specifications for open-hearth rail untreated call for a carbon element of from 0.75 to 0.85, but the specifications calling for open-hearth rail requiring an addition of 0.1 per cent metallic titanium for treatment, call for a carbon element of from 0.80 to 0.95, but not under 0.80.

In the accompanying view showing the curve on the rapid transit lines at Haverhill and Causeway Streets entering the North Station, south-bound track, a rail on the outside of the curve shows a wear vertically of 0.039 ft. after 281 days of service. The area worn off the head of the rail was 1.096 sq. in., and the traffic passing over it in the time named was 17,052,294 tons, giving a wear of 0.0643 sq. in. per million tons of traffic. The analysis of this rail was: carbon, 0.829; manganese, 0.786; silicon, 0.125; phosphorus, 0.030; sulphur, 0.030. The rail was treated with 0.1 per cent ferro-titanium.

The rail on the inside of this curve is a Frictionless rail (companion to the 85-lb. A. S. C. E. rail), of the open-hearth steel with ferro-titanium, and has a composition as follows: carbon, 0.950; manganese, 0.76; silicon, 0.080; phosphorus, 0.019; sulphur, 0.034. The vertical wear after 442 days was 0.051 ft. The square inches worn off the head of the rail section amounted to 0.9786. As the traffic during the time named was 36,777,638 tons, the square inches worn off per million tons were 0.0266.

In 1912 the company purchased 128 tons of ferro-titanium open-hearth rail for surface track use, consisting of 9-in. and 7-in. girder and girder guard rail.

This year the company purchased another lot of 179 tons of 7-in. and 9-in. girder and girder guard rail, of open-hearth steel, with 0.1 per cent metallic titanium added for the use on curves only. The girder rails are from 40 ft. to 60 ft. in length. The chemical requirements are as follows: carbon, 0.60 to 0.75; phosphorus, not over 0.04; silicon, not over 0.20; manganese, 0.60 to 0.90, treated with 0.1 per cent metallic titanium. These are practically the specifications of the A. E. R. E. A.

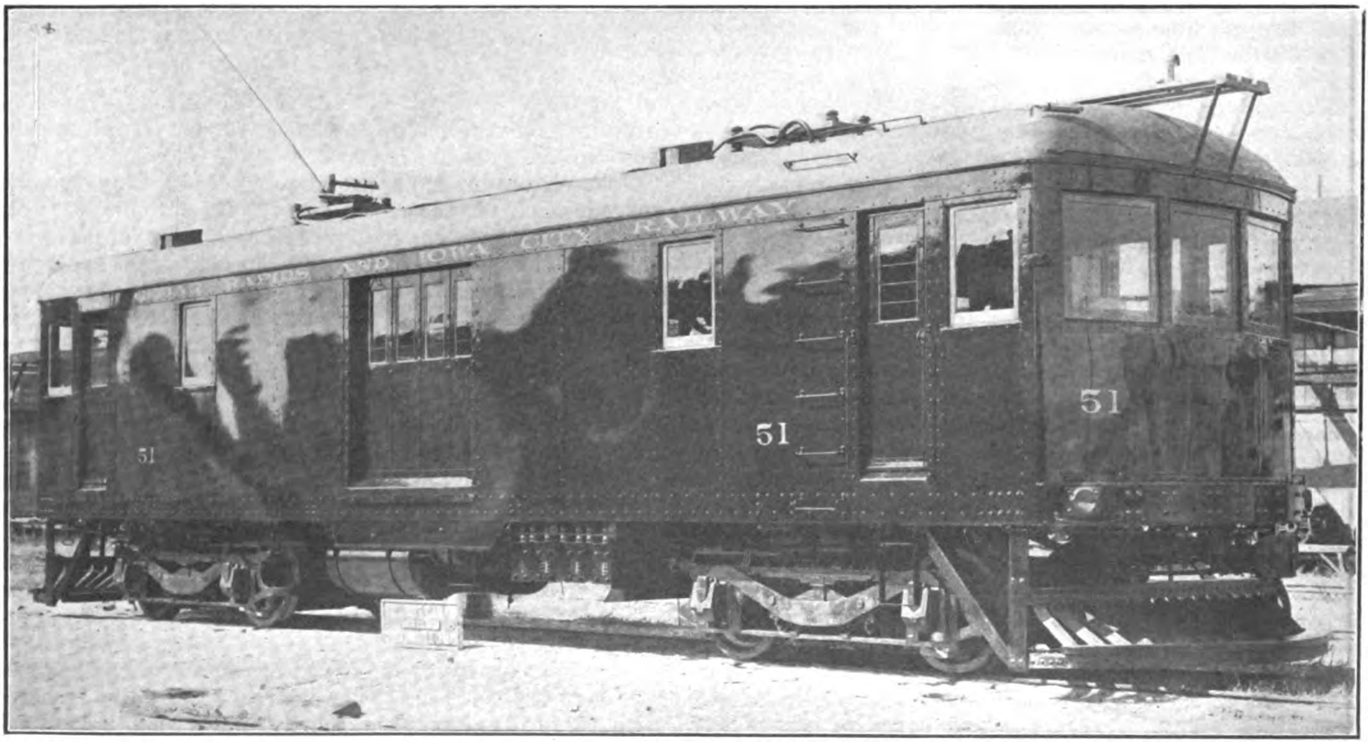
Ferro-titanium girder rail costs about $2 more per ton than untreated open-hearth rail. With this rail the company has always used specifications calling for a 9 per cent discard.

A 600-1200-Volt Steel Freight Locomotive

All-steel construction and 600-1200-volt electrical equipment are the interesting features of the new electric freight locomotive recently purchased by the Iowa Railway & Light Company, Cedar Rapids, Iowa. The locomotive is 50 ft. in over-all length and, equipped ready for service, weighs 57 tons. The underframe was built with 10-in. 40-lb. I-beam center and intermediate sills, and 10-in. 30-lb. channel side sills and bumpers. The cross-sills are 7-in., 14¾-lb. channels riveted to the tops of the longitudinal sills with the flanges up. The end sills are also 10-in. 30-lb. channels framed between the longitudinal sills with 6-in. x 6-in. x ⅝-in. angle connections. A ½-in. x 72-in. anti-telescoping plate and a 3/16-in. x 30-in. bumper corner plate are riveted to the top flanges of the bumpers and the longitudinal sills at each end of the car.

The body framing provides for two 6-ft. sliding doors on each side of the center and two 24-in. motormen's swinging doors at each end of the car. Four small drop sashes on each side of the car and sashes in the upper halves of the two sliding doors were provided to furnish natural illumination to the car interior where most of the auxiliary equipment is installed. At the center-door openings the side sills are reinforced by 10-in. 15-lb. channels riveted flange to flange and extending from intermediate tie to intermediate tie. The side posts are formed of 3-in. 5½-lb. I-beams which are continuous from side sill to side sill. This frame is inclosed with 3/16-in. rerolled steel plates with lap joints over the posts and securely riveted in place. The intermediate carlines are ½-in. x 1¼-in. bars extending between the side plates, which are formed of 3-in. x 3-in. x ⅜-in. angles fitted between the I-beam posts. The letterboard is continuous around the car and formed of ¼-in. x 9-in. sheet steel.

This all-steel car body is mounted on St. Louis Car Company's type 64 trucks, and it is equipped with a motorman's alarm gong, a St. Louis Car Company's vertical wheel brake, Tomlinson radial couplers, St. Louis steel pilots, pneumatic sanders and Peerless ventilators.

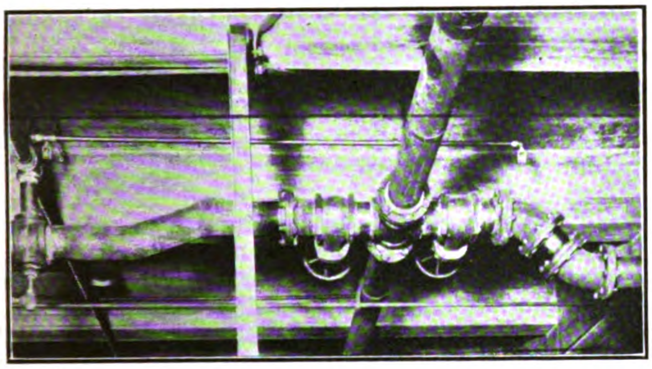


STEEL FREIGHT LOCOMOTIVE, IOWA RAILWAY & LIGHT COMPANY

The electrical equipment includes four General Electric type 207, 600-1200-volt motors rated at 145-hp. each. These are forced ventilated motors installed in connection with General Electric Type M control. Both the control equipment and the dynamotor air compressor are installed inside the car body. For the present the electrical equipment will be operated only at 600 volts, but all provisions have been made for the combined 600-1200-volt operation. The design of the control equipment permits operation on 600-volt energy with the motors in series, in series multiple and in multiple. On 1200 volts the control is arranged to operate the motors in series and in series parallel. This locomotive was built and equipped ready for service at the plant of the St. Louis Car Company, St. Louis, Mo.

Oxy-Acetylene Welds Replace Flanged Pipe Connections

Uses for oxy-acetylene welding are found almost daily, but a recent application in the sprinkler-pipe system of The Prest-O-Lite Company, Inc., Indianapolis, Ind., illustrates very forcibly that the field of usefulness is just beginning to be developed. In the accompanying illustration a welded connection is contrasted with the cumbersome flanged connections in the same pipe line.



VIEW OF WELDED AND FLANGED PIPE CONNECTIONS CONTRASTED

Two branches from a 6-in. water main in the sprinkler system became necessary in this company's plant. The main pipe was supported so close to the ceiling that offsets in the branches were required to clear the supporting concrete beams. Under ordinary conditions screwed fittings would have been used, but a drop of 7½ in. made the use of standard fittings with 6-in. pipe impossible. This connection was finally made by using regular 45-deg. flanged elbows and nipples, giving the pipe a 12-in. drop. The cost of the offset made in this manner, including materials and labor, was $17.50. Had it been possible to make the offset with standard screwed fittings the job would have cost $5.66.

The branch on the opposite side of the main, however, presented an altogether different problem. A downward offset of exactly 5¼ in. was necessary to clear pipes above and below the proposed new line. Neither flanged nor screwed standard fittings could be used, and an estimate was obtained on the cost of bending the pipe for the required offset. It was found that this would cost $18.60, including labor and material, and would entail considerable delay. As a last resort oxy-acetylene welding was employed, and three short sections of pipe, cut to the correct angles, were welded together to give the desired offset. This was done at a total cost of $3.40, which represents considerable saving as compared with the $17.50 flanged job and the $18.50 estimated for the bent pipe.

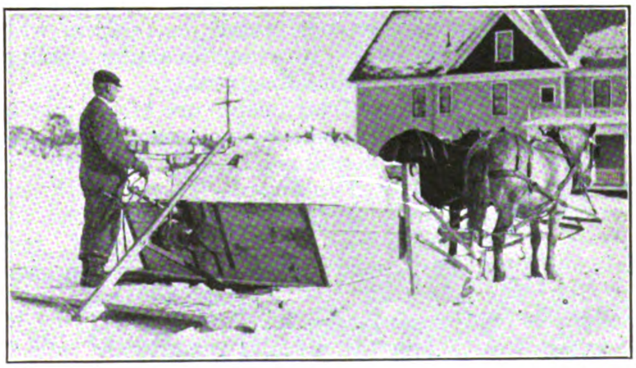
SNOW REMOVERS IN LEWISTON, ME.

Doing Away with Hand Shoveling in Snow Removal

The Lisbon Falls Manufacturing Company, Boston, Mass., has lately been developing an equipment for the removal of snow from the street which supersedes the hand shovel and dump cart method, with consequent savings in time and cost of labor. The equipment consists of a sled carrying a wrought-iron scraper which can be raised and lowered from the driver's position, a snow container and a movable bottom which can be opened and closed by a lever, shown in the accompanying illustration. The device is designed to be drawn by one, two or four horses, the latter two rigs being most serviceable. Depending upon the density of the snow, the capacity of the body varies from 1 cu. yd. with the single-horse outfit to 1.5 cu. yd., with two horses, and from 2 cu. yd. to 2.5 cu. yd. for the four-horse apparatus.

The over-all length and width of the four-horse outfit are 8 ft. x 7 ft. Oak is used in the wearing parts of the frame, the remainder being of white pine. The bottom of the snow container is lined with zinc. In the latest type of equipment the scraper is raised by hand wheel and worm, provision being made for locking the scraper in position at any point within its upward travel. The runners are inclined outward from the top on the inside at an angle of about 30 deg., to facilitate dumping snow, which can be done without stopping the rig. Two horses are usually sufficient to haul the snow remover any distance to a dumping place, but a pair of "snatch horses" are used to help draw the device along while it is being filled with heavy snow. The four-horse outfit is particularly adapted to service in larger cities, where longer hauls of snow are required. The runners are of metal and the body is of 1¼-in. plank, the boards on the bottom of the snow receptacle being 1 in. thick. The scraper has a wooden core, and is kept from dropping too far by a fixed chain attached to the cross-bar of the equipment.

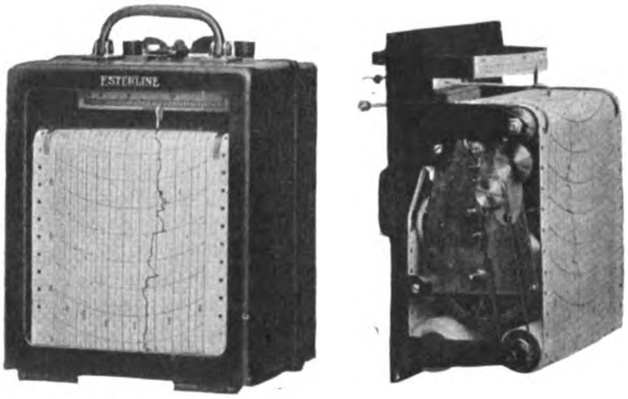
The manufacturers state that one man with one two-



REAR VIEW OF SNOW REMOVER SHOWING MEANS FOR CONTROL horse snow remover is equal to fifty shovelers and five two-horse dump carts. The snow is loaded and dumped by the driver as the horses walk; it leaves streets and gutters clear; requires no experienced operators, and is limited only by the endurance of the horses in its daily capacity. Recent sales include two equipments for the Rhode Island Company, Providence, R. I.; two to the Hudson Valley Railway, Glens Falls, N. Y., and seven to the Boston (Mass.) Elevated Railway. Other users are the Bay State Street Railway which has from ten to fifteen equipments located at Lowell, Lynn, Taunton, Brockton and Quincy, Mass., and the New York State Railways with four. The Lewiston, Augusta & Waterville Street Railway, of Lewiston, Me., has used fourteen outfits since their initial development about three years ago, and not a shovel or shoveler is required on the job. The Cumberland County Power & Light Company of Portland, Me., finds that with a two-horse machine snow can be piled 5 ft. or 6 ft. high in dumping, by having one rig follow another. The apparatus is known as the "Economy" snow remover by its makers, and was designed by Harry B. Ivers of Boston, Mass., until recently general manager of the Portland and Lewiston systems.

New Type of Graphic Meter

The Esterline Company, Indianapolis, Ind., has brought out a new type of graphic recording instrument known as the G. H. meter. It includes voltmeters and ammeters of either switchboard or portable type, weighing only 9½ lb. but designed for heavy service. The cases are of cast aluminum, and the front half is removable as in all other Esterline instruments, a brass handle being provided on the portable meters, and mounting studs on the switchboard types.



LIGHT-WEIGHT GRAPHIC METER FOR HEAVY SERVICE

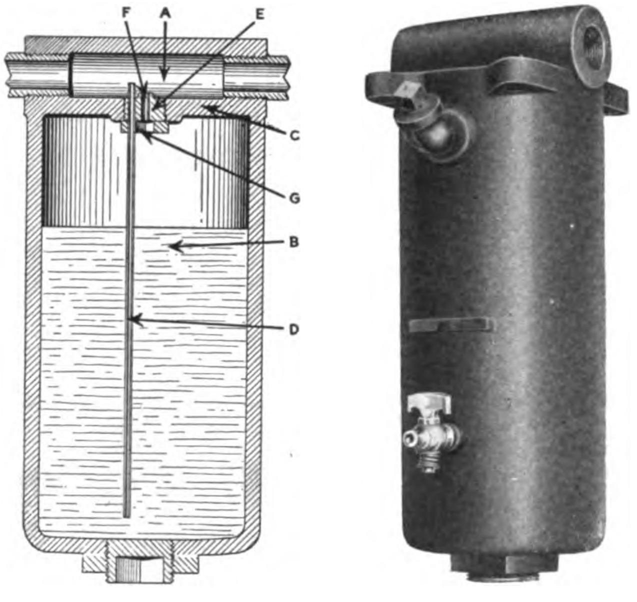
The charts are 26 ft. in length and are driven at a speed of either ¾ in. or 1½ in. per hour by an eight-day lever clock. A reroll is also provided for the used chart. A clear, open scale is obtained, this being 4½ in. in width and printed on perforated paper 6 in. wide. An indicating scale is also provided, enabling readings to be taken without opening the front.

The movements in the instruments are of the moving iron vane type, the armature being mounted in jewel bearings. The ink is contained in a large, stationary ink well, and a patented inking device enables a continuous record to be obtained with an all-metal pen, and with minimum friction. The clock movement, scale plate and all parts are mounted on a center casting, thus insuring true alignment and making all parts interchangeable and easily accessible for inspection or replacement. Although the price is remarkably low, accuracy and reliability have been maintained, and it is expected that these instruments will be used widely for checking voltage, current of street lighting circuits, etc.

Rectifier Prevents Frozen Air Brakes

Frozen air-brake systems are a rather serious difficulty encountered during low temperatures, and to obviate this trouble the air rectifier manufactured by the National Safety Device & Manufacturing Company, Chicago, Ill., has just been put on the market.

During the severe winter of 1914 and 1915 this device was thoroughly tested in service and gave entirely satisfactory results. It not only prevented the freezing of air but, in addition, softened the accumulated grease, gum and oil within the pipe system, which was very beneficial to the working of the valves. The apparatus consists of a malleable-iron container 4½ in. in diameter and 12½ in. high, which weighs 19 lb., and is attached to the air-brake pipe system leading from the air-storage tanks to the engineer's valve. Freezing is prevented by the frequent automatic mixing of very small amounts of alcohol or other satisfactory mediums with the moisture in the air-pipe system, which in addition to raising the temperature lowers the freezing point, thereby preventing the formation of frost particles. As is generally known, condensed vapor frequently becomes frozen in an air-pipe system, in which case the brakes are rendered inoperative until the obstruction is removed. The inclusion of this device in the brake-pipe system does not interfere with or obstruct the air passages in any way.



RECTIFIER TO PREVENT FROZEN AIR BRAKES

In connection with tests, it was found that the following alcohol and water mixture gave the indicated freezing points:

Water, Per Cent	Alcohol, Per Cent	Freezing Point, Deg. Fahr.
100	..	32
80	20	10
70	30	—5
60	40	—20
50	50	—35

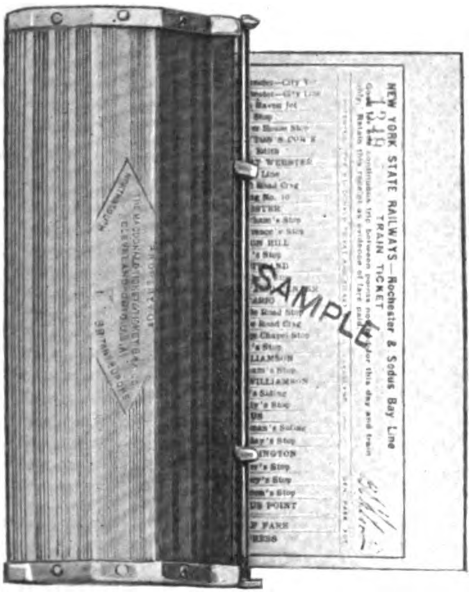
About three pints of either pure grain alcohol, or better, denatured alcohol which is just as satisfactory and much cheaper, may be placed in the container at one time. Based upon the tests made, this quantity is sufficient to last for from several weeks to three months. The principle of its operation in the air-pipe line is that of an ordinary atomizer. When the pressure in the air-brake pipe line is reduced by the operation of the engineer's valve, from 80 lb. to 70 lb., the air pressure in the container is also reduced, and this forces some of the alcohol into the air-brake pipe system.

The device consists of a malleable-iron casting with two compartments indicated on the accompanying cross-section as *A* and *B*. Communication between the two is through a hard brass tube, *D*, which is securely attached to the brass bushing *E*. This tube extends from a point about ¼ in. above the lower wall of the air-pipe line casting to within about ½ in. of the bottom of the container. In the center of the brass bushing *E* is an equalizing vent, *F*, which extends about ⅛ in. above the face of the bushing. That portion of the rectifier forming compartment *A* has two straightaway drilled and tapped outlets for ¾-in. pipe. If the air pipe on cars is smaller than this a bushing may be used satisfactorily, and if a larger size is desired these taps are increased as specified.

The rectifier may be substituted advantageously for an additional air reservoir installed to obviate the difficulty of frozen air-brake systems. It requires less space beneath the car body, is just as easy to install and costs but little, if any, more than the air storage tank and fittings. Primarily the device was designed for use during the winter months, but the manufacturers state that it may remain on the car during summer without affecting brake operation in the slightest degree. On the other hand, if the container is supplied with alcohol during the warm months it will improve braking service by keeping the grease, oil and gum cut, thus giving a freer valve operation.

Cash Receipt Holder

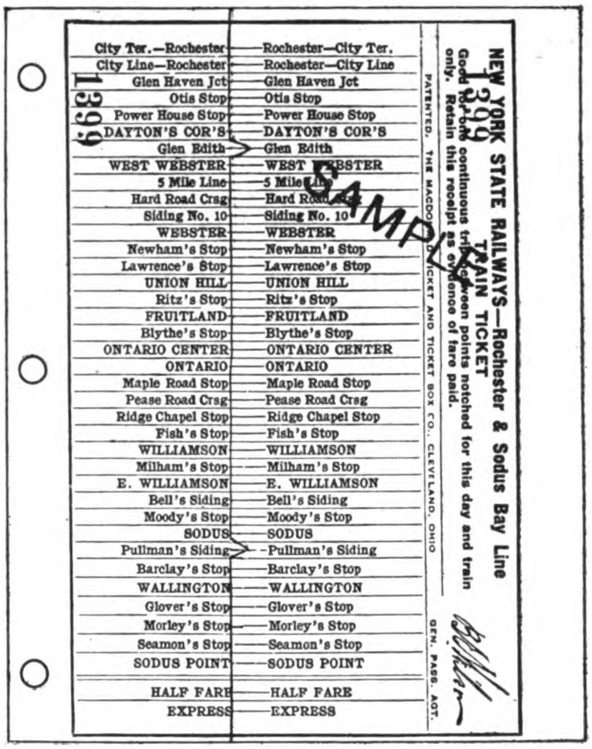
Under the ordinary duplex system of fare receipts for cash fares paid on interurban railways, the conductor punches the initial station and destination with the month, day, etc. One portion of this duplex receipt is given to the passenger and the other portion is returned to the auditing department. The time required to indicate these data is considerable, and the plan has not been found satisfactory in other ways, notably because the passenger's portion can be indicated separately from that of the audit stub.



TICKET HOLDER AND PAD

A quick method of issuing train fares in which these difficulties are avoided is embodied in a device recently put on the market by the Macdonald Ticket & Ticket Box Company of Cleveland, Ohio. This is a holder made to contain a pad of 100 receipts, assembled in flat form as distinguished from the bevelled type previously used and equipped with a register locking device which records each time the holder is opened. The method of cutting the ticket from the stub used in this device eliminates the possibility of different amounts being indicated upon the ticket and on the audit stub. It has also been found that conductors can issue these tickets in one-third and one-half the time required with the old form of duplex ticket.

In practice, one or two holders are given to each conductor with the register locking device open and the reading of the register is recorded upon the cardboard back of the pad. This enables the conductor to insert a pad of tickets at any time without increasing the register reading and eliminates the necessity of loading and unloading of holders at one central office. The holder is provided with a number of index cutters, and before each receipt is issued the conductor sets the cutter opposite the station required and tears off the receipt which is given to the passenger. The other half of this receipt is thrown into the holder by the conductor by pressing both sides of the holder together. The stub thus remains inside the holder, secure from any form of manipulation, until it is removed by the auditing department.



1399

City Ter.—Rochester	Rochester—City Ter.
City Line—Rochester	Rochester—City Line
Glen Haven Jct	Glen Haven Jct
Otis Stop	Otis Stop
Power House Stop	Power House Stop
DAYTON'S COR'S	DAYTON'S COR'S
Glen Edith	Glen Edith
WEST WEBSTER	WEST WEBSTER
5 Mile Line	5 Mile Line
Hard Road Crsg	Hard Road Crsg
Siding No. 10	Siding No. 10
WEBSTER	WEBSTER
Newham's Stop	Newham's Stop
Lawrence's Stop	Lawrence's Stop
UNION HILL	UNION HILL
Ritz's Stop	Ritz's Stop
FRUITLAND	FRUITLAND
Blythe's Stop	Blythe's Stop
ONTARIO CENTER	ONTARIO CENTER
ONTARIO	ONTARIO
Maple Road Stop	Maple Road Stop
Pease Road Crsg	Pease Road Crsg
Ridge Chapel Stop	Ridge Chapel Stop
Fish's Stop	Fish's Stop
WILLIAMSON	WILLIAMSON
Milham's Stop	Milham's Stop
E. WILLIAMSON	E. WILLIAMSON
Bell's Siding	Bell's Siding
Moody's Stop	Moody's Stop
SODUS	SODUS
Pullman's Siding	Pullman's Siding
Barclay's Stop	Barclay's Stop
WALLINGTON	WALLINGTON
Glover's Stop	Glover's Stop
Morley's Stop	Morley's Stop
Seamon's Stop	Seamon's Stop
SODUS POINT	SODUS POINT
HALF FARE	HALF FARE
EXPRESS	EXPRESS

NEW YORK STATE RAILWAYS—Rochester & Sodus Bay Line
TRAIN TICKET
1399
Good for one continuous trip between points notched for this day and train only. Retain this receipt as evidence of fare paid.
PATENTED. THE MACDONALD TICKET AND TICKET BOX CO., CLEVELAND, OHIO
GEN. PASS. AGT.

SAMPLE

PASSENGER'S STUB AND AUDIT STUB SHOWING CUTTING LINE

The holder is made of aluminum, and while it is extremely light it is very strong and durable. Owing to its extreme lightness it can be made to cover a large number of stations by increasing its length without any perceptible increase of weight.

At a recent meeting of the standing committee of the Administrative Council of the Swiss State Railways, at which estimates for construction and operation in 1916 were discussed, the sum of $583,200 was included in the estimate as a projected expenditure for the introduction of electric traction on the Erstfeld-Bellinzona line. The program provides for the appropriation of still larger sums for electrical construction in future years, so that the completion of the entire length is expected to be made by 1920.

LONDON LETTER

Dearth of Men to Operate Tramways Presents Very Serious Problem—Some Women, Efficient as Conductors, Being Trained to Replace Motormen

(*From Our Regular Correspondent*)

In Glasgow the question of operating cars is daily becoming more serious, and it is the opinion of James Dalrymple, the general manager of the tramways, that it will be necessary to have women drive some of the cars. This is a field of operation in which women have not yet performed in Great Britain. The Board of Trade has requested information from the Glasgow Corporation on the subject. More than two months ago Mr. Dalrymple reported to the tramways committee that so many men were joining the colors that in a short time there would not be a sufficient number of motormen to maintain service. For several weeks now a few women have been at this work to enable the general manager to report when the subject comes up before the committee. The women who are now operating cars have been acting as conductors since the spring. More than a month ago they were sent to the Glasgow training school for motormen along with the men. They proved apt pupils. For a week or two before they were assigned permanently they drove a car in service with an experienced motorman at hand. The latest statistics from Glasgow as to the staff show that 2600 men have already joined the colors and that 677 more have been accepted for service under Lord Derby's scheme, so that within a very short time Glasgow will be confronted with the problem of employing women as drivers or reducing the number of cars in service, as it is impossible to get capable men. In summing up the situation, Mr. Dalrymple states emphatically that at least 100 women out of the present staff of 1000 could in a very few weeks qualify to operate cars.

The officers and employees of the London County Council who are serving with the forces approximate 7000 in number, and about 620 of the central administrative staff have in addition been enlisted or attested under Lord Derby's scheme. The officers of military age regarded as indispensable are under seventy in number. It is reported by the general purposes committee, however, that the number of men on the operative staff who may be regarded as indispensable in connection with the various services will be much larger than on the administrative staff of the Council tramway.

The present services of all-night tramcars of the London County Council involve a loss of about £1,000 a year. The total number of all-night cars in service is sixteen, which is five fewer than the number before the outbreak of war. The reduction in mileage amounts to 105 car miles a night. The number of passengers carried is approximately 2000 a night, and the revenue from these cars during October, 1915, was only 5.69d. a car mile. Hitherto workmen's fares have been charged on these cars, and it is proposed by the highways committee that, as an experiment during the present abnormal state of affairs, ordinary fares should be charged from Jan. 1.

The woman tramway conductor has made her appearance in Central London. During the past few weeks women have been at work on the London County Council single-deck tramway cars running from Highbury to the Victoria Embankment. So far only a few women have been employed. They serve on the subway cars alone. Within a short time, however, a considerable addition will be made to the number in this service. Women will be employed on the double-deck cars on the Woolwich and Eltham and other outlying services. Between thirty and forty women have been trained as conductors by the London County Council tramways department. Most of them are working at the Clapham and the Holloway depots. For the present women will not be used on the cars in the crowded main-line services.

In connection with the London Electric Railway facilities bill, which was passed in an amended form limiting the proposal to the pooling of the receipts of the City & South London, the Central London, London Electric, and Metropolitan District Railways and the London General Omnibus Company, representations were made by the London County Council to the Board of Trade that the companies should be required to keep a form of accounts which would show the transactions with the common fund, and thus enable the Council to ascertain the financial effect of the pooling arrangements in regard to any particular company. The Board of Trade, however, has declined. It points out that a statement of the receipts of the separate companies before they were paid into the common fund would serve no useful purpose.

The tramcars running between Colwyn Bay and Llandudno are of the single-deck type. It is the intention of the company to augment the service by putting on a number of double-deck cars, and the Board of Trade has intimated that it sees no objection to the proposal. The Council of Colwyn Bay, however, is opposed to the change. It points to the steep Penrhyn Hill between the two towns and contends that such cars would not be in keeping with the character of the district.

The Stockport tramways committee has decided to employ women conductors on its trams. Since the war began 105 drivers and conductors employed by the committee have enlisted. Women between twenty-five and thirty-five years of age are to be employed. They will be paid at the same rate as the men.

The tramway committee of the Edinburgh Town Council is considering a report by the burgh engineer on the subject of tramway breakdowns in the city. It has been agreed to send a representation to the tramway company in connection with the matter, pointing out the inconvenience caused by the breakdowns. The committee is inclined to the opinion that the delays are attributable to the state of the track, but the company asserts that the majority of the breakdowns are due to the employment of so many inexperienced drivers on account of the demands made by the war.

The references made in this letter to the dearth of men on account of the war show that the shortage of male employees is making itself seriously felt in Great Britain. Local papers contain many complaints about service and suggestions as to the achievement of better results. In Birmingham the irregularity of running has given rise to an appeal for volunteers to become motormen to take the places of those who have left for military service. Many applications have been received, and upward of a hundred men have been interviewed. Some of these men have finished their course of instruction and are driving cars under the direction of competent motormen. More than sixty women are cleaning cars successfully, while about 600 women have been engaged as conductors and are performing their duties admirably. The whole department, however, is still about 20 per cent below strength, and men continue to leave for military purposes. Irregular running is due, it is said, in most instances to new men, who drive with infinite caution. Delays are also caused by the necessity for covering thoroughly the routes on which the munition factories are situated. The city of Hull is suffering in the same way, but everything possible is being done to mitigate the inconvenience to the public. About seventy women are employed on the cars at Hull. They are giving satisfaction. Newcastle-on-Tyne, perhaps more than any other city, is suffering from war conditions. The authorities there are calling for volunteers to operate the cars, as they are extremely shorthanded and the services have had to be curtailed. One of the reasons for the complaints in Newcastle is the fact that 50,000 more workmen are now being carried each week than in previous years. These men are largely workers in the munition factories in the vicinity. Offers from volunteers have been received from many men whose occupations would not interfere with their giving a portion of their time for railway work.

In London many of the railways have cancelled suburban trains, thereby throwing an increase of traffic on other methods of transportation. The tubes are crowded with passengers. The number of motor 'buses has been reduced. The Council trams are fewer in number and are meeting with more frequent delays by breakdowns. The extreme darkness of London streets is, according to the officials, one of the most potent reasons for bunching and delaying cars at crossings. In short all the tramways of Great Britain are being worked with the greatest difficulty and with little hope of a return to their former efficiency until after the war.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

NEW YORK COMMISSIONER RESIGNS

G. V. S. Williams Retires on Feb. 1—Governor Has Appointment of Two Members

George V. S. Williams has resigned as a member of the Public Service Commission of the First District of New York. The resignation was forwarded to the Governor on Dec. 28, and is to take effect on Jan. 31, 1916, at which time the term of J. Sergeant Cram expires. In a statement in regard to his resignation Mr. Williams said in part:

"For some time I have contemplated resigning from the commission and returning to the practice of the law, but, when the latest investigation was started, I felt that I could scarcely, in justice to myself, retire while under fire. Now that the investigating committee has gone into my actions and examined into my bank accounts I have decided to retire with the expiration of Commissioner Cram's term on Feb. 1.

"I hope that my successor will be spared investigations, charges, Grand Jury inquiries, and the like, and be permitted to do his work on the commission, for the public must realize that if public officials are to exercise their best judgment and full abilities, they must be free from continuous investigations. I do not mean to imply, however, that they should not be held to the fullest accountability for their public acts."

At the meeting of the Legislative investigating committee on Dec. 28 Chairman Thompson said he wanted the committee's attitude toward Commissioner Williams to go on record. The chairman made a statement in which he said:

"It was the intention of our committee to prefer charges against Commissioner Williams, but in view of the resignation, our committee will not feel called upon now to make any charges, nor to investigate further with particular reference to the commissioner.

"I believe the attitude of Mr. Williams as a Public Service Commissioner, and his personal view as to the manner of administration of the Public Service Law were wrong, and that his resignation has been a service to the State. I personally believe that his services would be of great value as an advocate in behalf of any public utility corporation."

Commissioner Williams was appointed on April 1, 1912. At the time of his nomination by Governor Dix he was counsel to the State Conservation Commission, and he was also an active member of the Brooklyn Democratic organization. Governor Whitman signed charges against Commissioner Williams, as well as against Commissioners McCall, Cram and Wood, last March, following the first investigation of the commission by the Thompson committee, of which Col. William Hayward, afterward appointed commissioner, was counsel. All four men appeared before the Governor at Albany and defended themselves. Commissioner Williams at one point coupled the Governor's name with men he called "cruel, piratical politicians" who were seeking his removal, and this so incensed the Governor that he threatened to remove Mr. Williams on the spot if he did not retract his statement. Two weeks later the Governor dismissed the charges against all four men. As a result of the retirement of Commissioner Williams on Feb. 1 and the expiration of Commissioner Cram's term on the same date, Governor Whitman will have had the appointment of four members out of the five. He has already appointed Chairman Straus and Commissioner Hayward.

SELECTING CHICAGO TRACTION COMMISSION

The subcommittee of which Henry B. Capitain is the chairman, has begun the work of selecting the three members of the Chicago traction commission who can be recommended to the local transportation committee, and later be confirmed by the Chicago City Council. Bion J. Arnold has tentatively been selected as the Chicago member of this commission, and William Barclay Parsons, New York, has been tentatively selected as the second member. The committee is considering a third member whose qualifications will make him especially fitted to round out a commission made up of the two members tentatively decided upon. The subcommittee is anxious to decide on the three members so that it can report to the local transportation committee, and obtain prompt approval by the Chicago City Council. This would permit actual investigation of Chicago transportation problems to begin early in January, 1916.

INCREASES IN WAGES IN NEW YORK

All the Principal Companies in the Greater City Raised Wages on Jan. 1

Increases in wages were announced on Dec. 24 by the Interborough Rapid Transit Company, New York Railways, Third Avenue Railway and the Brooklyn Rapid Transit Company. The increase of the Interborough Rapid Transit Company to the men in the station and transportation departments and the chief engineer's department is largely a horizontal one of 10 cents an hour, but in several cases is as much as 25 cents. Conductors are now paid as follows: first and second years, $2.35 a day; third year, $2.45 a day; fourth year, $2.55 a day; fifth year, $2.60 a day. The new rates are as follows: first and second years, $2.45 a day; third year, $2.55; fourth year, $2.65; fifth year, $2.70. Guards, who are now paid $2 a day for the first and second years, $2.10 for the third year, $2.20 for the fourth year and $2.30 for the fifth year, will receive $2.10 for the first and second years, $2.20 for the third year, $2.30 for the fourth year and $2.35 for the fifth year. Motormen have been paid $3 a day for the first year, $3.50 a day for the second, third, fourth and fifth years and $3.75 after the fifth year. They will be paid $3.25 the first year, $3.50 the second and third years, $3.60 the fourth year, $3.70 the fifth year, $3.80 after five years and $4 after eight years.

The present rate of pay per hour of the conductors on the electric lines of the New York Railways is as follows: first year, 24 cents; second year, 25 cents; third and fourth years, 26 cents; fifth year and thereafter, 27 cents an hour. This scale is to be increased 1 cent an hour for each period mentioned. The present pay for motormen of electric lines is 25 cents the first year, 26 cents the second year, 27 cents the third and fourth years and 28.5 cents the fifth year and thereafter. This scale is to be increased 1 cent an hour for each period mentioned. Conductors on storage battery lines now receive 22.5 cents an hour the first year and thereafter. In the future they will receive 23.5 cents the first year and 24 cents thereafter. Motormen on storage battery lines now receive 25 cents the first year and thereafter. Under the new scale they will receive 25 cents the first year and 26 cents thereafter.

The Brooklyn increase of wages is effective on Jan. 1. The increase applies to all motormen and conductors on the surface lines, all conductors and guards on the elevated and subway lines, all motormen on the elevated and subway lines who have been in service ten years or more, and miscellaneous transportation employees. The rate for surface motormen and conductors is increased uniformly 1 cent an hour, the new rates ranging from 25 cents to 29 cents an hour, depending upon efficiency and the period of service. The elevated motormen in service over ten years are advanced from $3.75 a day of ten hours to $4. The increase granted to elevated conductors and guards is by way of liberal time allowance, the compensation paid being for a minimum number of hours whether the employee is on duty for the full minimum time or not. In announcing the action of the company, T. S. Williams, president, called attention to the fact that this is the third general increase in wages during the last three and a half years.

On Dec. 29 the Second Avenue Railroad, which operates 25 miles of line in Manhattan, announced an increase of 1 cent an hour in the wages of motormen, conductors, switchmen and others. More than 400 men are affected.

ENTRANCE OF INTERURBAN RAILWAYS TO CINCINNATI DISCUSSED

In an interview with City Engineer Frank Krug of Cincinnati, Ohio, on Dec. 21. Charles L. Henry, president and general manager of the Indianapolis & Cincinnati Traction Company, stated that work on the extension to Cincinnati would be begun in the spring, if definite arrangements are made for the admission of the cars to the business section of the city. He suggested that a viaduct 3000 ft. long crossing the Cincinnati, Hamilton & Dayton Railroad and the Baltimore & Ohio Railroad at Queen City Avenue, be built to provide an entrance for his road. He advocated the city building the viaduct, as it may take advantage of condemnation laws which are not open to private corporations. He said that his company is willing to rent the viaduct and that it will advance $100,000 on its rental to make it easier for the city to take care of the construction work. It is estimated that a viaduct of the length required would cost $600,000. Mr. Henry's suggestions will be embodied in Mr. Krug's report to the Rapid Transit Commission.

Mr. Krug also conferred with Charles C. Harris of the Cincinnati, Milford & Loveland Traction Company. Mr. Harris expressed the desire of his company to have its cars enter the city by way of the belt lines. Financial conditions, however, made it difficult for the company to commit itself definitely to any proposition at the present time.

W. Kesley Schoepf, as the representative of the Ohio Electric Railway and Ohio Traction Company, informed Mr. Krug on Dec. 22 that these roads will make connections with the rapid transit belt when it is completed. Mr. Schoepf thought that the loop operating company should furnish the power. He told Mr. Krug that he had been informed that the Union Gas & Electric Company, on the completion of its plant, will be prepared to furnish the Cincinnati Traction Company with power at $40,000 a year less than it is costing now to generate it. He thought that power for the operation of the belt line could be secured from the same source. Mr. Schoepf agreed with Charles L. Henry that to carry city passengers on the interurban cars would defeat the purposes of the plan.

Mr. Krug conferred with H. E. Frost, auditor Cincinnati & Columbus Traction Company, on the same day. Mr. Frost estimated that the cost of making a connection for his road would be about $20,000. This completes Mr. Krug's interviews with representatives of the interurban roads. Each will submit estimates of the cost of making connections, and Mr. Krug will then prepare a report to be presented to the Rapid Transit Commission.

MULTIFARIOUS DUTIES

What It Means to Be Second Vice-President, Secretary, Treasurer, Auditor and Superintendent of a Company

Operators of small properties will appreciate the humor of a short article "Has Nothing on Roger," taken from the Thanksgiving number of *On the Cars*, which is published every now and then by the management of the Sioux Falls (S. D.) Traction System. The article follows:

"The newspapers are printing columns extolling Bill Harriman, son of the deceased railroad magnate, because although vice-president and director of dozens of railroads and heir to $75,000,000 he dons blue overalls and works as a section hand in the shops. He is given great credit because he eats out of a tin dinner pail and speaks to the workmen.

"Well our Roger, although he is a college man and vice-president, secretary and treasurer and superintendent and assistant to the president and general manager of the great Sioux Falls Traction System, does the same things as the wonderful Bill, also keeps the books, helps Jack Gibson run the immense shops of the system, runs on cars as motorman or conductor, greases the track if necessary, counts the nickels, but only draws one salary and inherits a goodly proportion of the abuse meted out in these latter days to street car operators, who are suckers enough to invest all the money they have and can borrow for the benefit of a community and city which sometimes seems to lay awake all night to concoct schemes to down them. However, the future has laurels in store for us all and Roger will come into his own. It is being recognized that he has all the virtues of Captain Brooks and his old dad with none of their vices and if he has to be a sort of scapegoat for the system he is young with lots of backbone and can stand it. You want to get acquainted with him. He can give aces and spades to Bill Harriman and beat him to it."

The Roger referred to is none other than R. C. Mills, whose official title is second vice-president, secretary, treasurer, auditor and superintendent of the company.

STUDY UNDER THE UNIVERSITY FOR SAN FRANCISCO MEN

Jesse W. Lilienthal, whose work in the interest of his men since he assumed the presidency of the United Railroads, San Francisco, Cal., has attracted nation-wide attention, recently made the following announcement:

"It is not the character of the job or the compensation that is paid for it, but the manner in which it is performed, that gives it dignity. In other words, a man should be judged not by the particular task that he is performing, but by the spirit, intelligence, industry and loyalty that he brings to bear upon it. At the same time, it is a laudable ambition for a man to want to advance himself; to acquire such learning and experience as will enable him to fill a position that earns larger compensation than he is getting. I, for one, am ready to encourage such an ambition. With that in view, I think it my duty to bring to your attention the plan of the University of California to extend to those who are at work some of the benefits of a broader education in a way that will not involve any interruption of the work from which they earn their livelihood.

"It is proposed to give courses of instruction in San Francisco at some place and time that will be convenient to workers by regularly accredited instructors of the university. Among the courses that might be expected to appeal particularly to employees of our company are mathematics, mechanics, electricity and languages. The subjects. however, can be selected according to the wishes of those who would care to take a course.

"For a course of fifteen lessons of one hour each the university makes a charge of $5 per person, or about 30 cents an hour. This is the only expense to the student, except the cost of text-books, which is from $1.25 to $2.25 for the entire course. It is proposed to hold meetings once a week, and, as already said, at such time and place as will be most convenient for the students. I should be willing to have the carhouses used for the purpose as far as practicable.

"The instruction would consist of lectures, demonstration experiments, and assignments of home work calculated to call for about five or six hours of such home study in each week.

"I am willing to help you arrange to do this in every way possible. If the idea should strike any of you favorably, I recommend that you arrange among yourselves for groups of fifteen, sending in to me the names of men composing such groups, the particular subject you would like to have taught, and the place and time that you would consider most convenient for you.

"I realize that many of you find your regular work so fatiguing that you would prefer to reserve all your leisure hours for recreation, but I have learned from my own experience that it is wonderful how much recreation can be derived from the stimulating influence that comes from learning new things, and perhaps some of you will prefer that kind of recreation to any other. If any of you do, I shall be happy to co-operate to have the instruction given in the most effective and convenient way possible."

BROOKLYN MECHANICAL DEPARTMENT SAFETY SHOWING

The report of the departmental safety committee of the Brooklyn (N. Y.) Rapid Transit Company mechanical department for the fifth quarter, dated Oct. 1, says that following the practice of several other departments the mechanical department finally determined that it would be to the best advantage of all concerned if membership in the Employees' Benefit Association became a definite part in the employment of all new employees of the department. Notice to this effect was issued on Aug. 6.

In the report William G. Gove, superintendent of equipment of the company and chairman of the safety committee of the mechanical department, calls attention to the offer of the company to pay half the premium upon $1,000 worth of insurance under the group plan for each employee. Mr. Gove urges the men to go in under the plan. He points out that he has been a member of the benefit association for some years past, and although he is not eligible under the plan whereby the company would pay part of his premium, he has applied for $5,000, the full amount permissible under the agreement between the railroad and the insurance company. Mr. Gove points out that under this insurance agreement the Brooklyn Rapid Transit Company has secured for its employees the option of annual renewals at the rates specified for at least twenty years and that the company is at liberty to make arrangements elsewhere if at any time during that period better rates can be obtained.

The total expenditure of the mechanical department for safety work is $9,985. Of this amount $2,172 was expended during the quarter covered by the report under review. Among the expenditures during the last quarter were $109 for the construction of boxes to transport supplies and to prevent injury from nails in kegs, etc., and $54 to purchase respirators for the use of those employed in cleaning parts of equipment with compressed air. Mr. Gove directs attention to the very creditable record as reflected in the accident tabulations of the department, which shows a total of 135 accidents at all shops. This compares with 146 for the previous quarter and 293 for the same quarter a year ago.

INJUNCTION AND DAMAGES IN WILKES-BARRE STRIKE

The Wilkes-Barre (Pa.) Railway has applied to Judge J. B. Woodward for an injunction to restrain strikers and officials of the union from interfering with the operation of cars, picketing and boycotting and has asked damages in the sum of $200,000 from the strikers and officials for loss of fares, destruction of property, etc. The company charges a breach of contract because the strikers refused to abide by the award of the board of arbitration. It is pointed out in the petition that arbitrators were named and an award filed, and it is contended that after the men had accepted payment on the award and had returned to work, a strike was called in violation of the agreement.

New Canadian Line Opened.—Operation has been begun by the Three Rivers Traction Company, a subsidiary of the Shawinigan Water & Power Company, on its 3-mile line in Three Rivers, Que.

Toledo Committee to Complete Hearings in January.—The street railway committee named by Mayor-elect Milroy of Toledo, Ohio, has arranged for four meetings in January, and these will complete the public hearings for the purpose of securing ideas from those who opposed the Dotson franchise. No meetings were held during the holidays.

Buffalo & Depew Railway in Operation.—U. L. Upson, superintendent of the Buffalo & Depew Railway, Depew, N. Y., informs the ELECTRIC RAILWAY JOURNAL that in the so-called strike on that property the platform men put their cars in the carhouse and walked away, and that he immediately secured new men, who are now operating the cars. Mr. Upson was not called upon to act as either motorman or conductor, as was previously reported.

Extension Asked Under St. Louis Ventilation Order.—The United Railways, St. Louis, Mo., made application to the Public Service Commission, on Dec. 18, for an extension of time until Oct. 1, 1916, for equipping all of its cars with forced ventilation heaters. The time accorded the company by the commission under an old order was until Oct. 15, 1915. At that time the company had equipped 1018 cars. It has since increased the number to 1075. The company has 1400 cars, and states that it is equipping them at the rate of twenty-five a month.

St. Paul Electrification in the Movies.—At the recent tests of the Chicago, Milwaukee & St. Paul Railroad's new electric locomotives operators from the *Hearst-Selig Weekly* and the *Pathé News* made several motion pictures. Exterior and interior views of the Great Falls power plant, the important substations, the last steam locomotive and the first electric locomotive over the electrified division were included in these reels, which contain between 500 and 600 ft. of film. The Hearst-Selig motion pictures are being exhibited at moving-picture theaters throughout the United States, and the Pathe pictures will be distributed throughout the world.

Work to Begin on Cleveland Subway.—Thomas Schmidt, secretary of the Cleveland Rapid Transit Railway, states that work will be begun on the proposed subway at three different points in January. An opening will be made at the Public Square, another on Euclid Avenue at East Fifty-fifth Street and a third on the same street at University Circle. Plans filed with the director of public service call for six stations on Euclid Avenue between the Public Square and University Circle. The line must be completed within thirty months after the work is started and must be in operation within forty-two months from that time.

Seattle Car Suit Decision.—The State Supreme Court of Washington, reversing the decision of Judge Frater of the King County Superior Court, has allowed a claim of $35,000 against the Seattle, Renton & Southern Railway for six cars which were sold to the railway by the Gordon & Henderson Car Company, Chicago, in 1909. Judge Frater refused to allow the claim on the ground that the contract for the cars had been entered into with the railway receivers appointed by the Federal court, who were afterward declared to have been appointed illegally. He agreed to approve the claim, however, provided it was assigned with the claims of the general creditors, instead of as a prior claim on the company's assets. This the claimants refused. In reversing the decision of Judge Frater the Supreme Court ruled that as the present State court receivers had ratified the contract the act of the Federal Court receivers in contracting for the cars was not void.

Changes in the Staff of the Society for Electrical Development.—A number of changes have been made in the staff of the Society for Electrical Development, Inc., New York, N. Y. George B. Muldaur, who had charge of the field co-operative work, has severed his connection with the society. H. W. Alexander, who is in charge of the editorial and the advertising departments, will undertake part of the work formerly done by Mr. Muldaur, assisted by G. W. Hill. The publicity work of the society has been handled by J. T. Kelly, who will remain with the society, and will, in addition to his former duties, undertake some of the work formerly handled by Mr. Alexander. W. W. Ayres and J. J. Reardon, who joined the staff for the electrical prosperity week campaign, have left the society, as has also C. Ridderhof, whose work consisted of the preparation of advertising copy, booklets, etc., and whose successor is C. H. Griffith, formerly with the McJunkin Advertising Agency in Chicago.

San Francisco Ferry Case Decided.—Judge Seawell, at San Francisco, Cal., on Dec. 17 granted the United Railroads an injunction against the operation of the "C" and "D" lines of the Municipal Railway over the outer loop at the ferry, but refused to grant the injunction sought against the same "C" and "D" lines on the outer tracks on lower Market Street from Sutter Street to the ferry. He held that the city and the United Railroads were joint tenants, with equal rights on these outer tracks, instead of the city being the servient tenant of the United Railroads, with an easement running only to the use of the tracks by the original Geary Street cars. Judge Seawell also upheld Judge Sturtevant's interpretation of the contract between the city and United Railroads for the use of electric power on the outer tracks, and for transfers, as applying only to the original Municipal Railways cars on Geary Street, and not applicable to the newer "C" and "D" lines, unless the United Railroads chose to extend its terms.

Speculating on Commission Legislation in New York.—The New York papers on Dec. 27 all contained stories about the prospects for legislation at the coming session growing out of the present inquiry into the Public Service Commissions. It is said that Chairman Thompson of the Legislative investigation committee will again introduce a measure designed to meet conditions which the investigation has brought to light. One of these will be a provision which will tend to make it impossible for a commissioner to hold stock in a public utility corporation in the name of his wife or a relative. The commission proposed by Senator Thompson would have all powers which are lodged in state-wide commissions, but would have nothing to do with the building of new subways for New York City, his idea being to lodge the supervision of the building of new subways either in the hands of the Mayor or the Board of Estimate, preferably the latter. The salaries of the commissioners would also be cut from $15,000 to $10,000 a year.

Services Over the Late Mr. Goodrich.—Funeral services for Calvin G. Goodrich, late president of the Twin City Rapid Transit Company, were held at the family home in Minneapolis on Dec. 24, at 2.30 p. m. Burial was at Lakewood cemetery. Rev. Marion D. Shutter of the Church of the Redeemer led the impressive ceremonies. Rev. Mr. Shutter reviewed the life of Mr. Goodrich from the time he entered the employ of the company, up through the various stages which finally led to leadership of the concern. Quoting a street railway employee, he said: "Mr. Goodrich did not occupy the position of an employer, but was more our comrade. He rarely criticised an employee and was inclined to correct him by making suggestions of a better or more efficient way in which to do the work. He taught us with kind words. He was the fairest, squarest man I ever met." The pallbearers were all officers of the Twin City Rapid Transit Company. They were A. M. Robertson, third vice-president; A. W. Warnock, general passenger agent; G. L. Wilson, engineer of maintenance of way; W. J. Smith, master mechanic; E. A. Crosby, treasurer; D. J. Strouse, auditor; F. H. Scofield, engineer of power and equipment; W. Whiteford, purchasing agent; P. J. Metzdorf, park manager.

PROGRAMS OF ASSOCIATION MEETINGS

Wisconsin Electrical Association

The annual convention of the Wisconsin Electrical Association will be held at Milwaukee, Wis., on March 16 and 17. Headquarters will be at the Hotel Pfister. The Wisconsin Gas Association will meet on March 15 and be in joint session with the Wisconsin Electrical Association on March 16. The program for the meeting is now in preparation and will be announced later.

M. C. B. and M. M. Associations

The Master Car Builders Association and the American Railway Master Mechanics Association will hold their nineteen-sixteen convention at Atlantic City, N. J., on June 14 to 16, and June 19 to 21, respectively. The Railway Supply Manufacturers' Association will hold its exhibition at the same time and place, and have once more secured Young's Million Dollar Pier for the exhibition.

American Wood Preservers' Association

The twelfth annual convention of the American Wood Preservers' Association will be held at Hotel Sherman, Chicago, Ill., on Jan. 18, 19 and 20, 1916. The effect of the European war on the American timber industry will be discussed from the viewpoint of importers of creosote oil and users of this important wood preservative, as well as by representatives of American manufacturers of wood preservatives.

Northern White Cedar Association

The twentieth annual meeting of the Northern White Cedar Association will be held in the Empire room of the Hotel Radisson at Minneapolis, Minn., on Jan. 13 and 14. Among the topics to receive attention will be the matter of publicity for Northern white cedar products, in line with similar action by allied lumber interests. Plans will also take form for educating the trade to the advantages of dealing with its members, who sell only to recognized dealers, affording the greatest possible protection on purchases with a practical guarantee of quality.

Financial and Corporate

ANNUAL REPORT

San Francisco-Oakland Terminal Railways

The comparative statement of income, profit and loss of the San Francisco-Oakland Terminal Railways, Oakland, Cal., for the fiscal years ended June 30, 1914 and 1915, follows:

	1915	1914
Operating revenue	$4,341,891	$4,515,798
Operating expenses, including maintenance	$2,845,728	$2,929,920
Taxes and licenses	251,882	239,000
Operating income	$1,244,280	$1,346,877
Miscellaneous income	74,555	125,963
Total income before charging interest and depreciation of road equipment	$1,318,835	$1,472,841
Interest on bonds and notes	1,101,111	1,057,499
Balance	$217,723	$415,341

The decrease in gross earnings was principally caused by jitney bus competition during the first six months of 1915, which, it is estimated, diverted from the company at least $150,000 in revenue for this period. Had it not been for the jitneys, the operating revenues of the company would have been substantially up to those of the preceding year, the decrease being $173,907. Operating expenses were reduced $84,191, but taxes were larger by $12,881 and there also was a decrease of $51,408 in miscellaneous income, so that the total income fell off $154,005. Interest on bonds and notes increased $43,612, and the surplus for the year was $217,723, as compared with $415,341 for the preceding year, a decrease of $197,618.

The special charges against surplus during the year included $89,338 for depreciation on equipment, in accordance with the requirements of the Interstate Commerce Commission, and $96,318 reserve for advances to the Oakland Terminal Company. With $78,000 of interest charged to capital assets, the company carried $110,120 to profit and loss for the year. In previous years it had carried on its books credits for rebates on the contract for power with the United Light & Power Company, but, as it was found impossible to collect these rebates, the practice was discontinued during the last year and the credits theretofore set up were written off. If this method had been followed for the year ended June 30, 1914, operating expenses for the last fiscal year would have shown a reduction of $140,825 instead of $84,191, and the operating income would have shown a decrease of only $55,963 instead of $102,597.

The company also discontinued the policy of capitalizing interest on non-operative rights of way, as well as the policy of charging non-operative real estate properties with interest at 6 per cent. These two changes resulted in decreasing the amount of miscellaneous income. The balance sheet of the company showed an increase of $1,122,385 in property account, of which $1,010,437 was in road and equipment valuations. Most of these additions were on account of the new terminal and pier improvements, funds for which were provided in 1912. The funds on hand June 30, available for construction expenditures, amounted to $210,441, most of which consisted of the balance deposited in trust for the pier improvements. Substantially all of this has been expended since the close of the fiscal year.

It is said that progress is being made in the reorganization and the refinancing of the company and its subsidiaries, and the change in the contract for power, by which it will obtain a materially lower rate through the new contract with the Consolidated Electric Company, will result in further decreasing operating expenses. In case the proposed reorganization plan can be carried out, it is expected that the current fiscal year will show much improved earning power.

While the reorganization committee has not yet completed details of the plan, it will make the following provisions: The funded debt of the company will not be scaled down; F. M. Smith will retain his stock equity; the $3,600,000 of Oakland Railways and Oakland Terminal notes will be extended; the new first mortgage bond issue will cover the operative properties to an amount to be later determined; the second mortgage bonds will have a prior lien on the non-operative properties to an amount to be later determined; at least six and possibly eight of the existing mortgages will be provided for in the new first motrgage bonds at par, and the remaining mortgages will receive a percentage in new first mortgage bonds and a percentage in new second mortgage bonds, these percentages to be determined later.

The six issues which will receive par for par in new first mortgage bonds aggregate $6,235,000, and the issues which will receive a percentage of both first and second mortgage bonds aggregate $7,563,000. The lowest percentages which have been considered in relation to any issue of the lower class bonds is 25 per cent in first mortgage bonds and 75 per cent in second mortgage bonds. The period for extending the Oakland Railways and the Oakland Terminal notes, both of which matured in 1912, is tentatively fixed at five years.

ST. LOUIS EARNINGS DECLINE

President McCulloch Estimates Decrease of $800,000 in Gross for 1915—General Depression and Drastic Service Regulations Said to Be the Causes

The gross earnings of the United Railways of St. Louis will be approximately $800,000 less for 1915 than for 1914, according to an official statement by President Richard McCulloch. The gross earnings of the company in 1914 were $12,450,924, and the net earnings from operations totaled $3,038,395. In commenting upon this showing President McCulloch says:

"The last year has been one of the most difficult in the history of the company. The financial depression caused by the war, resulting in the closing down of shops and factories and the curtailment of buying, forced a large number of men out of employment. When men are out of employment they do not ride; neither do their families ride. This naturally affected adversely the earnings of the company. In the face of the estimated decrease of $800,000, exactions in regard to service made by the Public Service Commission in its order early in the year, were particularly onerous. The standard of service which it set for the company was more drastic than has been required in any other American city by a regulating commission."

Circuit Judge Anderson recently affirmed the referee's report requiring that eight stockholders of the old St. Louis Transit Company, including the United Railways of St. Louis, must prorate a $45,119 judgment against the old company according to the amount of their unpaid stock subscriptions. The United Railways of St. Louis had pleaded that it was not responsible for accident claims against the old company, which it owns, but suit was brought by interests who had bought up various claims, to force the stockholders of the old company to pay for their stock in full, thereby creating funds to meet the claims. Previous reference to this case was made in the ELECTRIC RAILWAY JOURNAL of July 17.

SECURITIES FOR SAVINGS BANKS

The Massachusetts Public Service Commission has transmitted to the Bank Commissioner the following list of local street railways whose bonds are legal investments for savings banks: Boston & Revere Electric Street Railway, East Middlesex Street Railway, Fitchburg & Leominster Street Railway, Holyoke Street Railway, Springfield Street Railway, Union Street Railway (of New Bedford), West End Street Railway, Worcester Consolidated Street Railway and Boston Elevated Railway. The statutes do not require the commission to determine whether or not the provisions for maintenance and depreciation made by the companies have been adequate. The general intent, however, is that a company cannot qualify in the list unless it has annually earned and properly paid, without impairment of assets or capital stock, an amount in dividends equal to at least 5 per cent upon its outstanding capital stock in each of the five preceding years.

MICHIGAN RAILWAY LEASES LINES

Under New Arrangement Company Operates Directly About 550 Miles of Road, with 50 Miles to Be Added

The Michigan Railway, which built and has operated the third-rail 2400-volt line between Grand Rapids and Kalamazoo, Owosso and Bay City, Mich., and which also has operated the interurban road between Flint and Saginaw and Bay City, Mich., has leased the roads previously operated by the Michigan United Traction Company, extending from Kalamazoo to Jackson and Grass Lake and from Jackson to Lansing and Owosso. It has also leased and will operate the lines of the Grand Rapids, Holland & Chicago Railway, extending from Grand Rapids to Holland, Mich., and other Black Lake points, from which there is direct boat connections to Chicago and points on the west shore of Lake Michigan. Under the new arrangement, effective on Jan. 1, all of the roads will be operated as one property, under the active supervision of John F. Collins, vice-president and general manager. General office and headquarters will be maintained at Jackson. A previous statement regarding the relationship of these companies was published in the ELECTRIC RAILWAY JOURNAL of Oct. 9.

These developments will result in the company having one of the largest interurban railway properties in the United States, comprising about 550 miles of road. Its mileage will be increased to more than 600 miles when the connecting links from Owosso to Flint and Owosso to Saginaw are completed. The new plan will standardize and systematize all the lines. The company plans to do a general railway business, including fast freight and express and a high-grade passenger service. The management will continue its policy of developing the road to its largest possibilities, including the carriage of car-load freight, and physical connection and interchange of traffic with steam roads. The company is a subsidiary of the Commonwealth Power, Railway & Light Company, and is under the management of Hodenpyl, Hardy & Company, New York.

Birmingham Railway, Light & Power Company, Birmingham, Ala.—The directors of the Birmingham Railway, Light & Power Company have declared a semi-annual dividend of 3 per cent on the preferred stock, payable on Dec. 30 to holders of record on Dec. 24. This payment marks a resumption of dividends, which were suspended for both preferred and common stock in June, 1915, owing to business depression.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—In response to the request of the Ohio Electric Railway that its lease of the Cincinnati, Dayton & Toledo Traction Company be modified, a number of bondholders of the latter company recently met in Cincinnati to discuss the matter. One of the bondholders suggested that a syndicate be formed to take over the $2,700,000 of outstanding consolidated mortgage twenty-year gold 5 per cent bonds at their market value, 70, a payment of 10 per cent of the purchase price to be made in cash and the remainder to be covered by collateral trust bonds secured by the entire present issue of bonds purchased by the syndicate. At 70 the outstanding bonds would aggregate $1,890,000. A deduction of 10 per cent of this amount, or $189,000, would leave a balance of $1,701,000 to be distributed to the bondholders in collateral trust bonds. On the new bonds the interest charge would be $85,050 instead of $135,000, which the Ohio Electric Railway is now paying. It is said that this proposal will be considered. A previous modification of the lease was made on June 23, 1913.

Cities Service Company, New York, N. Y.—By virtue of the recent financing through the sale of $5,000,000 of preferred stock and $2,500,000 of common stock to a syndicate for $5,000,000 in cash, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 20, the Cities Service Company is now in a position to liquidate all its floating obligations. When this has been accomplished, the only obligations prior to the preferred stock will be $7,000,000 of 7 per cent notes to mature in 1918, with the exception of such convertible debentures and debenture certificates as may not be converted. Under the new financing the company will have outstanding on Jan. 1, 1916, a total of $31,168,426 of 6 per cent preferred stock, and in addition there will be outstanding $2,354,994 of 5 per cent debentures convertible into 100 per cent preferred and 25 per cent common stock, and $1,323 567 of certificates exchangeable for similar debentures. With all debentures and certificates converted there would be outstanding $34,847,751 of preferred stock. Following this is $17,218,380 of common stock, which with the conversion of all debentures and certificates will be increased to $18,138,211. According to the official circular of the company, it appears certain from the rapidly growing earnings of subsidiaries that even with the increased issues a better showing will be made in 1916 for the preferred stock, and the common stock as well, than in 1915. The debentures which the company will issue to liquidate the 9 per cent accrued dividends on its preferred stock up to Jan. 1, preparatory to resuming the cash dividends on Feb. 1, will be known as Series A 5 per cent convertible gold debentures, dated Jan. 1, 1916, and maturing on Jan. 1, 1966. They will be callable at any interest date at 102 and interest on thirty days' notice. The amount of debentures of the present series to be issued is $5,000,000, of which above the amounts to be distributed about $1,321,400 will be held in the treasury. The issue of additional debentures is made contingent upon specific rates of earnings.

Clarksville & Dunbar Cave Railway, Clarksville, Tenn.—Pursuant to a decree of foreclosure in the case of Robert Parks, trustee, against the Clarksville & Dunbar Cave Railway, the property of this company has been sold at a commissioner's sale for $3,000. E. B. Hamilton, representing the bondholders, was the only bidder. Immediately after the sale an order was issued on behalf of the bondholders that all operations of the defunct corporation should immediately be discontinued. According to information available at Clarksville, it is the intention to scrap or remove the plant unless there should be some immediate developments in the direction of purchase for continued operation by other interests. The railway is said never to have been profitable to the owners. The appointment of a receiver for the property was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 4.

Cleveland, Youngstown & Eastern Railway, Cleveland, Ohio.—The Chagrin Falls & Eastern Railway division of the Cleveland, Youngstown & Eastern Railway was sold at foreclosure in 1915 by order of the court, and all the rails, trolley wires, etc., were sold for salvage. The remaining division, from Cleveland to Chagrin Falls, is now operated as the Cleveland & Chagrin Falls Railway.

Connecticut Company, New Haven, Conn.—Leonard M. Daggett has been appointed as one of the trustees of the Connecticut Company to succeed the late W. W. Hyde.

Dominion Power & Transmission Company, Ltd., Hamilton, Ont.—On Dec. 15 the last payment of one-half of 1 per cent, making a total of 10 per cent, was made on the $5,100,000 of limited preference stock of the Dominion Power & Transmission Company, Ltd., thereby making this common stock.

Empire United Railways, Inc., Syracuse, N. Y.—Statements have recently appeared in the Syracuse local papers to the effect that the Loasby bondholders' protective committee will oppose the retention of C. D. Beebe as head of the company. This report is in accord with the announcement of the committee noted in the ELECTRIC RAILWAY JOURNAL of Dec. 25, in which it was said that the committee was not inclined to favor any plan of reorganization contemplating a continuance of the present "management." It is understood that these reports concern merely the financial management, and no change in the physical or operating management is intended.

Glendale & Montrose Railway, Los Angeles, Cal.—The California Railroad Commission has issued an order setting a valuation upon the operative property of the Glendale & Montrose Railway. The production cost, less depreciation, is fixed at $189,408.

International Railway, Buffalo, N. Y.—The ten Buffalo & Niagara Falls Electric Railway second mortgage sinking fund bonds of July 1, 1896, amounting to $10 000, have been called for payment on Jan. 1 at 105 and interest at the Bankers Trust Company, New York.

International Traction Company, Buffalo, N. Y.—The initial dividend of seven-eighths of 1 per cent has been declared on the new $5,000,000 of 7 per cent cumulative preferred stock of the International Traction Company together with a dividend of one-half of 1 per cent on the old 4 per cent preferred stock, both payable on Jan. 15 to holders of record on Jan. 3.

Lancaster & York Furnace Street Railway, Millersville, Pa.—The Lancaster County Court, it is reported, has been asked to appoint a receiver for the Lancaster & York Furnace Street Railway. As noted in the ELECTRIC RAILWAY JOURNAL of July 24, the company defaulted the July 1 interest payment on its $150,000 of first mortgage 5 per cent twenty-year gold bonds of 1908.

Lehigh Valley Transit Company, Allentown, Pa.—For the year ended Nov. 30 the Lehigh Valley Transit Company reports the largest earnings in its history. Gross revenues from operation increased from $1,869,006 to $2,056,875, an amount of $187,869 over the previous year, and the net revenue increased from $816,313 to $926,040, or $109,727. The net income of the company increased $115,266, or more than 37 per cent. This is equal to the full 5 per cent on the preferred stock and nearly 3 per cent on the common. It is said that the net income as given in the above preliminary figures is substantially the same as will be shown in the final report. The company closed its year with no floating debt and with more cash and liquid assets than ever before.

Lima-Honeoye Light & Railroad Company, Avon, N. Y.—The property of the Lima-Honeoye Light & Railroad Company is to be sold at foreclosure in Rochester, N. Y., on Jan. 31. The appointment of the receiver, C. F. Bown, 19 Elwood Building, Rochester, was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 4.

Little Rock Railway & Electric Company, Little Rock, Ark.—The directors of the Little Rock Railway & Electric Company have declared semi-annual dividends of 1 per cent on the $2,000,000 of common stock and 3 per cent on the $750,000 of preferred stock, payable on Jan. 1, the stocks being ex-dividend on Dec. 18. The previous semi-annual payments on the common stock have been at the rate of 5 per cent each.

Memphis (Tenn.) Street Railway.—The Memphis Street Railway announced that it would pay at maturity on Jan. 1 $906,000 of Citizens' Street Railway first mortgage bonds of 1887 out of part of the proceeds from the recent sale of two issues of gold notes.

New York (N. Y.) Railways.—In order to bring to an end the litigation arising out of the New York City Railway and the Metropolitan Street Railway receiverships the New York Railways has acquired the claims of the principal general creditors against the New York City Railway upon the basis of 45 per cent of the face amount of the claims. The company now offers to acquire the claims of all creditors which have not been acquired under the plan of reorganization of the Metropolitan company upon the basis of 50 per cent of the face amount allowed by the special master. Payment will be made on Jan. 15, provided the offer be accepted before that date, and approved assignments and releases be executed. The Guaranty Trust Company is asking for the deposit of assignments. Judge Lacombe in the United States Court recently took a step toward winding up the litigation over the old Metropolitan Street Railway in rendering an opinion in which he denied a motion to permit M. G. Palliser to intervene. Mr. Palliser in November, 1907, was appointed one of three receivers in the State Supreme Court, the others being Messrs. Dougherty and Fuller. They never succeeded in getting possession of the properties, which were administered by federal receivers. Messrs. Dougherty and Fuller recently resigned, and the judge found no reason to permit Mr. Palliser's intervention in the federal litigation after a lapse of eight years.

Northern Ohio Traction & Light Company, Akron, Ohio.—It is reported that B. Mahler, who for many years has been connected with the Northern Ohio Traction & Light Company, has sold his holdings in that corporation and resigned from the board of directors, in order to be able to devote more time to large real estate holdings.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The California Railroad Commission has issued an order authorizing the Oakland, Antioch & Eastern Railway to issue notes to certain stockholders who have advanced $90,911 to the company, and secure the same by pledge of bonds on a basis of 80 per cent face value of notes to 100 per cent face value of bonds.

Oklahoma Union Traction Company, Tulsa, Okla.—The foreclosure sale of this company previously noted in these columns covered only the 5 miles of city track, which section was taken over by the newly organized Tulsa Traction Company, as stated in the issue of Sept. 18. It is said that the 15-mile interurban line under construction is still in the hands of the Oklahoma Union Traction Company.

Omaha & Lincoln Railway & Light Company, Ralston, Neb.—The Nebraska State Railway Commission recently authorized the Omaha & Lincoln Railway & Light Company to issue $158,000 of additional securities, divided as follows: $125,000 of bonds, $22,000 of preferred stock and $11,000 of common stock. The original application asked for $175,000 but was later scaled to $160,000. The issues cover improvements and indebtedness.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has been granted authority by the California Railroad Commission to issue $1,402,278 of refunding fifty-year bonds and an extension of time until July 1, 1916, to issue $1,734,721 of bonds. The first amount is a portion of the $2,942,000 bond issue approved by the commission on Nov. 23, 1914, and the second a portion of the issue of $6,839,000 approved by the commission on April 8, 1913.

Pittsburgh, McKeesport & Westmoreland Railway, McKeesport, Pa.—Information just now available shows that the Pittsburgh, McKeesport & Westmoreland Railway was sold at foreclosure last June to interests identified with the Union Trust Company of Jersey City. This company was sold in February, 1913, but the purchaser did not make the required payments and James E. Secrist continued as receiver. A previous reference to this company was made in the ELECTRIC RAILWAY JOURNAL of April 24.

Public Service Corporation of New Jersey, Newark, N. J.—The financial statement issued by the Public Service Corporation of New Jersey for November shows a gross increase in total business of $307,664 or 10.10 per cent. The balance available—after payment of operating expenses, fixed charges, sinking fund requirement, etc.—for amortization, dividends and surplus, was $477,204, and the increase in surplus available for dividends over the corresponding month of 1914 was $56,739. For the eleven months ended Nov. 30, 1915, the gross increase in total business was $1,435,506, a percentage of increase of 4.42. The balance available for amortization, dividends and surplus was $3,472,337, while the increase in surplus available for dividends was $218,244.

San Francisco (Cal.) Municipal Railways.—The Board of Supervisors has issued a report showing that the actual receipts from all sources for the city railway fund of the San Francisco Municipal Railways from Dec. 27, 1913, to Nov. 1, 1915, were $3,545,066. The expenditures totaled $1,895,289, leaving excess receipts of $1,649,776. Transfers from this amount were made as follows: Stockton Street tunnel fund, $48,971; land purchased for Church Street line, $82,510; depreciation fund, $629,769; accident insurance fund, $36,219; investment fund, $200,000, and interest on redemption fund, $542,250; total, $1,521,720. The balance after these transfers was $128,055. From the investment fund of $200,000, city bonds which mature next July were purchased to the amount of $123,500, leaving $76,500 in the fund. From the $629,769 depreciation fund, $551,349 was also taken for investment in city bonds, leaving in the fund a balance of $78,420.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—The California Railroad Commission has issued an order setting the reproduction cost less depreciation of the San Francisco, Napa & Calistoga Railway at $1,010,846.

San Joaquin Light & Power Corporation, Bakersfield, Cal.—The San Joaquin Light & Power Corporation has applied to the California Railroad Commission for authority to renew six promissory notes for a total of $86,722, at from 6 per cent to 7 per cent.

Southeastern Ohio Railway, Light & Power Company, Zanesville, Ohio.—The Southeastern Ohio Railway was incorporated on Dec. 22 with a capital stock of $800,000 to take over the property of the Southeastern Ohio Railway, Light & Power Company, which operates a line between Zanesville and Crooksville. Of the stock of the new company $400,000 is to be paid for the property and the remainder will be used in extending the line from Crooksville to New Lexington, a distance of 10 miles. The appointment of a receiver for the old company was noted in the ELECTRIC RAILWAY JOURNAL of May 15.

Third Avenue Railway, New York, N. Y.—F. W. Whitridge, president Third Avenue Railway, has recommended that the board of the company authorize the appointment of a committee to consider the matter of arranging for the conversion of the company's 5 per cent bonds into stock. He stated that by the end of December it will be possible with the funds in the depreciation account to purchase all the bonds remaining in the possession of the Central Trust Company as of Jan. 1, which were recently authorized by the Public Service Commission. "During the first six months of this year," said Mr. Whitridge, "the company will net more than $500,000. It will have in the depreciation fund $2,500,000 of 4 per cent bonds and in the general fund $1,125,000 in cash. This last amount will suffice to pay for all the extra work the company will be called upon to do for at least two years, and also will provide for any deficiency in the amount necessary to pay the dividends on the capital stock. Assuming, of course, that the monthly payment into the depreciation funds shall hereafter cease until that fund shall have been depleted by expenditures to make up for the depreciation, I think it desirable that the board should officially proclaim that this depreciation fund is not applicable to the payment of dividends."

Washington (D. C.) Interurban Railway.—Gustave Herre, Brooklyn, N. Y., on Dec. 23 purchased the Washington Interurban Railway from the receivers for $25,000. Mr. Herre, it is stated, was representing some of the bondholders, and the purchase was made with the idea of continuing the operation of the line. Previous notes regarding this company were published in the ELECTRIC RAILWAY JOURNAL of July 31 and Dec. 4.

Youngstown & Ohio River Railroad, Leetonia, Ohio.—The directors of the Youngstown & Ohio River Railroad have declared an extra dividend of one-fourth of 1 per cent along with the regular dividend of 1¼ per cent payable on Dec. 20 to holders of record on Dec. 15. This company has been authorized by the Ohio Public Utilities Commission to issue $200,000 of twenty-year first mortgage bonds to refund other securities.

DIVIDENDS DECLARED

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Birmingham Railway, Light & Power Company, Birmingham, Ala., 3 per cent, preferred.

Chicago City & Connecting Railways, Chicago, Ill., 75 cents, preferred certificates.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred and common.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred.

Halifax (N. S.) Electric Tramway, Ltd., quarterly, 2 per cent.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

International Traction Company, Buffalo, N. Y., seven-eighths of 1 per cent, first preferred; one-half of 1 per cent, preferred.

Kentucky Securities Corporation, Philadelphia, Pa., quarterly, 1½ per cent, preferred.

Little Rock Railway & Electric Company, Little Rock, Ark., 3 per cent, preferred; 1 per cent, common.

London (Ont.) Street Railway, 3 per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

Porto Rico Railways, Ltd., Toronto, Ont., quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 1¾ per cent.

Republic Railway & Light Company, New York, N. Y., quarterly, 1½ per cent, preferred.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred and preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

South Carolina Light, Power & Railways Company, Spartanburg, S. C., quarterly, 1½ per cent, preferred.

Tri-City Railway & Light Company, Davenport, Iowa, quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Virginia Railway & Power Company, Richmond, Va., 3 per cent, preferred.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE RAILWAY, KENNEBUNK, ME.					
1m., Nov., '15	$23,678	$20,295	$3,383	$606	$2,777
1 " " '14	24,267	26,025	†1,758	643	†2,401
AMERICAN RAILWAYS, PHILADELPHIA, PA.					
1m., Nov., '15	$455,364	......	......	......	......
1 " " '14	435,945	......	......	......	......
11 " " '15	4,924,016	......	......	......	......
12 " " '14	5,974,870	......	......	......	......
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.					
1m., Oct., '14	$23,033	*$13,053	$9,980	$5,522	$4,458
1 " " '14	21,226	*13,621	7,605	5,605	2,000
12 " " '15	268,003	*160,260	107,743	66,681	41,062
12 " " '14	282,090	*181,843	100,247	67,105	33,142
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.					
1m., Oct., '15	$181,515	*$95,641	$85,874	$27,715	$58,159
1 " " '14	184,028	*93,382	90,646	26,565	64,081
12 " " '15	1,730,710	*1,038,188	692,522	330,119	362,403
12 " " '14	2,133,564	*1,191,454	942,110	310,103	632,007
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Oct., '15	$25,313	*$15,337	$9,976	$7,511	$2,465
1 " " '14	26,099	*16,076	10,023	7,569	2,454
12 " " '15	289,478	*180,484	108,994	91,595	17,399
12 " " '14	305,397	*195,423	109,974	91,522	18,452
PENSACOLA (FLA.) ELECTRIC COMPANY					
1m., Oct., '15	$22,386	*$13,026	$9,360	$7,082	$2,278
1 " " '14	19,818	*13,540	6,278	7,346	†1,068
12 " " '15	249,557	*146,263	103,294	86,375	16,919
12 " " '14	274,860	*174,513	100,347	86,440	13,907
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., Nov., '15	$2,136,746	$1,192,258	$944,488	$815,532	$128,956
1 " " '14	1,959,824	1,138,109	821,715	806,903	14,812
5 " " '15	10,203,500	5,722,268	4,481,232	4,080,295	400,937
5 " " '14	9,870,600	5,696,067	4,174,533	4,040,939	133,594
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., Oct., '15	$641,413	*$391,703	$249,710	$182,912	$66,798
1 " " '14	711,000	*412,550	298,450	177,850	120,600
12 " " '15	7,620,427	*4,754,318	2,866,109	2,170,491	695,616
12 " " '14	8,589,893	*5,047,956	3,541,937	2,113,183	1,429,754
REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.					
1m., Nov., '15	$289,151	*$167,266	$121,885	$58,838	‡$63,547
1 " " '14	241,625	*153,065	88,560	56,005	‡34,126
11 " " '15	2,800,428	*1,706,192	1,094,236	635,884	‡460,142
11 " " '14	2,741,626	*1,703 810	1,037,816	620,510	‡420,855
SAVANNAH (GA.) ELECTRIC COMPANY					
1m., Oct., '15	$67,962	*$44,492	$23,470	$23,273	$197
1 " " '14	67,529	*45,384	22,145	23,079	†934
12 " " '15	800,410	*519,859	280,551	278,552	1,999
12 " " '14	847,093	*562,803	284,290	274,495	9,795
TAMPA (FLA.) ELECTRIC COMPANY					
1m., Oct., '15	$84,803	*$42,938	$41,865	$4,211	$37,654
1 " " '14	83,008	*43,227	39,781	4,459	35,322
12 " " '15	978,006	*498,264	479,742	52,504	427,238
12 " " '14	973,427	*528,239	445,188	55,480	389,708

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

DETROIT SKIP-STOPS DISCONTINUED

Company Lays Its Case Before the Public in a Statement Dealing With the Matter

The Detroit (Mich.) United Railway has discontinued the skip-stop on Woodward Avenue. The company has made a statement about the matter in part as follows:

"The Detroit United Railway stands ready to resume the skip-stop plant of street car operation on Woodward Avenue any time the authorities agree, and we sincerely trust that the authorities will see in the plan, as we see and as the police department sees, its excellence as a method of cutting down congestion as well as giving the patrons a faster and safer ride.

"We think that the agitation against the plan, because of the fear that a reduction in the number of stops in the heart of the city would create grave injury to certain business institutions, was not well founded.

"A store's business does not come primarily because the store is located on a corner where the car stops, as witness the fact that stores in the middle of the block, and in front of which cars do not stop, are equally successful in their trading. If car stops seriously affected a shop's business, and if the shop's business were the first factor to be considered, then the car should stop in front of every store.

"The function of the car is to carry its riders as safely, as speedily and as regularly as it can. The necessity of reducing the number of stops in the heart of the city is founded on this: As water cannot flow out of the bottle any faster than the size of the neck will permit, so street cars cannot reach points beyond until after they get through the congested districts. If only ten cars can pass Adams Avenue within a period when twenty are needed, then only those ten can serve the people to points beyond Adams Avenue.

"In addition to relieving car congestion and giving the people faster riding, the skip-stop plan is also a safety measure in that it greatly reduces the number of places where people move between the sidewalks and the safety zones, and hence cuts down the possibilities of coming in contact with cross traffic.

"Conclusive proof that the skip-stop plan produced a material reduction in running time is shown in some checks made recently of the operation of Woodward cars."

Although the Common Council discontinued the skip stop on the Woodward line, after three days' trial, the matter is to come up again shortly. Protests against the discontinuance of the skip stop to some of the Aldermen resulted in a reference of the whole matter of faster transportation, rerouting and extensions to the Street Railway Commission, which is to make recommendations to the Council. The commission will go over the recent traffic survey of Barclay Parsons & Klapp, New York engineers, and will make recommendations based upon their report.

AN INTERURBAN SAFETY CRUSADE

J. R. Harrigan, manager of the Kansas City, Clay County & St. Joseph Railway, has extended the safety-first work to the schools of Platte and Clay Counties, through which the interurban runs. For more than a year the organization under Mr. Harrigan has been doing effective educational work along the lines of safety first among the trainmen and other employees. The safety society of the road has forty members. There are talks at meetings, and as previously mentioned in the ELECTRIC RAILWAY JOURNAL recently there were specific prizes for trainmen with the best accident records. It seemed that the time was ripe for spreading the safety doctrine among the people of the communities served. The school boards of the counties granted the privilege of safety meetings at the public schools, and a series of such meetings was arranged. The first sessions were held recently at several schools in the two counties, and further programs are being outlined which will include all the schools. After every institution has had one meeting, the list will be gone over again.

While the direct purpose of the meetings is to educate the children to keep away from the tracks and cars, an incidental result is the enhancement of public acquaintance with the road and its operators, thus creating a closer bond of sympathy between the patrons and the railway. Mr. Harrigan is having buttons made for distribution among the children, modeled after the safety-first buttons specially designed and made for the employees of the railway, on which will be the words "Stop—Look—Listen." The distribution of speakers during the first week of the educational campaign indicates the method employed in arranging programs as follows:

Liberty—J. R. Harrigan, general manager, high school; Lester Hall, attorney for the road, and J. H. Miller, general passenger agent, ward schools; Tom Lothen, negro porter at the Kansas City station, school for negro children.

Excelsior Springs—James S. Simrall of Liberty, prosecuting attorney of Clay County; Justin D. Bowersock, attorney for the road; R. S. Mahan, claim agent; W. S. Torley, auditor; Frank Munagle, publisher of the *Electric Railway Trainman*, ward schools.

North Kansas City—D. A. Miller, local attorney.

Avondale—J. A. Weimer, superintendent of transportation.

Camden Point—Dr. F. H. Matthews, surgeon for the road.

Dearborn—J. F. Holman, general freight agent.

Lone Star—R. S. Mahan, claim agent.

Fawcett—C. W. Fort, general superintendent.

DETROIT PASSES CAR CAPACITY ORDINANCE

An ordinance to limit the number of passengers which may be carried on a street car at any one time, based upon an allowance of 30 cu. ft. of air space to each passenger, has been passed by the Common Council of Detroit, Mich., and signed by the Mayor. The only exception in the ordinance is that it shall not apply where cars of a line are operated under a half-minute headway or less.

The Detroit United Railway protested to the Mayor that the ordinance should not be signed by him on the ground that under operating conditions in Detroit the riders would suffer severely under its provisions. At a hearing before Mayor Marx, it was agreed that the ordinance should not apply to the rush hour and its provisions will not be enforced until the authorities have done something towards re-routing and providing extension to relieve present congested conditions.

The measure has been passed as a health ordinance, but the company pointed out the inconsistency of considering cars operating twenty-nine seconds apart as sanitary irrespective of the load while when operating thirty-one seconds apart conditions are unhealthful if 30 cu. ft. of air space is not allowed each passenger.

SAFETY PRECAUTIONS BY AUTO DRIVER AND MOTORMAN

In its campaign against recklessness in automobile driving the San Pedro, Los Angeles & Salt Lake Railroad (steam) is making very effective use of a short treatise on this subject by Howard Elliott, secretary of its safety and efficiency committee. Among other things Mr. Elliott says:

"If auto drivers were as careful as street car drivers, collisions between automobiles and trains would be as rare as those between trains and street cars. Before a trolley car crosses a steam road at grade, where there is no human flagman, one member of the crew goes forward, looks both ways and listens. Suggest this procedure to the auto driver and he smiles. Yet there are more and stronger reasons why the auto driver should be more careful than the motorman.

"The motorman is prohibited from talking to passengers. There is no such prohibition for auto drivers. The motorman must pass a rigid examination as to eyesight, hearing, steadiness of nerve and sobriety. The auto driver is subjected to no such test. To the street car employee the passengers are so many 'persons.' Perhaps he could call none of them by name. Yet he protects his charges with extraordinary care. The law demands it, the rules of his company require it, and his best judgment dictates it. The autodriver's passengers are usually his kith and kin. Their lives are as precious to him as his own. If one should die, his heart would bleed. Yet he races across a railway track looking neither to right nor to left (as careful observation shows a vast majority do) and then calls unreasonable and unnecessary for his adoption those precautions which street railway companies take to safeguard the lives of those in whom they have only a passing interest."

WASHINGTON CHRISTMAS ENTERTAINMENT

Nearly 2000 children gathered at the National Theater, Washington, D. C., early on the afternoon of Dec. 27 and celebrated Christmas all over again, the occasion being the fifteenth annual Christmas festival of the Washington Railway & Electric Company and the Potomac Electric Power Company for the children of the employees. The feature of the entertainment was a series of Mother Goose tableaux and character dances produced under the direction of Cora B. Shreve, in which fifty of the company children participated, in addition to a number of Miss Shreve's pupils. The program also included vaudeville acts from local theaters. Gifts were distributed to the children.

Directors of the two companies and several invited guests were present. President Clarence P. King said in part:

"To-day is our children's day, and I represent them. This is the house of representatives—representing the home life of the Washington Railway & Electric Company and the Potomac Electric Power Company employees. The children bid me tell you that they have heard a lot about hard times, trouble, aches and pains, etc., during the past year, but that they do not mind little things such as colic, measles, mumps, whooping-cough, chilblains, stone bruises, and are here today in the full vigor of life, filled with the Christmas spirit. They want all of you grown-up people to have a good time, but particularly request me to caution you not to be too boisterous, and not to get the fidgets. Now let us have fun!"

The children were provided with car tickets to and from the theater, and a number of special cars were used to convey them.

One-Man Cars in Dubuque.—The Union Electric Company, Dubuque, Iowa, has recently remodeled eight of its single truck cars for one-man operation.

Opposition to One-Man Cars Carried to Commission.—The City Council of Urbana, Ill., has appealed to the State Public Utilities Commission of Illinois to compel the Urbana & Champaign Railway, Gas & Electric Company to employ two men on all cars.

Campaign in Brooklyn Against Spitting.—In the future persons who violate the anti-spitting ordinance in the cars or about the platforms of stations of the elevated lines of the Brooklyn (N. Y.) Rapid Transit Company will be handed by an employee of the company a leaflet of the Board of Health dealing with spitting.

Railway Buses Not Jitneys.—The city attorney of Topeka, Kan., in response to complaints of jitney owners, has ruled that the buses being operated by the Topeka Railway are not jitneys. The company installed two buses to transfer passengers, without extra charge, between the disconnected ends of two lines, pending the erection of a bridge. Jitney owners insisted that the company should pay jitney licenses.

San Francisco Municipal Line Changes.—Thomas Cashin, superintendent of the San Francisco (Cal.) Municipal Railways, has been authorized to inaugurate a six-day week for platform men of the city railways. This will give each operator one day off a week without pay, and will result in giving practically steady employment to from twenty-five to thirty men laid off since the exposition closed.

Spokane Bridge Collapse Kills Five.—The north span of the Division Street bridge across the Spokane River gave way on Dec. 18 under the weight of two passing cars of the Washington Water Power Company. One of the cars, carrying fifteen passengers, plunged into the river and five men were killed and ten injured. The other car, which had reached the end of the bridge, slid back until the rear end rested on the river bed. The two passengers and crew escaped uninjured. The Washington Power Company denied responsibility for the accident in a statement by Thomas G. Aston, claim agent. He said the city owned the bridge.

Seeking to Regulate Automobile Parking in Kansas City.—The board of control of the Kansas City (Mo.) Railways is seeking a way to regulate the parking of automobiles on streets with tracks, and to expedite the movement of vehicles. Street car traffic is seriously congested on two down-town streets in the busy evening hours because of the slow movement of automobiles and other vehicles on the tracks, such use of the tracks being necessary because of the occupation of the pavement next to the curbing by standing vehicles. It has been suggested that automobilists should not be allowed to stop their engines while the cars are on the narrower busy thoroughfares.

Not a Passenger Killed in Portland, Ore.—The records of the Portland Railway, Light & Power Company, Portland, Ore., show that not a single person has lost his life while a passenger on board one of the company's cars. The following statistics for passengers carried cover the period from Jan. 1, 1907, shortly after the Portland Railway, Light & Power Company acquired the various electric railway properties operating in and around Portland, up to and including Nov. 30, 1915: 1907, 60,093,139; 1908, 65,195,914; 1909, 77,019,803; 1910, 88,310,850; 1911, 91,600,993; 1912, 94,125,464; 1913, 93,908 891; 1914, 89,800,788; Jan. 1 to Nov. 30, 1915, 72,152,608. Total, 732,208,450.

Abandonment of Service Possible in Santa Monica.—In a letter to C. B. Kearsley, secretary of the Santa Monica Chamber of Commerce, Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., says in part: "We have fared very badly in Santa Monica in the last two or three years. On the one hand we have put at least $250,000 into improvements, and as against this our earnings have fallen off materially. Our good lines are no longer able to carry the weak ones. Naturally, it is best for you and best for us that the lines which earn the least should be dispensed with. What I am trying to avoid is the conclusion that now seems staring us in the face and which is that we will have to abandon our street car lines and local street car service entirely in Santa Monica."

Booze Fighting.—At least one electric railway has reprinted for circulation among its men the following from the *Illinois Steel Company Bulletin:* "For the married man who cannot get along without drinks, the following is suggested as a means of freedom from bondage to the saloons: Start a saloon in your own house. Be the only customer. (You'll have no license to pay.) Go to your wife and give her $2 to buy a gallon of whiskey, and remember there are sixty-nine drinks in a gallon. Buy your drinks from no one but your wife, and by the time the first gallon is gone she will have $8 to put in the bank and $2 to start business again. Should you live ten years and continue to buy booze from her, and then die with snakes in your boots, she will have enough money to bury you decently, educate your children, buy a house and lot, marry a decent man, and quit thinking about you entirely."

Illinois Traction to Protest St. Louis-Granite City Fare.—The St. Louis Electric Terminal Railway, which operates between St. Louis, Mo., and Granite City, Ill., and is part of the Illinois Traction System, will apply to the Missouri Public Service Commission or to the Interstate Commerce Commission early in January for authority to increase the passenger fare between St. Louis and Granite City from 5 cents to 10 cents. Under the franchise of the St. Louis Electric Terminal Railway, granted by the Municipal Assembly of St. Louis in 1907, the company is required to carry passengers between St. Louis and Granite City for 5 cents. The company probably will take the view, in presenting the case to the Public Service Commission or to the Interstate Commerce Commission, that the city of St. Louis exceeded its authority by attempting to legislate beyond its own jurisdiction, and that the section of the franchise imposing a 5-cent fare between a Missouri point and an Illinois point is illegal.

Dining Train for Shop Men.—For the accommodation of the workmen engaged in assembling the 478 new steel cars which are fast taking the place of the original composite cars in the New York subway, a unique lunch room has been fitted up at the Highbridge yard of the Interborough Rapid Transit Company. When the car bodies arrived they were complete in their interiors. Now, however, they rest on cribbing, stripped of all their furnishings to make way for the temporary order of things. One car divides responsibility with the kitchen, lunch counter and the steward's desk. The lunch counter is mid-length of the car, and alongside it is the desk. The other three cars comprise the dining rooms. The employees enter by the kitchen—or center door—give their order to the stewards at the counter, taking it along with them, together with a check for the amount. They then pass along to the cashier's desk, make settlement and proceed to the "dining room," to take their seats.

Volume One of Public Service News.—*Public Service News*, published in the interest of the Virginia Passenger & Power Company, Richmond, Va., since March 18, 1915, and distributed on the cars of the company, closed its first volume with the issue for Dec. 25, which appeared in holiday dress of red and green. The company said, in part, editorially: "The publication was experimental. From the beginning the little paper has made friends. Street-car patrons have apparently found in it material sufficiently interesting, informing and diverting to account for the constantly growing family of its readers. A statement of the general principle that guides this publication appears regularly in every issue. It is a standing invitation to every reader interested in a better Richmond and a better service from the public utility company to submit his views on how this company can help toward this end. In the coming year *Public Service News* will continue from time to time to lay before its readers timely and interesting information about things that concern the company and the city. At the same time it will not forget that the tedium of the street car ride is lightened by a bit of nonsense and a touch of wit."

The New "Transit."—*Transit*, which heretofore has been published by H. L. Hamersly, with an advisory committee of employees of the Lehigh Valley Transit Company, Allentown, Pa., and the Philadelphia & Western Railway, will hereafter be published by the Lehigh Valley Transit Company in the interest of both railways. The issue of the paper for January says editorially: "Starting with this issue, *Transit* will be published by the advertising department of the Lehigh Valley Transit Company. It will make its appearance the fifteenth of each month, to the number of 10,000 copies. More copies will be printed each month as demand requires; also its size, in number of pages, will be increased. While this monthly is not for profit, but for publicity and pleasure to passengers, a limited number of pages will be devoted to paid advertisements, as a number of dealers have shown their desire to avail themselves of its usefulness. The future policy of *Transit* will be to present uncommonly interesting articles dealing with transportation, light and power facilities and industrial farming and civic advancement in the territory served by the Lehigh Valley Transit Company. A place will always be found for articles touching on character, thought and optimistic prophecies on the future. Also photos, verse and humor will play an important part."

Near-Stop Side a Success in Storm.—The Newark *News* of Dec. 12 had the following to say about the near-side stop during the storm of Dec. 13 and 14: "According to the Public Service Railway division superintendents and supervisors all over the system were ordered Monday to observe how patrons took the near-side stop proposition when storm conditions existed. It was said that the reports of these officials were that pasengers experienced little or no difficulty in reaching the entrances to the cars, and seemed to have no complaint to make. It was pointed out by Newton W. Bolan, general superintendent of the railway, that the test of the near-side stop system was thorough. On Monday, he said, passengers had soft, slushy snow and rain to contend with, while yesterday (Tuesday) the heavy, frozen snow offered difficulties. The conviction was expressed that the patrons of the company were satisfied with the near-side stop system, and that no difficulties had been encountered during the past three days to crystallize public sentiment against it. The reports of the division superintendents and supervisors were that where cross-walks had been cleared, passengers walked on them out to the tracks, and then up the tracks on the space cleared by the track sweepers to the point where the rear of the cars come to a standstill. These sweepers brush free of snow a path about 20 in. wide outside the tracks."

Personal Mention

Mr. George V. S. Williams has sent to Governor Whitman of New York his resignation as a member of the Public Service Commission of the First District of New York, to take effect on Feb. 1, 1916.

Mr. Lynn R. MacBroom, formerly electrical engineer and general superintendent of the Rutland Railway, Light & Power Company, Rutland, Vt., is now manager of the electric light department of Burlington, Vt.

Mr. B. J. Fallon, engineer of maintenance of way of the elevated railroads of Chicago (Ill.), has been appointed chairman of the subdivision on city transportation and public utilities of the ways and means committee of the Chicago Association of Commerce.

Mr. Frank S. Briggs, superintendent of transportation of the Cumberland County Power & Light Company, Portland, Me., has been granted an indefinite leave of absence from his duties because of ill health. In the meantime Mr. G. M. Todd will act as superintendent of transportation of the company.

Mr. M. D. Evans has been elected secretary and assistant treasurer of the United Gas & Electric Corporation, New York City, to succeed Mr. Henry Morgan, resigned. Mr. Evans, in addition to continuing as first vice-president of the United Gas & Electric Engineering Corporation, has been elected secretary of the company.

Mr. Carl Sylvester, general manager of the Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, and formerly general manager of the Middlesex & Boston Street Railway, is on a vacation and business trip to the United States. Mr. Sylvester expects to remain north until the latter part of January or the first of February.

Mr. Louis M. Day, Chillicothe, has been appointed by Gov. Frank P. Willis as a member of the Ohio Public Utilities Commission to succeed Mr. Oliver H. Hughes. Mr. Day is an attorney and served two terms in the Legislature, in 1909 and 1913. He is a Democrat. The other members of the commission, Mr. Beecher W. Waltermire and Mr. Lawrence K. Langdon, are Republicans.

Mr. John A. Beeler, formerly vice-president and general manager of the Denver (Col.) Tramway, was waited upon at his home in Denver recently by a committee of employees. Mr. A. J. Krick, a motorman, was spokesman for the party. On behalf of all divisions and departments of the company he presented Mr. Beeler a twenty-three-jeweled gold hunting-case watch, with his initials in a raised monogram set with diamonds. Mr. Beeler spoke of his pleasant associations with the employees, and reviewed his own experiences extending over a period of many years as an employee of the company.

Mr. George Carson, claim agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., and president of the American Electric Railway Claims Association, has resigned from the company at Seattle. Mr. Carson has been connected for many years with street railways in New York, Chicago, San Francisco and Seattle. He was one of the organizers of the Pacific Claim Agents' Association, formed in 1909, and of the Pacific Claim Agents' Index Bureau, formed in 1912. A biography and a portrait of Mr. Carson were published in the ELECTRIC RAILWAY JOURNAL of Oct. 9, 1915.

Mr. Leonard M. Daggett has been appointed by Judge Mayer of the Federal District Court at New York one of the trustees of the Connecticut Company. Mr. Daggett takes the place of Mr. William Waldo Hyde, one of the original trustees, who died on Oct. 30. In accordance with the dissolution decree, the vacancy has been filled on the nomination of the surviving trustees, ex-Judge Walter C. Noyes, Mr. Lyman B. Brainerd, Mr. Charles Cheney, and Mr. George E. Hill. The appointment has been agreed to by Attorney General Gregory and Mr. Howard Elliott, president of the New York, New Haven & Hartford Railroad.

Mr. E. G. Connette, president of the International Railway and vice-president of the International Traction Company, Buffalo, N. Y., and Francis T. Homer, formerly connected with Bertron, Griscom & Company, New York, have been elected vice-presidents of the United Gas & Electric Corporation, New York, N. Y., to succeed Mr. R. E. Griscom and Mr. S. J. Dill, resigned. Mr. Connette has also been elected president of the United Gas & Electric Engineering Corporation to succeed Mr. J. S. Pevear, who has gone to Birmingham, Ala., as president of the Birmingham Railway, Light & Power Company to supervise the operation of that company. Mr. Pevear has been elected vice-president of the United Gas & Electric Engineering Corporation. The United Gas & Electric Corporation, of which Mr. Connette has been elected president, controls through ownership of common stock, the International Traction Company, which in turn owns and controls the International Railway.

Mr. F. M. Hamilton, who has been purchasing agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., since May, 1914, has been appointed claim agent of the company to succeed Mr. George Carson, resigned. Mr. Hamilton was born at Grafton, W. Va., on Oct. 15, 1875, received a graded and high school education and continued his studies under a private tutor. He studied medicine for two years, but abandoned the idea of becoming a physician to enter the service of the Baltimore & Ohio Railroad. From 1900 to 1905 he was with the Jones & Laughlin Steel Company, Pittsburgh, Pa., which owns and operates the Monongahela Connecting Railroad, successively filling the positions of yardmaster, assistant trainmaster, special agent and chief clerk to the general superintendent. Mr. Hamilton resigned from the Jones & Laughlin Steel Company to become manager of the American Car Tracing & Shipping Company, a private traffic organization. He removed to Seattle in 1907 and worked jointly for the Northern Pacific Railroad and the Pacific Northwest Demurrage Association, resigning to accept the appointment of traffic manager for the Alaska Exposition. At the close of the exposition Mr. Hamilton became assistant sales agent for the Roslyn Fuel Company, covering the States of Idaho, Oregon and Washington. Mr. Hamilton was appointed freight traffic agent of the Seattle division of the Puget Sound Traction, Light & Power Company in September, 1911, and continued in that position until he was made purchasing agent of the company in 1914.

Mr. W. B. Donaldson, assistant purchasing agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has been appointed purchasing agent of the company to succeed Mr. F. M. Hamilton, who has been appointed claim agent of the company. Mr. Donaldson was born in Pittsburgh, Pa., on June, 1883. Being obliged to leave school after having finished the grammar grades he secured a position in a grocery store in Toledo, Ohio. Following this he was connected in turn with the general freight department of the Ann Arbor Railroad and Toledo, St. Louis & Western Railroad in Toledo for several years, and the Dillon-Griswold Wire Company, Sterling, Ill. In December, 1903, he entered Y. M. C. A. work and for three years was employed as an assistant secretary in the Young Men's Institute branch of New York Y. M. C. A., located on the Bowery. On Oct. 30, 1906, Mr. Donaldson entered the employ of the Seattle-Tacoma Power Company as clerk in the store room. From that position he was transferred to the purchasing department and when the head of that department resigned in May, 1909, Mr. Donaldson was appointed purchasing agent. This position he held until the consolidation of the Seattle-Tacoma Power Company and the Seattle Electric Company in April, 1912. He occupied the position of chief clerk in the purchasing department of the Puget Sound Traction, Light & Power Company until April, 1914, when, upon the appointment of Mr. F. M. Hamilton to the office of purchasing agent, Mr. Donaldson was advanced to the positon of assistant purchasing agent of the company.

OBITUARY

Charles C. Ostrander, in the service of the Louisville (Ky.) Railway since 1886 and for the last twenty years chief night inspector, is dead at his home in the city of Louisville of pneumonia.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Kansas Southern Traction Company, Oswego, Kan.—This company has received a new charter in Kansas to construct a line from Parsons to Coffeyville and from Parsons to Columbus, about 70 miles. Capital stock, $100,000. The company has asked the Public Utilities Commission for permission to issue $1,360,000 in bonds for the construction of the line. Incorporators: Philip Strack, Parsons; Theodore Ritzo and Dominic Conti, Kansas City, Mo., and J. W. Everett and John M. Page, Topeka.

***Southeastern Ohio Railway, Zanesville, Ohio.**—Incorporated in Ohio to take over the property of the Southeastern Ohio Railway, Light & Power Company. Capital stock, $800,000. It is planned to extend the line from Crooksville to New Lexington, 10 miles. Incorporators: E. R. Meyer and W. H. Niekirk, Zanesville; Fred J. Fox and J. C. Heinlein, Bridgeport, and Samuel W. Harper, Wheeling, W. Va. Mr. Niekirk was secretary, treasurer and superintendent of the old company, which has been in the hands of a receiver for some time.

***Guthrie-Edmond Electric Railway, Oklahoma City, Okla.**—Incorporated in Oklahoma to construct an extension of the Oklahoma Electric Railway from Edmond to Guthrie, 15½ miles. Capital stock, $500,000. Incorporators: Burke Shartel, Charles Hoopes, Guy B. Treat, George W. Knox and E. J. Reichart, all of Oklahoma City and also of the Oklahoma Railway.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has received a franchise from the Council to extend its proposed elevated tracks across San Julian Street, bringing the tracks to grade at San Pedro Street, so as to reroute cars north and south on San Pedro Street. The company has received a franchise granting permission to abandon its line beginning at Sixth and Beacon Streets, extending on Beacon Street to Second Street.

San Bernardino, Cal.—Bids will be received by the Board of Supervisors until Jan. 3 for a fifty-year franchise to construct and operate an electric railway on Orange Grove Avenue from Foothill Boulevard to Mesa Avenue.

Kankakee, Ill.—The Kankakee Electric Railway will ask the Council for a franchise to remove its tracks on Washington Avenue from Hawkins to Jeffery Streets.

Peoria, Ill.—The Peoria & Chillicothe Electric Railway has asked the Board of Supervisors for a franchise for its proposed line from Peoria to Chillicothe.

Hutchinson, Kan.—The Hutchinson Interurban Railway has received a franchise from the Council granting an extension of right-of-way on Lorain Street, south of Avenue B. The extension will be used for switching tracks for the Arkansas Valley Interurban Railway.

Cincinnati, Ohio.—The West End Rapid Transit Company has prepared a new ordinance to be submitted to the Council which provides for the same route as the one presented in September, but makes several changes in the conditions under which the grant is now sought. It does not mention the term of the franchise, but provides that the city may take over the property at the end of ten years by paying the cost plus 25 per cent. Other companies may use the tracks on a just and equitable basis, and construction work shall begin within eighteen months from the time the franchise is granted. C. E. Hooven is president, and Stanley Shaffer, secretary, of the company. [Oct. 23, '15.]

Warren, Ohio.—The Mahoning Valley Street Railroad has asked the Council for a franchise to build an extension of its line from the present interurban station at Main and South Streets to the city limits at the plant of the Trumbull Steel Company.

Youngstown, Ohio.—The Youngstown & Southern Railway has received a ten-year extension of time on its franchise, making the concession good for twenty-five years from the date of its passage.

Corvallis, Ore.—Ralph H. Moody, attorney for the Southern Pacific Company, reports that the franchise for the new tracks to be built in Corvallis by the Southern Pacific Company for the West Side line, which is to be electrified between Corvallis and Whiteson, has been agreed upon by the Council and the Southern Pacific Company. The electrification of the Whiteson-Corvallis line was announced nearly a year ago, but has been held up by the failure of the Corvallis Council to grant the necessary franchise. Mr. Moody announces that the company will begin the work of electrifying the line immediately.

Collingdale, Pa.—The Philadelphia & Garrettford Street Railway, a subsidiary of the Philadelphia & West Chester Traction Company, has received a franchise from the Council to construct a line through Collingdale.

Salt Lake City, Utah.—The Salt Lake Terminal Company has received a franchise from the Council to construct the necessary turnouts in First West Street, just south of South Temple Street, to give the Salt Lake & Ogden Railway and the Salt Lake & Utah Railroad access to the terminal site at the corner of South Temple and West Temple Streets.

Salt Lake City, Utah.—The Utah Light & Traction Company has received a franchise from the Council to extend its tracks from the present terminus at Wall and Second North Streets east past the front of the capitol and north on West Canyon Street to a point due east of the capitol, provided it will also extend them north to Fourth North Street and thence west to De Soto Street, thus extending on three sides of the capitol.

TRACK AND ROADWAY

***Pine Bluff, Ark.**—George B. Blanchard, consulting engineer, Chicago, has signed a contract with the free bridge commissioners to operate a steam, oil or electric railway from Pine Bluff over the free bridge to some point on the Mississippi River. The contract specifies that he is to have the road in operation by the end of eighteen months or forfeit $500 cash, which he has placed in trust. The contract extends for thirty-six years and six months. The first year's rental will be $5,000 and will increase $1,000 each year until 1921. After that the rental will be $15,000 a year.

Municipal Railways of San Francisco, San Francisco, Cal.—Construction of the Church Street extension of the Municipal Railways of San Francisco has begun. Barring unforeseen delays, the line from Thirtieth to Market Street will be in operation by May 1 next. The section between Twenty-second and Thirtieth Streets, which does not involve such heavy construction, is also expected to be ready by the same date. No objection to the use of Church Street tracks between Sixteenth and Market Streets is anticipated and it is expected that an agreement as to the use of Market Street to a connection with the Van Ness Avenue city line will be reached between the city and the United Railroads by the time the remainder of the Church Street line is ready for operation.

Connecticut Company, New Haven, Conn.—Operation has been begun by this company on its North End trolley line extending on Main Street, Grove Street, Broad Street, Washington Street, Farmington Avenue and Commonwealth Avenue, New Britain.

Caldwell (Idaho) Traction Company.—Business men of the city of Caldwell have decided to assume responsibility for floating a $25,000 bond issue of the Caldwell Traction Company, the money to be utilized in electrifying the Wilder branch of the Oregon Short Line Railroad. The proposed line to be electrified is 11 miles long and taps a rich farming section. The Caldwell Traction Company recently secured a fifty-year lease on the road and will begin the work of electrifying early in 1916.

Twin Falls (Idaho) Railroad.—A preliminary survey is being made and work will soon be begun by this company on the construction of a 20-mile extension to Castleford. The line will extend through Clover City.

Hammond, Whiting & East Chicago Railway, Chicago, Ill.—This company plans to rehabilitate 1½ miles of track in Whiting and 1 mile in East Chicago during 1916.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—It is reported that negotiations are being made with the city of Cincinnati relative to trackage rights, which will result in the completion of the proposed interurban lines between Indianapolis and Cincinnati. This will mean the extension of the Indianapolis & Cincinnati Traction Company's line from Rushville to Cincinnati at an approximate cost of $3,000,000.

Arkansas Valley Interurban Railway, Wichita, Kan.—Operation has been begun by this company on its extension from Wichita to Hutchinson. Plans are being considered to extend the line to Salina. Two routes are proposed, one from Newton north through Geossel, Canton, Roxbury and Gypsum, the other from Halstead north through Moundridge, McPherson and Lindsborg.

Atlantic Shore Electric Railway, Sanford, Me.—Connection has been made by this company at Biddeford with the Biddeford & Saco Street Railway. This gives a continuous trolley line from Waterville to Portsmouth.

United Railways & Electric Company, Baltimore, Md.—This company will construct an extension from St. Paul Street to Guilford.

Point Shirley Street Railway, Winthrop, Mass.—The Boston, Revere & Lynn Railroad contemplates establishing a steamboat line between Boston and Shirley, connecting at that point with its steam line and with the Point Shirley Street Railway, which it owns.

St. Paul (Minn.) Southern Electric Railway.—It is reported that this company proposes to build a line from Hastings to Rochester, 64 miles, during 1916.

Metropolitan Street Railway, Kansas City, Mo.—Committees have been appointed by the Elm Ridge Improvement Association to induce this company when it begins the extension of the Troost Avenue line from Forty-ninth Street to Fifty-third Street to continue it on to Sixty-third Street.

Salem-Pennsgrove Traction Company, Salem, N. J.—The Board of Public Utility Commissioners has announced its approval of the general plan of this company for the construction of a line from Salem to Pennsgrove. The Board concluded that the cost of construction of the entire road, including substations at Pennsville and Salem, should not exceed $554,505. Accordingly it approved a proposed issue of $224,000 of stock at par, $273,000 of first mortgage bonds at 90 per cent of par and $100,000 of second mortgage bonds at 85 per cent of par. It is proposed to begin immediately the construction of the road from Pennsgrove to Plant No. 3 of the E. I. du Pont de Nemours Powder Company above Pennsville [Sept. 25, 1915].

New York, N. Y.—The Public Service Commission for the First District of New York has authorized the chairman and secretary to advertise for bids, to be opened on Jan. 14 at 12.15 p. m., for the construction of Section No. 2-A of Route No. 12, a part of the Broadway-Fourth Avenue subway. Route No. 12 is generally known as the Eastern Parkway subway in Brooklyn, which is to be operated under the dual system contracts as an extension of the first subway by the Interborough Rapid Transit Company. Section No. 2-A covers a portion of the route which is to be operated by the New York Municipal Railway Corporation. It extends from Prospect Park Plaza at Flatbush Avenue to a point at the intersection of Flatbush Avenue, Ocean Avenue and Malbone Street. It will be a two-track line, and will connect with the Brighton Beach railroad at Malbone Street. The commission also authorized the New York Municipal Railway Corporation to award the contract for the reconstruction of the Brighton Beach line, to connect with this section of the subway, to the Inter-Continental Construction Company, the lowest bidder. The work will cost about $1,000,000, and is to be completed within twenty-four months.

Cleveland (Ohio) Underground Rapid Transit Company.—Work will be begun in January on the proposed subway system in Cleveland. The subway will be under Euclid Avenue and ground will be broken simultaneously at the Public Square, East Fifty-fifth Street and at University Circle. There will be six stations between Public Square and University Circle. The company's franchise, which expires on Jan. 23, 1916, unless work is started, provides that the line must be in operation within forty-two months after ground is broken. Thomas Schmidt, secretary.

Corry & Columbus Street Railway, Corry, Pa.—This company reports that during 1916 it expects to build 15 miles of new line between Columbus, Pa., and Sherman, N. Y.

Holston Valley Railway, Bristol, Tenn.—It is reported that this company, which is operated as part of the Bristol Traction Company, is securing right-of-way for an extension from Bull's Gap to Leadvale, 22 miles.

***Chattanooga, Tenn.**—A short route car line to East Chattanooga is a project that the members of the East Chattanooga Chamber of Commerce propose to undertake. A committee will be appointed later to promote the movement. Efforts will be made to interest the city and get an appropriation, if possible. At present, it is stated, cars reach East Chattanooga by a roundabout way, while by a direct route it is only 3½ miles from the heart of the city.

***Greenwood, Tenn.**—Plans are being considered to construct a line from Greenwood to Schlater via Itta Bena. It is also proposed to build an extension to Black Hawk. It is planned to have the line ready for operation by August, 1916. S. M. Anderson, Greenwood, is interested.

Memphis (Tenn.) Street Railway.—Officials of the Illinois Central Railroad stationed at the new industrial town, Nonconnah, Tenn., and other citizens of this new Memphis suburb, are preparing a petition addressed to T. H. Tutwiler, president of the Memphis Street Railway, asking for a new line. This would call for an extension of the Florida Street line of the company and in order to expedite the action of the company the Illinois Central Railroad has offered a free right-of-way into the new town.

Southern Traction Company, Dallas, Tex.—It is reported that during the early part of next year plans will be renewed by this company for the construction of an extension from Waco to Austin and thence to San Antonio.

Northern Texas Traction Company, Fort Worth, Tex.—This company expects to double track approximately 2 miles of its line between Forth Worth and Dallas during 1916.

***San Angelo, Tex.**—Eastern capitalists are investigating the street-car situation in San Angelo, and it is reported that plans are being considered to build an entirely new system. J. D. Sugg, owner of the San Angelo Power & Street Railway, recently offered to make the city a present of the line and equipment on condition that San Angelo pay this year's taxes and make the improvements demanded of him. The city commissioners refused to accept the gift and he discontinued the service.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—This company reports that during 1916 it expects to build 4½ miles of new track, including 3 miles of double tracking of its present line and 1½ miles of new city track.

Appalachian Power Company, Bluefields, W. Va.—Surveys have been made and work will be begun at once by this company on the construction of an extension of its Bluefield-Graham line from Lee Street to the end of East Princeton Avenue, where it will connect with the Princeton-Bluefield Electric Railway.

SHOPS AND BUILDINGS

Cumberland County Power & Light Company, Portland, Me.—An extensive terminal station will be built at Portland by the Cumberland County Power & Light Company to be used by this company and the Lewiston, Augusta & Waterville Street Railway to handle their express and freight business. The headhouse will be two stories and the freight shed 140 ft. long. It is expected that the terminal will be completed about March 1. About $40,000 will be expended on the structure.

Kansas City, Mo.—It is said that the interurban railways entering Kansas City have agreed upon the section of the city in which a union interurban station shall be located. Proceedings have been begun for reducing the grade at Eighth and McGee Streets, so that the Kansas City, Clay County & St. Joseph Railway may have easy access to the presumed site, near Eleventh and McGee Streets.

Manufacturers and Supplies

ROLLING STOCK

Salina (Kan.) Street Railway will purchase one closed city car during 1916.

Grand Rapids (Mich.) Railway is expected to be in the market soon for ten and possibly twenty new city cars.

Visalia (Cal.) Electric Railroad expects to purchase during 1916 one electric locomotive.

Hutchinson (Kan.) Interurban Railway is building two front-entrance, one-man, single-truck cars.

Aurora, Plainfield & Joliet Railway, Joliet, Ill., has purchased material to rebuild one of its interurban cars.

Chicago & Interurban Traction Company, Chicago, Ill., expects to purchase one interurban motor car to replace one destroyed by fire.

Metropolitan Street Railway, Kansas City, Mo., it is reported, will exercise its option for fifty four-motor single-end city cars like those purchased during 1915.

Charleston Consolidated Railway & Lighting Company, Charleston, S. C., expects to purchase during 1916 two double-truck cars for suburban service.

Des Moines (Iowa) City Railway has ordered forty double-truck, center-entrance, semi-steel cars for city service from the McGuire-Cummings Manufacturing Company.

Arkansas Valley Interurban Railway, Wichita, Kans., has ordered from the Cincinnati Car Company an additional steel underframe trail freight car, a duplicate of the one previously ordered.

Hammond, Whiting & East Chicago Railway, Chicago, Ill., has purchased four semi-steel, monitor-deck, double-truck, pay-as-you-enter cars from the American Car Company, St. Louis, Mo. These cars will be equipped with four G.E.-80 motors and a General Electric control not yet selected. The cars have a seating capacity for fifty persons.

San Francisco (Cal.) Municipal Railways, through a request by the Board of Public Works from the Supervisors, has asked for an appropriation of $1,000 for the use of the engineering bureau in preparing plans for a lighter type of car for use on the heavy grades of the Union Street division.

Princeton (W. Va.) Power Company, Princeton, has ordered two all-steel combination passenger and baggage cars from the Cincinnati Car Company. These cars are arranged to seat forty-eight passengers, and will be placed in service on the new line between Princeton and Bluefield, W. Va.

Connecticut Company, New Haven, Conn., proposes to build during 1916 one 40-ft. double-truck motor line car for city and interurban service, four 41-ft. double-truck motor express cars, city and interurban. The company is now converting two single-truck closed cars into one center-entrance prepayment double-truck car.

Charleston (W. Va.) Interurban Railroad, has ordered from the Cincinnati Car Company two light-weight one-man cars for near-side operation, complete with Cincinnati long-base single trucks equipped with 24-in. wheels, seating capacity twenty-six passengers; two 45-ft. baggage express cars, ordinarily to be used in express service, but designed and equipped with a view to being used as locomotives and capable of hauling seven or eight standard freight cars; two 47-ft. 3-in. all-steel straight passenger interurban cars, seating capacity fifty-two, double-end operation, for the new Montgomery division.

TRADE NOTES

Edwin G. Hatch, New York, N. Y., has received a repeat order from the Illinois Traction System for a number of overhead protective crossing clamps, to be used at overhead three-phase line crossings.

Perry Ventilator Corporation, New Bedford, Mass., has had its ventilators installed on the fifteen new cars now being delivered by the G. C. Kuhlman Car Company to the East Liverpool Traction & Light Company, East Liverpool, Ohio.

American Mason Safety Tread Company, New York, N. Y., announces that, effective Jan. 1, 1916, Joseph T. Ryerson & Son of Chicago, will act as general Western distributors for its various types of Mason safety treads. A large stock of both lead and carborundum filled tread will be carried in stock for immediate deliveries.

Automatic Ventilator Company, New York, N. Y., has been appointed selling agent for the Flower Products, which include brush holders for railway motors, controller and air handles, D-shaped seamless steel bushings, etc., for the United States and Canada, with the exception of the States of Pennsylvania, Ohio, New Jersey, Virginia, West Virginia, Maryland and Delaware.

Track Specialties Company, New York, N. Y., announces that Warren Moore Osborn is now representing the company in the Chicago district, with headquarters in the McCormick Building, Chicago, Ill. R. L. Mason, who was formerly connected with Hubbard & Company, Pittsburgh, Pa., is now representing the Track Specialties Company, Inc., in the Pittsburgh district. His headquarters will be 1501 Oliver Building, Pittsburgh.

Paul M. Lincoln, whose connection with the Westinghouse Companies in their operating and engineering activities dates back for more than twenty-three years and whose resignation from the Westinghouse Electric & Manufacturing Company was announced in the ELECTRIC RAILWAY JOURNAL of Nov. 13, 1915, has again become associated with this company, and now holds the title of commercial engineer in its sales organization. Mr. Lincoln is well known in engineering circles through his active work in the American Institute of Electrical Engineers, of which he is a past president. He is a well-known writer on technical subjects and has also been indentified with educational work for some time, filling the chair of professor of electrical engineering of the University of Pittsburgh.

ADVERTISING LITERATURE

National Tube Company, Pittsburgh, Pa., has issued a folder which contains illustrations of its exhibit at the San Francisco Exposition, which received the grand prize for its tubular products and fittings.

Delta-Star Electric Company, Chicago, Ill., has issued descriptive Leaflet No. 910, showing its special high-tension disconnecting switches, "unit type" indoor equipment, suspension type disconnecting switches, and surge arresters.

Electric Service Supplies Company, Philadelphia, Pa., has issued a folder describing its Keystone lamp guards, suitable for protecting lamps in mines, tunnels, subways, locomotive or car pits, as well as for other general uses where a wall type is required.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a reprint of a paper entitled "Notes on Electric Power Development," by E. M. Herr, president of the company, which was presented at a meeting of the Railway Club of Pittsburgh on May 28, 1915.

Armstrong Cork & Insulation Company, Pittsburgh, Pa., has issued a cardboard-bound booklet which discusses thoroughly the chief insulating qualities of its Nonpareil corkboard. The catalog also analyzes the other qualtiies of this material, which include non-absorbence of moisture, sanitary and odorless quality, compactness, strength and slow burning and fire-retarding qualities. The catalog describes a number of tests which have been conducted, the results of which support the above contentions for quality.

C. W. Hunt Company, Inc., West New Brighton, N. Y., has issued Catalog No. 15-4 which contains specifications of its pivoted bucket conveyor, with plates giving conveyor details valuable to engineers in laying out a boiler house. Two of the illustrations are of particular interest in showing the adaptation of the conveyor buckets to railway power houses. One illustration shows a view of the run of conveyor buckets as installed by the Rochester Railway & Light Company, Rochester, N. Y. The other two illustrations are taken from an installation in the power house of the Springfield Street Railway, Springfield, Mass. One of these illustrations show the coal passing through a rotary filler into a conveyor after being crushed. The coal is then elevated to a hopper in the tower, and taken by cable railway to the storage bin over the boiler.

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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THE "ORDER THEM NOW" MOVEMENT In a brief symposium on the prospects for 1916 deliveries of materials required in the manufacture of cars, printed in last week's issue, an axiomatic but timely truth was stated by a leading car manufacturer. This was in substance that the date of delivery of a car depends upon that of the last important component of that car. If the axles are late the car will be late, no matter how promptly the wheels are received. The manufacturing chain is as strong only as its weakest link. There is no doubt, therefore, that disappointment in regard to car deliveries will be minimized for those prospective purchasers who get their orders in early. The condition of the steel market as outlined editorially two weeks ago was by no means exaggerated, and the electric railway industry must take its place in the waiting line. Steel is being produced at a rate of approximately 40,000,000 tons annually and as long as the reign of the god of war continues it can be consumed at this rate, or at a greater rate if manufacturing facilities are increased under the temporary stimulus. The slogan "Order them now" is therefore an appropriate one.

ENGINEER APPOINTED TO NEW YORK COMMISSION We are glad to record this week another excellent appointment by Governor Whitman to the New York Public Service Commission, First District, in the person of Henry W. Hodge. The complaint of several politicians on the appointment is added evidence of its suitability, and the new appointee's record as an engineer makes his selection one of the best things that could have happened to restore public confidence in the now discredited regulatory body in New York City. We are glad that Governor Whitman has recognized the demand that there should be representation on the Public Service Commission of the engineering profession because of the large number of engineering questions which naturally come before the commission for consideration. Mr. Hodge has been engineer for some of the largest bridges in the country and is a director of the American Society of Civil Engineers and a member of the council of the American Institute of Consulting Engineers. But it is not only because of Mr. Hodge's reputation as an engineer that we commend the appointment. His standing in the community and his success in other fields where careful judgment and executive ability are required are additional evidences of his fitness for the place. If, as has been said, he is a strong personal friend of the Governor, we can only repeat the wish expressed by Lincoln when told that Grant favored a particular brand of whiskey, and hope that he has many more friends of this character.

AUTOMOBILE COMPETITION NOT DISCOURAGING Elsewhere in this issue we are fortunate in being able to publish a discussion by Ernest Gonzenbach upon the future influence of the automobile, which, it may be said, was written some months ago, not for publication, but for private circulation among the investors in the properties with which the author is associated. It was intended originally to bring about debate upon the problem which appears so portentous of ill fortune to many electric railway operators to-day, and it provides a most excellent basis for consideration of the wider aspects of the present situation. In brief, Mr. Gonzenbach's belief is that, though there may be new and untapped sources of revenue, especially for the interurban railways, the real opportunity for the industry in meeting automobile competition lies in the financing of operating-cost reductions whose possibilities have only become apparent since the present period of readjustment and refinement began. That there are many such chances for improving conditions cannot be doubted. Some will involve capital expenditures, as exemplified by the lightweight interurban cars, the one-man city cars and the automatic substations cited by the author, but on the other hand, such improvements as increased schedule speed and accident prevention may actually cost nothing for their introduction. For the industry as a whole, all of these and similar more or less definitely understood betterments are of the future. They are developments whose eventual commercialization cannot fail to relieve the situation at least in part, and if for no other reason than that the industry has something to look forward to, the outlook for the future cannot fail to be encouraging.

COMPETITION AS A STIMULANT In the light of past experience one must admit that the automobile is certain to be gradually improved, even though the chances are greatly against the sudden arrival of any revolutionary change in its favor such as gasoline at 3 cents or 4 cents per gallon—a circumstance, by the way, which alone would not make the jitney really profitable. Since even gradual changes eventually become revolutionary in extent, it is quite conceivable that, if the electric railway stands still long enough, it might be driven out of business by some form of super-jitney, or seriously injured by some vast and at present incomprehensible increase in the use of private automobiles. Clearly enough, the electric railway industry cannot afford to stand still at all. It is now meeting competition, and whether this competition is going to centralize about the jitney or the private motor car is really immaterial in the final result. The obvious move is to take advantage of those opportunities for reducing the cost of transportation that are presenting themselves, and there is no doubt that those electric railways which do so will, as Mr. Gonzenbach has so aptly put it in his article on another page, emerge soonest from the black clouds of to-day, from which they will have "grabbed the silver lining."

CAN THE JITNEY BE REVIVIFIED?

It is the practicability and definiteness of improvements for the immediate future of the electric railway industry that provides an answer to the somewhat alarming queries propounded by H. S. Cooper in his article of last week regarding the prospect of a revivified jitney.

It is obviously true, as this author points out, that the recently deceased jitney movement had everything against it; that its latent possibilities were submerged by improperly designed equipment as well as by a general insufficiency of knowledge and experience, and that, given the advantage of certain "favorable changes," the present receding wave might flow back with an added impetus that could even sweep away the very foundations of the electric railway industry. Granting this possibility, however, does not alter the fact that in the competition between the two forms of transportation the electric railway has already "sunk its putt," and the jitney, in whatever form it comes in future, has still to make its shot. Whether its chances for "holing out" are good or bad depends upon the individual viewpoint, but no one can say that it is certain eventually to make good. There is at least a chance for it to miss at its next trial, as it did in the past disastrous twelvemonth of operation.

On the other hand, we know definitely that the electric railway can be successful, and we know definitely that improvements can be made. For it to survive, miracles are by no means necessary. Of course, Mr. Cooper's list of "favorable changes" for the jitney bus are perfectly reasonable possibilities, including even a low-priced fuel, and the establishment of all of them as accomplished facts would, no doubt, wreck the electric railways. But for that matter, so would the commercial development of individual flying machines that permitted every one to fly instead of walk. This, as a matter of fact, is no more than equivalent to the threat of revolutionary change which the future holds over every form of activity, and yet the number of industries that actually have been thus wiped out is utterly insignificant, reciprocating steam engine construction and carriage building being the only recent ones that come off-hand to mind.

That the jitney or its equivalent will return some day in new form and with renewed vigor is, therefore, exceedingly unlikely. As a nation-wide movement the jitney is dead. Rattling its bones may bring some valuable lessons to the electric railways but can hardly be terrifying, and in this regard we cannot agree with Mr. Cooper even though we can heartily applaud his belief that the electric railway industry should keep its ear close to the ground.

THE RHODE ISLAND ARBITRATION AWARD

Probably the most striking point in the Rhode Island arbitration award, abstracted in last week's issue, is the limitation of the wage increase to blue uniformed men who have been in the company's service more than one year, and the grant of a 0.5 cent increase for second-year service and a 1.5 cent increase for third-year service, thus placing a premium on the continuance of service for three years. The arbitration board thus does well in regarding the first-year and second-year men as apprentices, and gives the more experienced men the higher wages. Naturally this finding has led to expressions of dissatisfaction among the younger men, but the newer employees have been decidedly helped by the fixing of a daily guarantee of six hours' work, with fourteen hours' outside time for extra men.

The granting of the increase on the basis of comparison with neighboring schedules is worthy of note, since the board stated emphatically that little light was thrown upon the wage question by the consideration of compensation in other occupations. In arbitration proceedings in Massachusetts it has long been a favorite method of the union representatives to present extended evidence in regard to the earnings of carpenters, bricklayers, masons and other craftsmen per hour or per day in order to prove that the earnings of platform men are low. Even city employees have been dragged into such proceedings. The present arbitration board, however, rightly considers such evidence of little value, and prefers to fix the scale by direct comparison. This is obviously a more just method. Just how far a board can properly go in assuming that operating conditions on one railway resemble those on another is, of course, a question open to debate, but on the whole it seems that the prevailing scales on neighboring systems having similar service problems may justly be considered in wage awards. It is interesting to observe that the present arbitration board, when judging the similarity of conditions on different properties, refused to countenance the technical objection that state lines intervened between such properties. In other words, the board felt that a likeness of conditions was a matter for proof based on other factors than mere geographical boundaries, and on the basis of the data submitted it considered that Massachusetts and Connecticut companies were near enough in the same general section and under sufficiently analogous conditions to permit fair and just comparisons to be drawn.

The difficulty of occupational comparison, or at least the lack of satisfactory comparative evidence presented by the employees in the present case, appears in part responsible for the decision to leave the wages of shop, power-plant and other miscellaneous employees unchanged. The deeper the board went into the evidence, the more difficult it became to compare the work of such men on the Rhode Island system with that of miscellaneous employees elsewhere. Owing to local conditions, and probably also to gradual development, the classifications of these employees differ materially in different companies, which is only another way of saying that their duties and capabilities vary widely. At all events, the board found no reason to recommend an increase for any men in this class, from which it would seem that they must be reasonably well paid.

The broader question of the company's ability to withstand the increases granted is closely related to the onerous conditions imposed upon it in the way of taxation and assessment for city improvements and maintenance. Heavy burdens have been assumed by the road as a condition of the right to do business in Providence, and the case is simply another one where public co-operation is needed to put the company on the plane where it belongs as a successful business institution. If citizens and employees will do their part, the Rhode Island Company and others which are laboring under enormous handicaps will come out of the woods and be able to pay an attractive wage, and also render the service that skilled management and loyal support are glad to give in return for a reasonable reward to the investor.

PHYSICAL LIMITATIONS IMPEDE INTERURBAN GROWTH

Progress in interurban railway extensions and construction has not only practically ceased but existing roads are finding the problem of earning a fair return on their investment increasingly difficult. Gross receipts are not only not increasing with the development of the country, but in many individual cases they are actually decreasing. Greater economy in operation is hardly possible except at the expense of maintenance, and this would be merely "robbing Peter to pay Paul." What has brought about this condition? Competition? Yes, to some extent. Regulation? Only to a small degree. Mismanagement? No. Then what is the cause? We are strongly of the opinion that the present trouble is due principally to the erroneous idea on the part of the original builders of the roads as to their revenue-producing possibilities.

Most of the interurban roads were built, primarily, to handle passenger traffic. The frequency and reliability of the service established soon gleaned the territory of any prospect of adding greatly to the gross revenue from improvements in this direction. As passenger traffic stimulators, picnics and amusement parks have been tried, but most companies have found them to be unprofitable. To cap the climax, the automobile, in the past few years, has made irretrievable inroads into the possibilities for future development of passenger traffic. The question now is, where shall the interurban railways turn to obtain the additional revenue which they require?

As we view the situation, the interurban roads are in a rut and heroic measures are necessary to bring about an enduring remedy. While it is true that some regulatory measures have tended to impede natural growth, the question with most companies has been whether they dared to increase their passenger and freight rates to the maximum permitted by law. Many have done this, but renewals, automobile competition and laws requiring block signal protection and grade separations have more than offset the increased earnings thus obtained. Fields other than the passenger business now must be sought to recover this loss, and it appears that the best opportunity for rapid development is afforded by going into the general freight-handling business. To do this, franchise limitations must be overcome, physical restrictions must be removed and liberal freight-handling facilities and terminals will be required to obtain sufficient freight traffic to make it profitable.

Why the electric interurban lines have not considered themselves as undeveloped until they were fitted physically to meet the competitive freight service offered by steam roads is a question difficult to answer. Some may say that the experience with freight service on a small scale has shown that it is unprofitable. We are of the opinion that this is a mistaken conclusion.

The passenger traffic, on most interurban roads, has been sufficiently dense to show a small profit, but it should be evident, at least by this time, that it alone will not make the interurban electric railways prosper. Many isolated properties could be cited that have gone into the wholesale freight-handling business on a scale equal to that practised by steam roads and have found it profitable. If this policy is successful on roads without track connections to other electric interurban lines, how much more so would it be with networks of electric lines such as exist in certain parts of the country.

Interurban railway managers, as a rule, are close to the public they serve, and there does not appear to be the slightest doubt that they could obtain most of the intrastate freight, and where they have electric or steam road connections, considerable interstate freight as well, both in car loads and in less than carload shipments.

A network of interurban lines, through their associations, should work together as one system in the handling of through freight to insure the reliability and dispatch of the service. Belt lines around many cities will be necessary, tracks to industries will be required, and extensions to passing sidings must be made to care for freight traffic. The expense of these changes unquestionably will be considerable, but all of these things need not be done at once. The principal matter is to decide upon the direction of future improvement. The situation may seem clearer if we consider that the interurban road, as it stands to-day, is largely an undeveloped enterprise, and that for it to lie idle during the night hours when the passenger service is practically off the line is an economic waste.

Interurban electric railways, like every other successful business, should be prepared to sell every product that they can supply. There is not the slightest doubt that if the electric lines will prepare to handle freight of all kinds the business will be forthcoming and at rates which will make it profitable. But it cannot be obtained in considerable quantities without a sufficient degree of preparedness in the form of trackage especially installed to handle every class of freight that can be carried profitably and the elimination of physical errors which impede the operation of freight trains.

Safety First in Seattle

The Author Describes the Early Interest of the Seattle Company in Accident Prevention, the Organization of Safety Committees, the System of "Barn Bogies" and other Methods Which Have Materially Reduced the Accidents on the Railway

By **GEORGE CARSON**
President American Electric Railway Claims Association

WHILE the country has been progressing in various directions for many years, advance in accident prevention in an organized and systematic manner is comparatively new. So far as I know, the first work of this kind was undertaken by Stone & Webster in 1908, when the firm began a campaign of publicity in the daily press in all the cities where their properties were located, publishing cuts illustrating various types of accidents to pedestrians, vehicle drivers, etc. Soon after that time we held occasional meetings in Seattle of the officials of the company and trainmen at the various carhouses, but these meetings were few, and it was not until June 21, 1910, that we became active in organized preventive work.

On the evening of that date we held a safety meeting at Fremont carhouse of the trainmen, transportation officials and members of the claim department. There was an attendance of about 150 trainmen. The meeting lasted for more than two hours, the heads of the transportation, employment and claim departments making addresses, and the keynote in every instance was co-operation. Co-operation is still the watchword. Without such no part of the business in which we are engaged can be a complete success. Mr. Kempster, at that time superintendent of transportation, presided and opened the meeting with the following address, which was so pertinent to the work about to be undertaken and afterward followed, that I quote it in full:

"The subject of prevention of accidents is the one for which we have met to-night. We have met to talk about ways and means in preventing accidents. The money that this company pays out in settling accident claims and in taking care of the expense incident to every accident that occurs is something enormous, way beyond what a majority of you have any idea of. Not only is that true of this company, but it is equally true of every public utility corporation engaged in transporting passengers throughout the country.

"Money paid in that way is practically a dead loss. It is gone. No good can come from it. There is no possible means of getting it back. The question in this business is how much profit you can get out of that 5 cents that is paid by the passenger, and we are in this business for the profit that there is in it.

"No single individual can furnish the money necessary to equip and operate a company of the size of the transportation company here in Seattle. The company that can make the best record in accident claims or in the prevention of accidents is the company that has the best standing, as a rule, in the financial world.

"A side of the question that touches all of us more closely than the investment side is the question of safety, the question of being carried on these cars without injury, without danger of losing life or limb, and free from injuries of that character. That is what the public wants. That is what it demands. There is always a double loss. We lose the confidence that the public has a right to expect. If the people of the community feel that the cars upon which they are riding are not properly handled, that they are apt to be hurt, and if men feel that when their wives and children are being carried from one part of the city to another they are likely to suffer injury, they will have a very poor opinion of the company, of its methods, and incidentally of the men who handle the cars.

"We have had an experience in the past few years that has been anything but creditable. We want from now on to get closer together—each one of us—in the matter of prevention of accidents, and with that end in view the claim department, right from the chief of the department, Mr. Carson, all the way down, is going to take part with the transportation department in an effort to study out this question, and enlist the aid and support of you men in eliminating a great many of these dangerous and costly accidents. There is only one way in which that can be done, and that is through securing the hearty co-operation and support of every man in the department. It means just as much to you as to any one else connected with the company. You—all of you—would, I am sure, take pride in working for a concern whose record in that particular is good. There are many features in this city which make accidents more liable to occur than they do in other communities. It calls for just a little more care than it would if conditions were easier in the matter of operation.

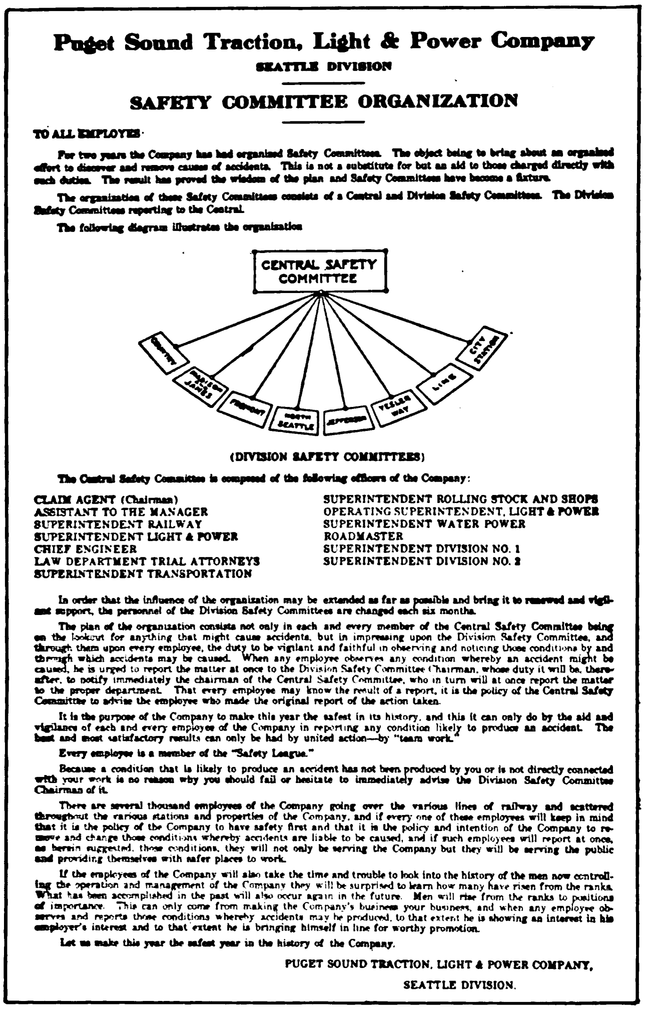
"I want you to know this: that it is not the purpose of these meetings from now on to lecture or to find fault, or anything of that kind, but the whole purpose of these meetings is to educate, to train and to render such help as we can, singly or unitedly, to pull this thing up to a higher plane and to cut down and to cut out a great many of the accidents from which we now have to suffer."

J. M. Wilmot, who was at that time chief clerk in the claim department, submitted figures which were amazing, emphasizing the fact that 10 per cent of the gross railway receipts were being spent for accidents, so much money being absolutely thrown away. The accident situation and expense at that time was alarming. For the preceding month (May, 1910) the following was the condition:

There were 450 reported accidents.
Ten collisions between cars.
Seventy-one collisions with vehicles.
Eighteen collisions with pedestrians.
Ten collisions with animals.
Thirty-eight derailments.
Twelve accidents due to defective car or track.
Twenty-nine accidents due to persons boarding moving cars.
Sixty-nine accidents due to persons leaving moving cars.
Eighty-three accidents to persons while on cars (including where they fell in aisles, etc.).
Two persons fell from moving cars.
Sixteen persons fell near cars.
Ninety-two miscellaneous.

During that month there were eighty-five accident reports on which no witnesses were returned, or 18.8 per cent of the whole amount. The average witnesses per accident was but four, an exceedingly bad showing as compared with other companies. Great improvement has been brought about in this regard since that time.

Of the ten collisions between cars, six were with injuries and four without, the total cost of the ten accidents being $3,417.


CENTRAL SAFETY COMMITTEE
MADISON AND JAMES
FREMONT
NORTH SEATTLE
JEFFERSON
YESLER WAY
LINE
CITY STATIONS

Puget Sound Traction, Light & Power Company

SEATTLE DIVISION

SAFETY COMMITTEE ORGANIZATION

TO ALL EMPLOYES·

For two years the Company has had organized Safety Committees. The object being to bring about an organized effort to discover and remove causes of accidents. This is not a substitute for but an aid to those charged directly with such duties. The result has proved the wisdom of the plan and Safety Committees have become a fixture.

The organization of these Safety Committees consists of a Central and Division Safety Committees. The Division Safety Committees reporting to the Central.

The following diagram illustrates the organization

(DIVISION SAFETY COMMITTEES)

The Central Safety Committee is composed of the following officers of the Company:

CLAIM AGENT (Chairman)	SUPERINTENDENT ROLLING STOCK AND SHOPS
ASSISTANT TO THE MANAGER	OPERATING SUPERINTENDENT, LIGHT & POWER
SUPERINTENDENT RAILWAY	SUPERINTENDENT WATER POWER
SUPERINTENDENT LIGHT & POWER	ROADMASTER
CHIEF ENGINEER	SUPERINTENDENT DIVISION NO. 1
LAW DEPARTMENT TRIAL ATTORNEYS	SUPERINTENDENT DIVISION NO. 2
SUPERINTENDENT TRANSPORTATION	

In order that the influence of the organization may be extended as far as possible and bring it to renewed and vigilant support, the personnel of the Division Safety Committees are changed each six months.

The plan of the organization consists not only in each and every member of the Central Safety Committee being on the lookout for anything that might cause accidents, but in impressing upon the Division Safety Committee, and through them upon every employee, the duty to be vigilant and faithful in observing and noticing those conditions by and through which accidents may be caused. When any employee observes any condition whereby an accident might be caused, he is urged to report the matter at once to the Division Safety Committee Chairman, whose duty it will be, thereafter, to notify immediately the chairman of the Central Safety Committee, who in turn will at once report the matter to the proper department. That every employee may know the result of a report, it is the policy of the Central Safety Committee to advise the employee who made the original report of the action taken.

It is the purpose of the Company to make this year the safest in its history, and this it can only do by the aid and vigilance of each and every employee of the Company in reporting any condition likely to produce an accident. The best and most satisfactory results can only be had by united action—by "team work."

Every employee is a member of the "Safety League."

Because a condition that is likely to produce an accident has not been produced by you or is not directly connected with your work is no reason why you should fail or hesitate to immediately advise the Division Safety Committee Chairman of it.

There are several thousand employees of the Company going over the various lines of railway and scattered throughout the various stations and properties of the Company, and if every one of these employees will keep in mind that it is the policy of the Company to have safety first and that it is the policy and intention of the Company to remove and change those conditions whereby accidents are liable to be caused, and if such employees will report at once, as herein suggested, those conditions, they will not only be serving the Company but they will be serving the public and providing themselves with safer places to work.

If the employees of the Company will also take the time and trouble to look into the history of the men now controlling the operation and management of the Company they will be surprised to learn how many have risen from the ranks. What has been accomplished in the past will also occur again in the future. Men will rise from the ranks to positions of importance. This can only come from making the Company's business your business, and when any employee observes and reports those conditions whereby accidents may be produced, to that extent he is showing an interest in his employer's interest and to that extent he is bringing himself in line for worthy promotion.

Let us make this year the safest year in the history of the Company.

PUGET SOUND TRACTION, LIGHT & POWER COMPANY,
SEATTLE DIVISION.

SAFETY IN SEATTLE—BULLETIN ANNOUNCING APPOINTMENT OF SAFETY COMMITTEE

The seventy-one collisions with vehicles cost $4,370. Collisions with pedestrians cost more than $2,000.

Derailments during the month cost $1,157; accidents to persons leaving moving cars came to more than $5,000. The eighty-three accidents to persons while on cars, due to bad operation, cost the enormous total of $4,012.

Miscellaneous accidents cost $1,229.

The operating expenses of the claim department brought the total expense for the month to the enormous sum of $26,620, fully double our present average expense.

The Fremont meeting was a complete success. The men listened with the closest attention. Other similar meetings followed close thereafter, and this, coupled with publicity in the *Live Wire*, brought about almost an immediate reduction in the number and severity of accidents and in the accident expense. We have continued the carhouse meetings regularly ever since.

In August, 1912, a sub-committee of the central safety committee was appointed to take up the matter of carhouse meetings and subjects, in this way making the work most systematic and efficient. This committee is still serving.

LECTURES TO SCHOOL CHILDREN AND THEIR RESULTS

In the fall of 1910 we started safety lectures in the public and private schools, women's and other clubs, universities, business colleges, etc., employing for that purpose F. S. Hughes, who had lectured to the school children of Portland some months previous with splendid success. In connection with the school lectures we distributed 100,000 safety lapel buttons to the children of the schools, and followed that by placing nicely framed cards of "Street Car Don'ts" in all the schools throughout the city, both public and private, with warnings against accidents printed thereon.

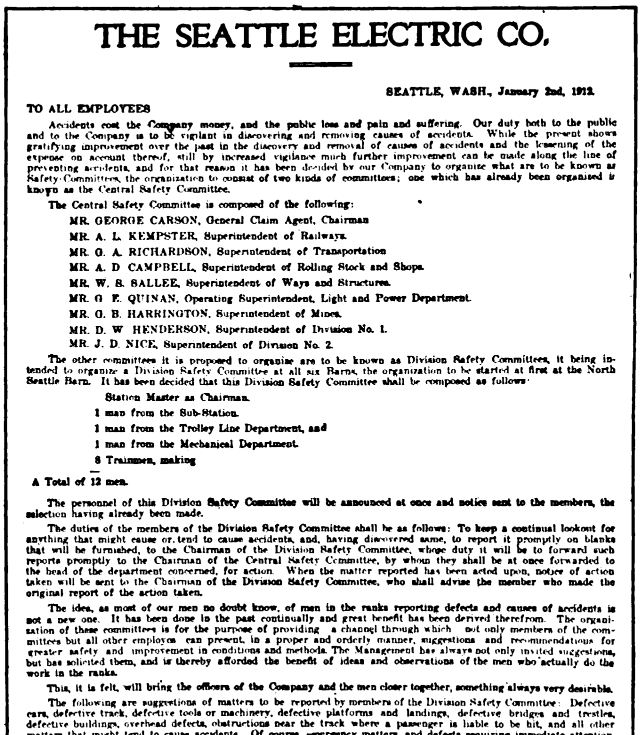
There were in the city of Seattle at that time some 900 school rooms, more than 30,000 pupils and approximately 1000 teachers. This has reference only to the public schools. There were a number of private schools, in which there were employed approximately fifty teachers, with 1500 pupils. Two talks were given to all the pupils, both public and private, between Sept. 10, 1910, and April 15, 1911, reaching approximately 45,000 children, and undoubtedly, through the discussions and

CLAIM EXPENSES AND COMPARISON OF ACCIDENTS IN SEATTLE SINCE SAFETY COMMITTEE ORGANIZATION WAS EFFECTED IN JANUARY, 1912

Claim expense, 1911, $216,999.84..Per cent of gross earnings, 6.16
Claim expense, 1912, 226,668.20..Per cent of gross earnings, 6.50
Claim expense, 1913, 188,805.46..Per cent of gross earnings, 5.15
Claim expense, 1914, 177,955.59..Per cent of gross earnings, 4.86

Comparison of Accidents

	1911	1912	1913	1914
Derailments	25	9	8	6
Collision between cars	22	15	15	21
Collision with vehicles	363	424	539	515
Collision with pedestrians	176	149	136	116
Boarding moving cars	114	32	55	39
Leaving moving cars	209	125	110	106
Boarding and leaving still cars	172	150	172	184
Accidents to persons on cars	356	351	384	427
Defective car or track	79	21	55	28
Totals	1,516	1,276	1,474	1,442



THE SEATTLE ELECTRIC CO.

SEATTLE, WASH., January 2nd, 1912.

TO ALL EMPLOYEES

Accidents cost the Company money, and the public loss and pain and suffering. Our duty both to the public and to the Company is to be vigilant in discovering and removing causes of accidents. While the present shows gratifying improvement over the past in the discovery and removal of causes of accidents and the lessening of the expense on account thereof, still by increased vigilance much further improvement can be made along the line of preventing accidents, and for that reason it has been decided by our Company to organize what are to be known as Safety Committees, the organization to consist of two kinds of committees; one which has already been organized is known as the Central Safety Committee.

The Central Safety Committee is composed of the following:

MR. GEORGE CARSON, General Claim Agent, Chairman
MR. A. L. KEMPSTER, Superintendent of Railways.
MR. G. A. RICHARDSON, Superintendent of Transportation
MR. A. D CAMPBELL, Superintendent of Rolling Stock and Shops.
MR. W. S. SALLEE, Superintendent of Ways and Structures.
MR. G F. QUINAN, Operating Superintendent, Light and Power Department.
MR. G. B. HARRINGTON, Superintendent of Mines.
MR. D. W HENDERSON, Superintendent of Division No. 1.
MR. J. D. NICE, Superintendent of Division No. 2.

The other committees it is proposed to organize are to be known as Division Safety Committees, it being intended to organize a Division Safety Committee at all six Barns, the organization to be started at first at the North Seattle Barn. It has been decided that this Division Safety Committee shall be composed as follows·

Station Master as Chairman.
1 man from the Sub-Station.
1 man from the Trolley Line Department, and
1 man from the Mechanical Department.
8 Trainmen, making

A Total of 12 men.

The personnel of this Division Safety Committee will be announced at once and notice sent to the members, the selection having already been made.

The duties of the members of the Division Safety Committee shall be as follows: To keep a continual lookout for anything that might cause or tend to cause accidents, and, having discovered same, to report it promptly on blanks that will be furnished, to the Chairman of the Division Safety Committee, whose duty it will be to forward such reports promptly to the Chairman of the Central Safety Committee, by whom they shall be at once forwarded to the head of the department concerned, for action. When the matter reported has been acted upon, notice of action taken will be sent to the Chairman of the Division Safety Committee, who shall advise the member who made the original report of the action taken.

The idea, as most of our men no doubt know, of men in the ranks reporting defects and causes of accidents is not a new one. It has been done in the past continually and great benefit has been derived therefrom. The organization of these committees is for the purpose of providing a channel through which not only members of the committees but all other employes can present, in a proper and orderly manner, suggestions and recommendations for greater safety and improvement in conditions and methods. The Management has always not only invited suggestions, but has solicited them, and is thereby afforded the benefit of ideas and observations of the men who actually do the work in the ranks.

This, it is felt, will bring the officers of the Company and the men closer together, something always very desirable.

The following are suggestions of matters to be reported by members of the Division Safety Committee: Defective cars, defective track, defective tools or machinery, defective platforms and landings, defective bridges and trestles, defective buildings, overhead defects, obstructions near the track where a passenger is liable to be hit, and all other matters that might tend to cause accidents. Of course, emergency matters, and defects requiring immediate attention, will continue to be reported as heretofore.

One of the most important duties that members of the Committee will be called upon to do is to watch the work of new men entering the service, or comparatively new men, and when such men are disposed to be negligent in operation, due to excessive speed or failure to slow down as required by rules when passing cars, or rough handling of cars either in stopping or starting, or other matters of similar nature, either through ignorance of the rules or other cause, it will be the duty of men on the Committee to go to them in a friendly way and tell them about matters in connection with operation in which they are not proficient and matters about which they might be careless. Of course, if the man spoken to did not respond to the advice given him, it would become necessary to report the matter to the proper authority, and if a man should continue to be careless after sufficient warning had been given, it would become necessary to remove him from the service, as none of the men can afford to have a careless man among them.

It has been decided that the time of service on Division Committees shall be six months, thus giving opportunity to a large number of the men to serve within a year or two.

It is the belief of the Company that the men appointed on these committees will, in he future, largely recruit the vacancies occurring in higher positions, and also that service on these committees will tend to develop men to fill higher positions.

It is intended that the Division Committees shall meet at least once each month, the Company paying them for the time consumed in attendance at the meetings, and also that meetings shall be held between the Division Committees and the Central Committee at times to be decided upon, for the purpose of discussing matters of interest in the prevention of accidents.

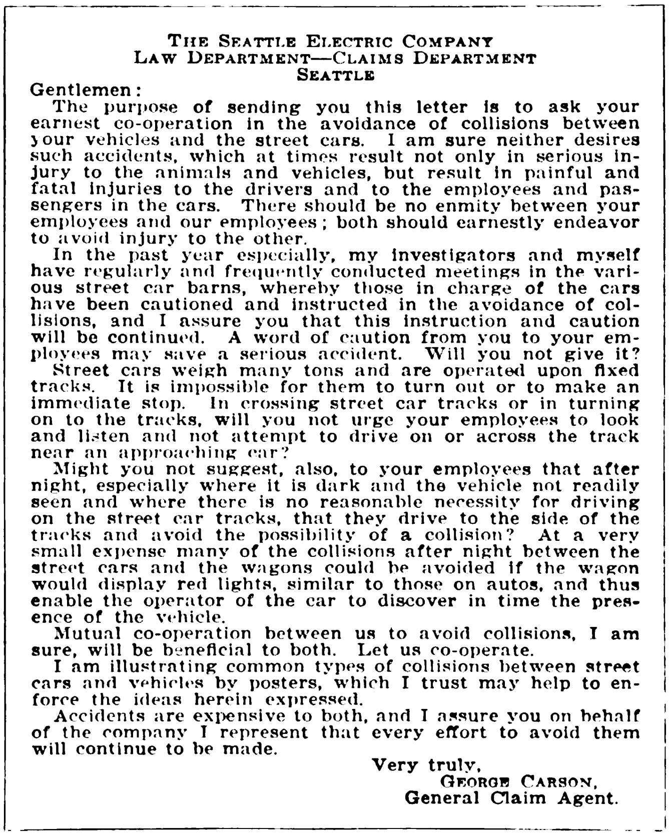
It is also believed that this organization, in the bringing together of the officers and employees of the Company, in this intimate way, will result in more friendly and closer relations between them; that conditions will improve and accidents will be greatly reduced, and that we shall secure what everybody desires, viz., greater safety and less accident expense.

THE SEATTLE ELECTRIC COMPANY.

SAFETY IN SEATTLE—BULLETIN DESCRIBING WORK ACCOMPLISHED BY SAFETY COMMITTEE AFTER TWO YEARS OF SERVICE communications that of necessity would occur in their homes following the talks and lectures, almost every person in the city. With a view of determining accurately the probable effect of these talks along the line of safety, I made a comparison of the records in my office from Sept. 1, 1910, to May 1, 1911, with the year preceding July 1, 1910. In another communication bearing upon this same subject, and covering the accidents to boys and girls where the boys and girls were not without fault, between July 1, 1909, and July 1, 1910, I compiled the following summary:

Between July 1, 1909, and July 1, 1910, the confidential reports of my office showed 157 accidents in which boys and girls were involved and in which the girls and boys were not without fault. In these, thirty-six girls were involved and 121 boys. This indicates a greater carelessness and indifference to danger on the part of the boys. A further classification of these accidents showed that forty-nine children were injured by being struck by a car, twenty-three were hurt in jumping on or off moving cars, thirteen occurred in getting off standing cars, seven on account of collisions with little wagons or bicycles, twelve by being hit by teams or some other vehicle while alighting from a car, two falling down while running beside a car, fifty-one miscellaneous. As will be seen, there were 157 accidents in twelve months, approximately thirteen a month.

The confidential reports of my office also showed from Sept. 1, 1910, to May 1, 1911, a period of eight months, thirty-three accidents in which boys and girls were not without fault, being accidents of similar character to those occurring in the summary of the year prior to July 1, 1910. In other words, the accidents of that character averaged, beginning with the school year of 1910, when the lectures were begun, to the spring of 1911, approximately four a month, or nine less per month than had occurred during the previous period. While probably the lectures in the public schools cannot claim the credit for all of this reduction, as improvements had been made in other and various lines, I cannot but feel that they constituted a controlling factor in reducing the number of accidents. They are a type of accidents generally in which the defense of contributory negligence cannot be ordinarily sustained, and where there is any negligence on the part of the company a liability exists.



THE SEATTLE ELECTRIC COMPANY
LAW DEPARTMENT—CLAIMS DEPARTMENT
SEATTLE

Gentlemen:

The purpose of sending you this letter is to ask your earnest co-operation in the avoidance of collisions between your vehicles and the street cars. I am sure neither desires such accidents, which at times result not only in serious injury to the animals and vehicles, but result in painful and fatal injuries to the drivers and to the employees and passengers in the cars. There should be no enmity between your employees and our employees; both should earnestly endeavor to avoid injury to the other.

In the past year especially, my investigators and myself have regularly and frequently conducted meetings in the various street car barns, whereby those in charge of the cars have been cautioned and instructed in the avoidance of collisions, and I assure you that this instruction and caution will be continued. A word of caution from you to your employees may save a serious accident. Will you not give it?

Street cars weigh many tons and are operated upon fixed tracks. It is impossible for them to turn out or to make an immediate stop. In crossing street car tracks or in turning on to the tracks, will you not urge your employees to look and listen and not attempt to drive on or across the track near an approaching car?

Might you not suggest, also, to your employees that after night, especially where it is dark and the vehicle not readily seen and where there is no reasonable necessity for driving on the street car tracks, that they drive to the side of the tracks and avoid the possibility of a collision? At a very small expense many of the collisions after night between the street cars and the wagons could be avoided if the wagon would display red lights, similar to those on autos, and thus enable the operator of the car to discover in time the presence of the vehicle.

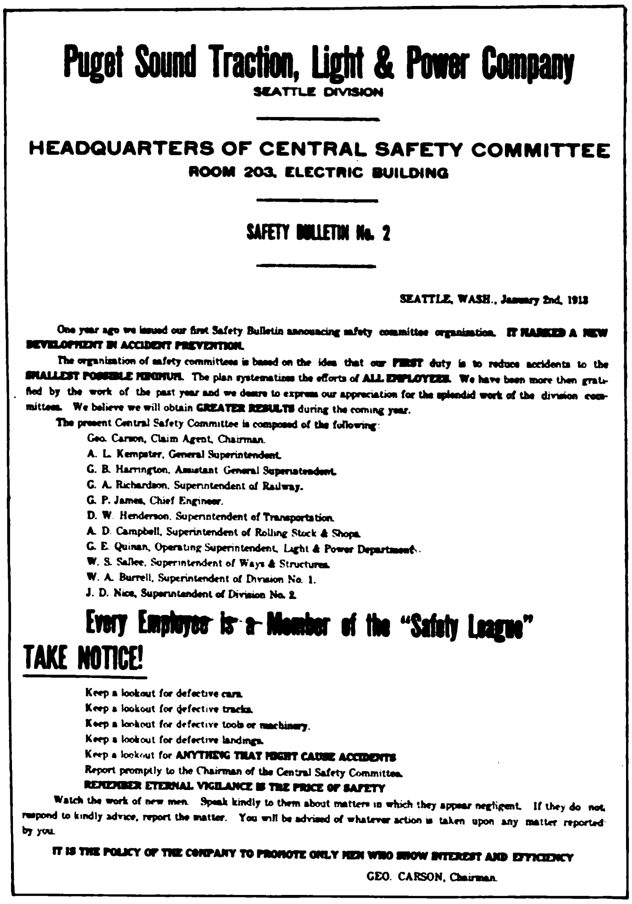
Mutual co-operation between us to avoid collisions, I am sure, will be beneficial to both. Let us co-operate.

I am illustrating common types of collisions between street cars and vehicles by posters, which I trust may help to enforce the ideas herein expressed.

Accidents are expensive to both, and I assure you on behalf of the company I represent that every effort to avoid them will continue to be made.

Very truly,
GEORGE CARSON,
General Claim Agent.

SAFETY IN SEATTLE—CIRCULAR LETTER TO VEHICLE OWNERS



Puget Sound Traction, Light & Power Company
SEATTLE DIVISION

HEADQUARTERS OF CENTRAL SAFETY COMMITTEE
ROOM 203, ELECTRIC BUILDING

SAFETY BULLETIN No. 2

SEATTLE, WASH., January 2nd, 1913

One year ago we issued our first Safety Bulletin announcing safety committee organization. **IT MARKED A NEW DEVELOPMENT IN ACCIDENT PREVENTION.**

The organization of safety committees is based on the idea that our **FIRST** duty is to reduce accidents to the **SMALLEST POSSIBLE MINIMUM.** The plan systematizes the efforts of **ALL EMPLOYEES.** We have been more then gratified by the work of the past year and we desire to express our appreciation for the splendid work of the division committees. We believe we will obtain **GREATER RESULTS** during the coming year.

The present Central Safety Committee is composed of the following:

Geo. Carson, Claim Agent, Chairman.
A. L. Kempster, General Superintendent.
G. B. Harrington, Assistant General Superintendent.
G. A. Richardson, Superintendent of Railway.
G. P. James, Chief Engineer.
D. W. Henderson, Superintendent of Transportation.
A. D. Campbell, Superintendent of Rolling Stock & Shops.
G. E. Quinan, Operating Superintendent, Light & Power Department.
W. S. Sallee, Superintendent of Ways & Structures.
W. A. Burrell, Superintendent of Division No. 1.
J. D. Nice, Superintendent of Division No. 2.

Every Employee is a Member of the "Safety League"

TAKE NOTICE!

Keep a lookout for defective cars.
Keep a lookout for defective tracks.
Keep a lookout for defective tools or machinery.
Keep a lookout for defective landings.
Keep a lookout for **ANYTHING THAT MIGHT CAUSE ACCIDENTS**
Report promptly to the Chairman of the Central Safety Committee.
REMEMBER ETERNAL VIGILANCE IS THE PRICE OF SAFETY

Watch the work of new men. Speak kindly to them about matters in which they appear negligent. If they do not, respond to kindly advice, report the matter. You will be advised of whatever action is taken upon any matter reported by you.

IT IS THE POLICY OF THE COMPANY TO PROMOTE ONLY MEN WHO SHOW INTEREST AND EFFICIENCY

GEO. CARSON, Chairman.

SAFETY IN SEATTLE—SAFETY BULLETIN NO. 2

We are still giving the school lectures with continued gratifying results.

In addition to school lectures the safety inspector, J. F. Cooper, takes up with the police department, automobile association and owners of vehicles the matter of carelessness on the part of drivers. He also calls on parents of children found reckless in the streets.

EFFORTS WITH VEHICLE DRIVERS SUCCESSFUL

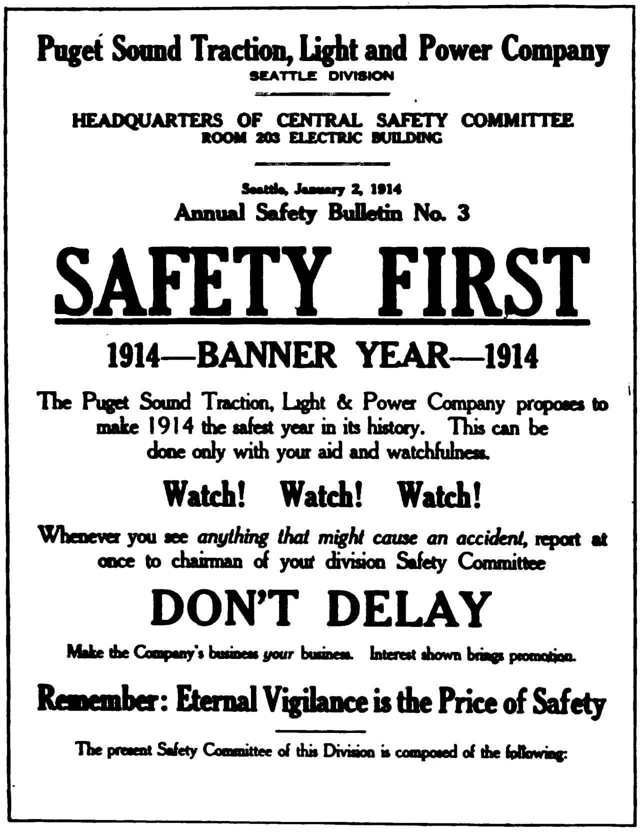
In the spring of 1911 we sent a circular letter to all vehicle owners throughout the city, asking their cooperation in the prevention of accidents. A copy of this circular letter is given herewith.

We also placed in the barns and garages throughout the city cards illustrating various types of vehicular accidents with words of warning against accidents printed thereon. These cards were patterned from the cuts which were used by Stone & Webster in newspapers in 1908.

About the same time we distributed in offices and stores thoughout the city 100,000 desk blotters with words of warning against accidents printed thereon and also mailed a large number with bills to the company's customers, and we placed large safety pennants in the trainmen's quarters, company's shops, carhouses and other buildings.

ORGANIZATION OF SAFETY COMMITTEE

In January, 1912, we organized safety committees. The safety committee idea originated with Ralph



Puget Sound Traction, Light and Power Company
SEATTLE DIVISION

HEADQUARTERS OF CENTRAL SAFETY COMMITTEE
ROOM 203 ELECTRIC BUILDING

Seattle, January 2, 1914
Annual Safety Bulletin No. 3

SAFETY FIRST

1914—BANNER YEAR—1914

The Puget Sound Traction, Light & Power Company proposes to make 1914 the safest year in its history. This can be done only with your aid and watchfulness.

Watch! Watch! Watch!

Whenever you see *anything that might cause an accident*, report at once to chairman of your division Safety Committee

DON'T DELAY

Make the Company's business *your* business. Interest shown brings promotion.

Remember: Eternal Vigilance is the Price of Safety

The present Safety Committee of this Division is composed of the following:

SAFETY IN SEATTLE—SAFETY BULLETIN NO. 3

R. Richards, general claim agent of the Chicago & Northwestern Railroad. We in Seattle are the originators of safety committee organization as applied to electric roads. Our plan of organization was taken up by a small number of electric roads immediately after our organization, on lines similar to ours, and gradually other companies have been organizing them. I believe that nine-tenths of all the large electric companies now have safety committee organizations, which, in my opinion, are the most effective accident preventive agency known at this time. The benefit that comes from safety committee organization is due to the fact that it creates an official channel by which not only members of the committees but all other employees can present in a proper and orderly manner suggestions and recommendations for improvement in conditions and methods. This plan affords the management the benefit of ideas and observations of the men who actually do the work in the ranks. The organization arouses interest and enthusiasm in accident prevention that cannot be brought about, in my opinion, by ordinary methods. In addition, the organization brings the officials and employees of the company closer together—something which, for the mutual good feeling that it creates, is always very desirable.

"BARN BOGIE" SYSTEM

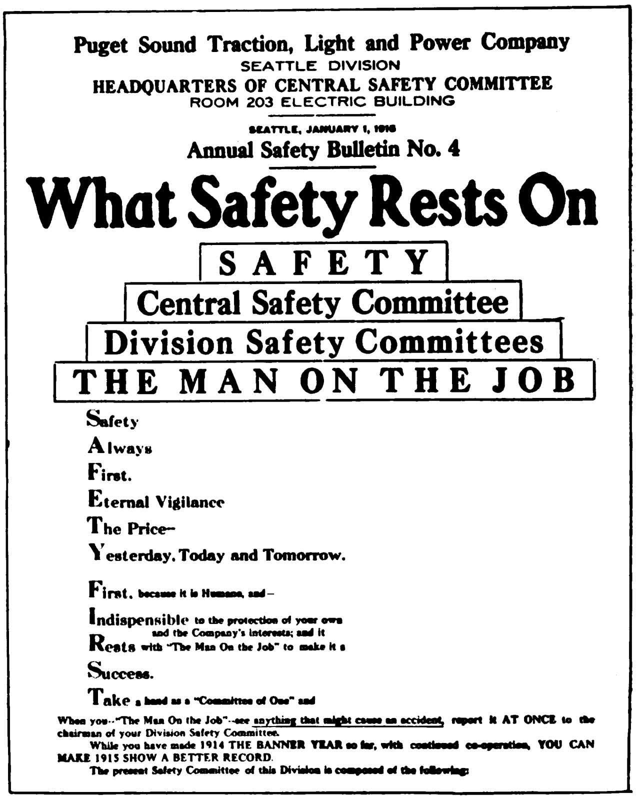
Following close on the safety committees, we adopted the "barn bogie" system. These bogies, I am satisfied, result very beneficially as they create a friendly rivalry which brings about increased exertion to avoid accidents. (An account of this system was published in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 1, 1913.)

Briefly the plan consists of a friendly, competitive scheme among the trainmen of the several carhouses of the company, wherein each carhouse not only attempts to make the best showing as to the number of accidents for a given time but, in addition, endeavors to beat its own previous record. The electric carhouses compete with each other distinctly from the cable houses. The bogie allowance is made monthly and is a certain number of accidents allowed each carhouse based upon the past showing of the carhouse, number of cars operating therefrom, car mileage, topographical conditions, etc. This allowance is displayed upon the bogie chart, divided by the month on a daily scale which is posted in each carhouse.

The progress as to the number of accidents is posted daily in each carhouse from figures made up from the claim department so that the trainmen can at once see the number of accidents in which their carhouse has been involved to date and also the number of accidents the other carhouses have had and their relative standing. At the end of each month the percentages are computed, and the score is then published in the journal issued by the company, with such comments as may be deemed pertinent.

Cumulative bogies are figures made up upon the same theory for succeeding months. At the end of the first six months the scores of the several carhouses for such time are published and again at the end of the year, and the carhouse which has made the best showing for the year is, of course, proclaimed champion for that time. But the fact that such carhouse has made the best showing among the carhouses is of itself not the only goal, for it must be remembered that in addition to having made the best showing among the carhouses, the carhouse, in order to have accomplished the purpose of the bogie, must have improved its own record for the previous year.

The "barn bogie" system has proved to be very successful from every viewpoint. The company has found the trainmen to be very much interested in it. In addition, the scheme has stimulated them to better effort on their part in endeavoring to reduce the number of accidents by more careful operation, etc. As in any competitive game, the scores are watched by the trainmen with much interest, and it has engendered a friendly rivalry among them as to which carhouse will carry off



Puget Sound Traction, Light and Power Company
SEATTLE DIVISION
HEADQUARTERS OF CENTRAL SAFETY COMMITTEE
ROOM 203 ELECTRIC BUILDING

SEATTLE, JANUARY 1, 1915
Annual Safety Bulletin No. 4

What Safety Rests On

SAFETY
Central Safety Committee
Division Safety Committees
THE MAN ON THE JOB

Safety
Always
First.
Eternal Vigilance
The Price—
Yesterday, Today and Tomorrow.

First, because it is Humane, and—
Indispensible to the protection of your own and the Company's interests; and it
Rests with "The Man On the Job" to make it a
Success.
Take a hand as a "Committee of One" and

When you—"The Man On the Job"—see anything that might cause an accident, report it AT ONCE to the chairman of your Division Safety Committee.

While you have made 1914 THE BANNER YEAR so far, with continued co-operation, YOU CAN MAKE 1915 SHOW A BETTER RECORD.

The present Safety Committee of this Division is composed of the following:

SAFETY IN SEATTLE—SAFETY BULLETIN NO. 4

final honors, all to the common and commendable end of materially reducing accidents.

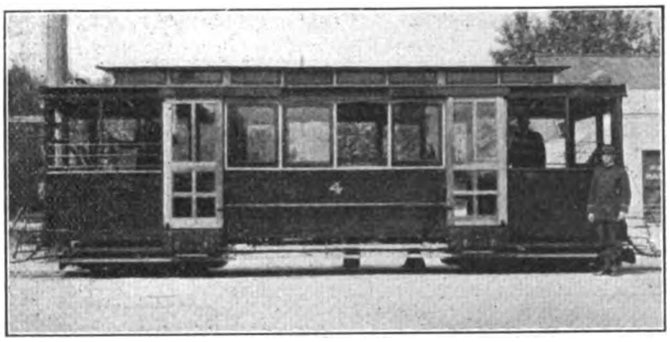
OTHER SAFETY METHODS

In the summer of 1912 the transportation department adopted the near-side stop. It is generally believed by all companies that this stop prevents a number of collisions.

In the summer of 1909 the mechanical department began the equipping of cars on the prepayment system with gates, completing this work on all cars on the system (except cable cars) in the fall of 1912. Folding or sliding gates on both ends of cars undoubtedly decrease step accidents, more particularly after trainmen have become accustomed to their use. Apart from defective steps and landings, gates should eliminate all liability step accidents and will do so if the gates are handled by trainmen according to rules.

A short time ago our management decided to convert the cable cars to the prepayment system with gates. Some of the cable cars are now so equipped, and I feel quite certain that this change will bring about a large reduction in step accidents on cable cars, a cause of accident from which we have suffered very much in the past, many times through no fault of trainmen in handling the cars.

In the spring of 1913 we sent a "follow-up" circular letter to vehicle owners, urging their co-operation in the avoidance of accidents, and at the same time we posted other more elaborate posters illustrating vehicular accidents in the carhouses and garages throughout the city.



SAFETY IN SEATTLE—CABLE CAR REBUILT FOR PREPAYMENT SERVICE

In September, 1913, we organized our safety committee, adding thereto three divisions of the light and power department and added to the central safety committee our two trial attorneys.

In the winter of 1913, we introduced stereopticon views in connection with carhouse meetings, the views being displayed by Mr. Upton, safety lecturer.

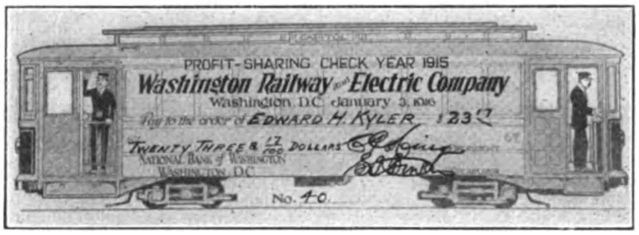
In May, 1914, we printed and distributed among the school children 50,000 safety guide pamphlets for children, with appropriate words of warning against accidents. In accident prevention, two factors are concerned—the employee and the public. I believe that the education of employees constitutes the backbone of all safety work.

The topography of Seattle is unfavorable to safe operation. Its many hills call for the most rigid inspection to detect defects so that the remedy may be applied before the accident occurs. A defect in equipment on level track might not occasion any damage whatever, while the same defect on a steep grade might cause the most disastrous kind of an accident. In this regard our safety committees are continually rendering valuable aid in reporting promptly defects and dangerous conditions wherever found.

Washington Employees Receive Bonus

Distribution of $15,527 Under Profit-Sharing Plan Inaugurated by the Washington Railway & Electric Company Four Years Ago

FOLLOWING the fifteenth annual Christmas entertainment given at the company's expense for the children of employees, the management of the Washington Railway & Electric Company, Washington, D. C., announced that 790 employees of the transportation department will receive specially designed checks with face value aggregating $15,527, representing the sum to be disbursed under the profit-sharing plan inaugurated by President Clarence P. King four years ago. The profit-sharing plan was conceived with a desire that the employees, classified as platform men should share in whatever improvement could be made in the year's results over the preceding year. During the past four years the amount divided has been based on the year 1911, when 26 per cent of the earnings (after deduction of 4 per cent District of Columbia tax) was expended for accidents and trainmen's wages. This year a slight modification in the plan was made so that men not receiving demerits during the year will receive a larger amount than those who have received demerits for infraction of rules. The transportation men eligible to participate in the fund are those who have been in the service a longer period than thirty days. The amount of the check for 1915 to all men in the service of the company for a period of one year or longer term, and who have not received demerits, is $23.17; to those in service eleven months $20.15, and a proportionate amount to all others according to the length of time employed.



PROFIT-SHARING CHECK YEAR 1915

Washington Railway and Electric Company

Washington, D.C. January 3, 1916

Pay to the order of EDWARD H. KYLER $23.17

TWENTY THREE & 17/100 DOLLARS

NATIONAL BANK of WASHINGTON

WASHINGTON, D.C.

No. 40

SPECIALLY-DESIGNED PROFIT-SHARING CHECK

Japanese Railway Projects

According to *Eastern Engineering*, the final plans for the construction of a government railway line from Tokyo to Koté, cutting off the haul over the Hakone Mountains by boring a tunnel through the mountains, were adopted during 1914. It is intended to use electric power for hauling through the tunnel. The year 1914 witnessed the completion of the long expected electric line between Yokohama and Tokyo. Unfortunately, the engineer having the work in charge decided to alter the plans submitted by the foreign experts called into consultation, hoping to effect a saving in the cost of the line. The overhead contact wire for carrying the current was in the original plan to have been welded to the supporting carriers. The plans adopted provided for the support of the wire by means of a hook which was not closed. As a result, when the line was opened, the passage of a train would elevate the wires so that they slipped off the hooks. The consequent confusion tied up the line for more than four months. The line is now in operation and is proving very successful.

The Electric Railway and the Automobile

The Author Considers Competition from the Private Automobile a Serious Problem of the Future —He Recommends Greater Attention to the Freight Business, Systematic Traffic Development, Rearrangement of Schedules and Possible Auxiliary Bus Service as Remedies

By ERNEST GONZENBACH
General Manager Empire United Railways, Syracuse, N. Y.

THE electric railway situation at this time is so extraordinary that an analysis is worthy of deepest thought, and a way out of existing conditions must be sought and found. Indeed, it has even been charged that the industry is in danger of being crowded aside by the very circumstances which caused it to spring into existence, although the facts here presented do not justify that view.

The electric railway is really an expression of the good roads movement which began long before that movement had assumed definite shape, but which was, nevertheless, a distinct development of that thought. When it was desired to haul in a horse-drawn coach more people than could be hauled by two horses on the roads then prevailing, someone laid a pair of rails in the street. The object was to provide a smooth highway. Horse cars prospered because the investment was small and the operating expenses were within reason. Then came the era of electrification, when enormous sums of money were spent in providing heavy track and larger rolling stock, and the railways were extended out into the country. In the meantime, charges due to the enormous investment multiplied, the wages of men operating the cars increased enormously and, with the increase in weight of cars, the maintenance of the roadway and the power required to move cars kept on growing. The unit of compensation, however, remained persistently the same, and electric railways eventually reached the crisis which now confronts the entire industry. This is a crisis which is based almost entirely on the fact that the return to the railways has not kept pace with the increasing expenses, and that the railways have never at any time in their history had enough net earnings to be able to write off any portion of their capital charges, although, in fact, such capital has been continuously subject to diminution by wear and tear as well as by obsolescence.

To-day the conduct and management of the industry has largely been taken out of the hands of the owners. Legislative bodies of all descriptions prescribe how the road shall be operated, and they prescribe operations which are admittedly unprofitable. City councils impose regulations and, from horse car days, the industry has inherited the burden of street paving. Public service commissions demand service and requirements beyond the power of the investments to bear. The labor unions have taken their toll, and at the present time it is quite impossible to manage an electric railway on an efficient basis such as would be approved in the management of any other form of business.

In addition to these burdens there has now been developed, in the shape of the automobile, a form of competitive transportation for which a roadway is being furnished free of charge by the taxpayers and by which is provided for the individual a means of conveyance far more serviceable than that provided by any other form of vehicle. The automobile owner makes his own schedule speed and his own schedule. It is admitted that the operation of automobiles costs more per car-mile and more per passenger than the operation of an electric car, but the extra cost of such operation seems to be willingly assumed, and it would seem that the owner is justified in the assumption of the cost because of the greater convenience to himself and the greater efficiency in time and service. Attempts to carry passengers by means of automobiles for 5 cents are bound to be failures, and the so-called "jitney menace" is only a temporary danger. No automobile at present prices and operating costs can compete with electric railways in carrying passengers in public service.

The real competition is the privately owned automobile, and we must assume that the privately owned automobile will continue to increase in numbers. More and better brick, concrete and asphalt roads are being constructed, and the price of automobiles continues to decrease—factors which inevitably spell "more automobiles." Neither can it be assumed that the cost of maintaining an automobile will discourage the man of moderate means from purchasing another one when his first machine has worn out. Almost invariably a purchaser who has purchased a cheap machine for his first attempt will purchase a more expensive one after the first one has worn out. There may be a very few exceptions to the case, but the rule has been amply proved.

Although the jitney owner has been living on his property, or, in street parlance, has been "eating his car," he has not been a greater sinner than the electric railway industry itself, for in very few cases have the railways made provision for renewals and replacements of depreciation and obsolescence. The electric railways have been living on their property and have been "eating" their cars quite as much as have the jitney owners, and that they have not come to grief earlier is because more capital is tied up in the railway industry and, therefore, there have been more "eats." Money which should have been available to keep intact the capital account has been spent in giving unprofitable service, street paving and similar expenses, such funds rarely being used for dividend purposes. In fact, the industry has arrived at the beginning of a distinct epoch of its existence, and plans for the future will need to be carefully weighed.

POSSIBILITIES OF THE FUTURE

In the future the industry must concern itself principally with meeting competition by privately owned cars which, it must be assumed, will continue to increase. It is quite inconceivable that the electric railway industry will entirely succumb and be crowded out. The investment in immovable objects and intangible assets is the greatest portion of an electric railway's capital, and in some way or other the owners of the property will have to continue to live with it, no matter what competition or conditions may face them.

But it is quite possible that in the future electric railway schedules may have to be handled in exactly the reverse condition from that now obtaining, i.e., schedules in the winter time may have to be increased and they may have to be decreased for the summer season. This is because the privately owned auto is most active as well as most attractive in the summer time, and because most private owners are more than willing to put up their cars during the cold weather period. That, however, will not solve the problem of existence of electric railways.

The matter of utilizing the rails of electric roads for the handling of freight is a possibility, but it is one which is full of pitfalls. The successful handling of freight involves interchange of equipment with steam roads and the making of joint tariffs. It has been almost impossible to meet this situation so far, and even if steam railroads are willing to make joint tariffs and to interchange equipment, the handling of freight on electric lines will require a very large additional investment for side tracks, yards, etc. Very few electric roads to-day have side-track facilities, and practically none have yards for adequate freight handling on a considerable scale. There is admittedly some revenue to be obtained from the freight business, but at the present moment such revenue is that which can be obtained mostly from package freight, and no very large revenues can be made available for electric railways unless additional investments are made for the purpose of providing freight facilities.

It is possible to handle the auto competition which threatens the industry in such a way that it will become an aid to both passenger and freight service, but it is a new field which has not yet been exploited and which is full of dangers. For instance, it would be possible to provide covered platforms at terminal and way stations, where passengers could be transferred from electric cars to an auto-bus, and the local distribution of the passengers would be handled by auto-bus for the price of an additional fare. Collection of passengers would similarly be made and transferred to the electric cars. Package freight collections and deliveries might be similarly handled. In a large measure this might prove an aid to the electric railway, but the aid would necessarily have to be self-supporting, if not actually profitable.

More important than this, however, is the fact that the electric railway industry has never made a systematic effort to sell its merchandise in the same way that electric light companies, gas companies and merchandising establishments generally have been selling their wares. Efforts heretofore have been directed towards procuring excursion business. Summer parks have principally been provided at an enormous expense to the company which have not been self-supporting and which have proved a detriment. Good salesmanship of the electric railways' stock in trade does not permit existence of such artificial stimulants and "traffic cocktails," but should look rather toward the securing of permanent business, as this is the kind of patronage that uses the cars every day of the year. It is possible, for instance, for the electric railway to take an interest in the present "back to the land" agitation by facilitating as much as possible the settlement of city workers in the country along the lines of electric railways where frequent service to and from the city may be had. The facilitating of such a movement does not have to be an expense to the railways, but can be carried on as an independent transaction which should not only be self-supporting but should actually be profitable. The work. however, involves a promoting ability of extraordinary degree, and it requires provision of ample electric railway service as well as a dependable supply of electric power service for twenty-four hours per day. In addition, there must be suitable sites for acreage plots and small homes, and there must be a systematic and sustained effort to stimulate interest in country life. Such development has been automatic along many lines of old established suburban and interurban railways, and it is to be noticed that such lines are least affected by the present revenue depression.

It is always possible to seek help from our old friend "cutting operating expenses"—poor, overworked old friend! Many of us old-timers have been "cutting operating expenses" for a quarter of a century and we are still doing it. Some day some old white-haired electric railway veteran will write a book entitled "Operating Expenses I Have Cut," and beyond the shadow of a doubt it will be worth reading. What heartaches, what intrigues, what profanity have grown out of the three words! Yet they cannot be dodged, and operating expenses must be reduced and are being reduced to the lowest level that has ever been reached in the history of our industry.

Reference to the matter is warranted not so much by the fact as by the method of accomplishing the object. Probably there does not exist a well-managed property which could not be turned over to some fiend on operating expenses with resulting great glee to the said fiend, temporary glory to himself and a fleeting happy hour to the stockholders. Cutting operating expenses is one of the easiest and simplest things we have to do, but cutting them wisely is quite another matter. And, just at this time, with incomes reduced in all directions, the temptations to overdo are almost irresistible. But cheese-paring of petty expenditures is not management, nor is the sudden cessation of all disbursements warranted even in the present hour of trial. Substantial reductions in operating costs usually carry with them capital expenditures, and just now that is the Senegambian in the wood pile. Light-weight interurban cars, one-man city cars, automatic substation operation, all these will be large factors in the rehabilitation of our balance sheets, but all call for new capital. We can sum up the situation by stating as an axiom the fact that the electric railways which can and will finance the severe reductions in operating costs will soonest emerge from out of the black clouds—they will have grabbed the silver lining.

In the end, the electric railway industry is not to be crowded aside, it is not on the decline, it is not going to be permanently superseded by any other form of transportation. But it is going through a period of trial, readjustment and refinement, and, to the man with foresight and backbone, the present is a time of opportunity.

New Method for Producing Pure Iron

It has been recently announced by the University of Illinois that a new method of producing pure iron, whereby a great saving can be effected in the electrical industries of the country, has been discovered by Trygve Yensen of the experimental bureau of the university. The new method consists in melting electrolytically-refined iron in a vacuum, and this reduces the impurities to a point far below that which has been reached by previous investigators. The magnetic properties of this vacuum-fused iron have proved to be as remarkable as its purity, its maximum permeability being reported to be about 20,000, or about seven times that of the sheet metal commonly used for transformer cores. The practical result of this investigation is obviously that the amount of iron required for the magnetic path in electrical machinery of all kinds can be reduced very materially and the magnetic losses may be largely decreased. It is said that the University of Illinois has declined to permit a patent to be taken out on the process, as it is believed that the benefits from it should accrue to industry as a whole.

Fare Collection Revolutionized at Boston

On the Elevated and Subway Lines Tickets Have Been Abolished in Favor of Straight Cash; on the Surface Lines, Fare Box and Register Work Automatically in Unison—Motor-Driven Coin Registers Are Used in Both Services to Effect the Improvements Described

IN an address made at the San Francisco convention of the American Electric Railway Association in October, 1915, M. C. Brush, vice-president of the Boston Elevated Railway, set forth the advantages that would follow the displacement of ticket delivery and deposit at elevated and subway stations by a straight cash, fare-box system. The chief advantages foreseen by Mr. Brush may be summarized as follows:

Traffic at the stations would be accelerated because passengers would not have to stop to buy tickets. They would proceed directly to the car platforms, only a small fraction being obliged to stop for change.

Since passengers would be much more likely to have the proper fare, a given number of ticket sellers could be replaced by a smaller number of change makers.

Short-change disputes with passengers would be greatly reduced because they would go to the change-maker only for an exact exchange; not for a transaction involving subtraction and the counting of tickets.

Accounting disputes with the station cashiers also would be reduced because the change-maker simply would have to turn in exactly as much money as she received on beginning work. On the other hand, with the use of tickets, errors may arise from the duplication or skipping of serial numbers on the ticket reels. In this event, an honest ticket seller would get into trouble for turning in "overs."

Aside from these differences, the abolition of tickets would prevent collusion between the ticket sellers and the ticket choppers and would make it impossible for the ticket sellers to substitute transfers for cash fares.

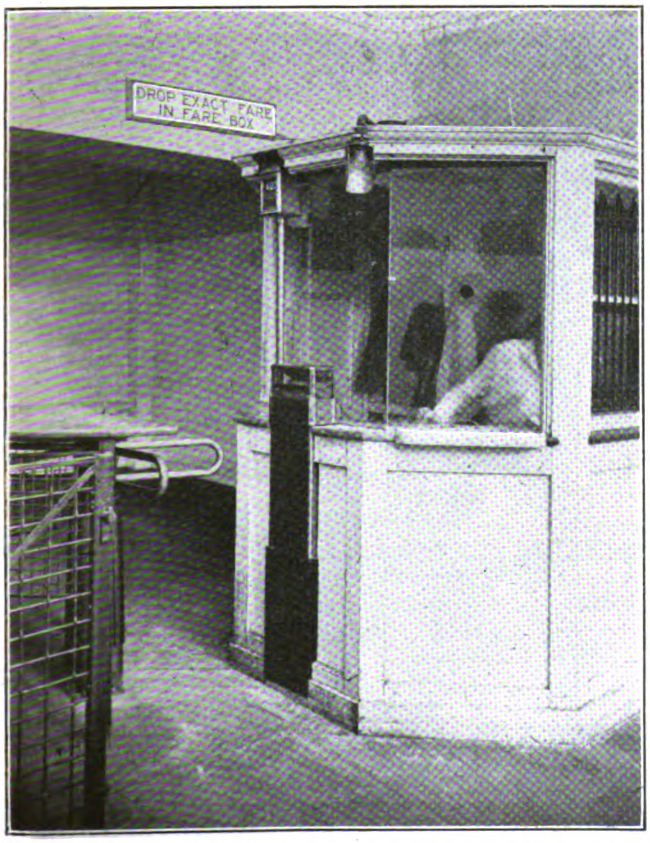
The palming of tickets by dishonest passengers would be eliminated. Losses from the palming of money would be trifling, since a wrong coin would be detected more easily than a crumpled counterfeit ticket.

There would also be a material increase in revenue in addition to the saving which would be effected from the elimination of tickets and the reduction of station forces.

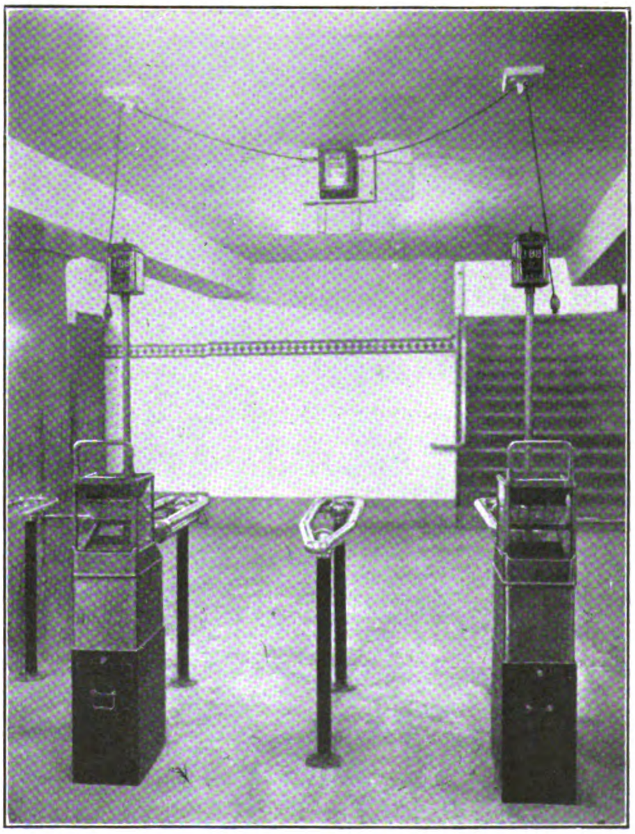
DEVELOPMENT OF STATION APPARATUS

After a number of consultations with the International Register Company, Chicago, Ill., the Boston company decided that the success of an all-coin system would depend upon the proper design of a motor-driven coin register with tilting inspection table, the box to be in charge of a coin inspector. It was clear that passengers would not move past the box at maximum speed if it was to be operated like the old-fashioned ticket chopper.

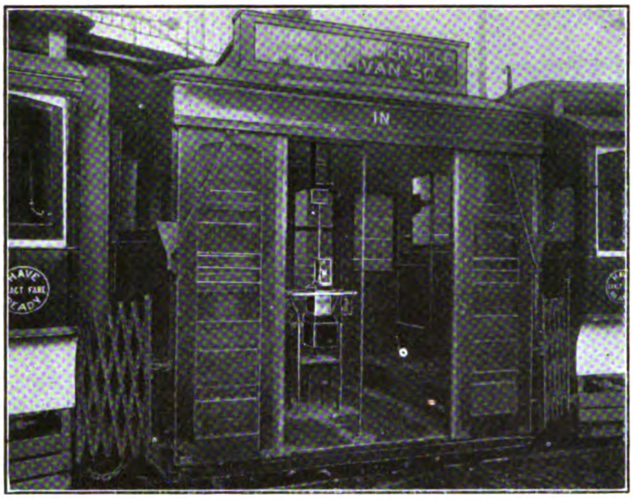
Late in 1913 a trial fare box was installed at the Scollay Square station to ascertain the features that would be necessary to insure success on a large scale. The motor and money-counting mechanisms gave little trouble, but it was found desirable to develop a motor which



BOSTON FARE COLLECTION—ONE-PERSON REGISTER AND TURNSTILE OUTFIT AT PARK STREET STATION, NORTH



BOSTON FARE COLLECTION—MOTOR-DRIVEN COIN REGISTERS AT A BUSY STATION, HAND-OPERATED REGISTER FOR OCCASIONAL TRANSFERS SHOWN ON WALL BEHIND



BOSTON FARE COLLECTION—POSITION OF MOTOR-OPERATED COIN REGISTER AND STANCHIONS IN CENTER OF ARTICULATED UNIT

would operate directly on railway voltage instead of using lighting voltage or resistance.

In the spring of 1914, after several months' trial at Scollay Square, the company ordered fifteen additional station equipments and these were put in service in October. An order for twenty more followed in December. Because of the excellent results secured additional equipments for the subway-elevated lines were purchased, until at this time seventy-eight motor-driven outfits are in use for station service, all delivered through the Charles N. Wood Company, Boston, representative of the International Register Company.

OPERATION OF NON-TICKET SYSTEM

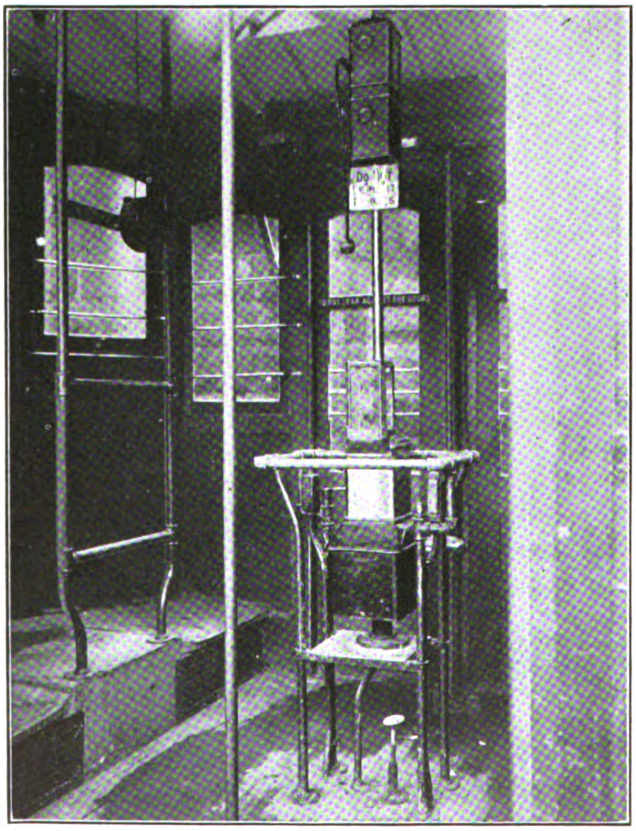
The actual operation of the non-ticket system has met the most optimistic expectations of the company. The acceleration of traffic may be appreciated from the fact that 80 per cent to 90 per cent of the passengers now have their fares ready in order to avoid stopping for change and possibly losing a car. The incentive to have the exact fare in advance is particularly strong among passengers who pass through a prepayment area in going to those surface cars which are run into part of the subway system.

At the Park Street station it was originally necessary to supply the change-makers with $1,000 in change, while to-day $500 each morning is enough. Another indication that passengers are more likely to have exact fare when coin boxes are used is that the rush-hour travel at this station is now handled by two change-makers instead of six ticket sellers.

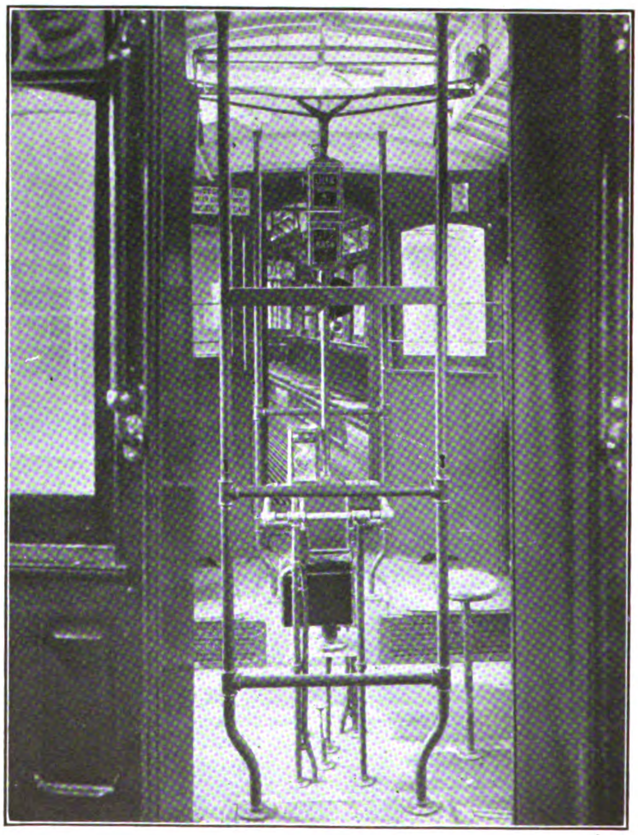
The change-making booths are so placed that they do not interfere with the direct movement of those passengers who have their fare ready. The fare box registers pennies, nickels and dimes. Every coin falls through the hopper onto a revolving drum which carries it into a locked receptacle. If the fare inspector sees a suspicious coin he causes the drum to stop until he has satisfied himself that the coin is either good or bad. It is found that the number of non-current coins is astonishingly small. Thus of $340,000 taken in these boxes during November, 1915, only the equivalent of $11 was non-current. Even of this insignificant sum more than half was redeemable. Foreign keepsake coins are found oftener than slugs.

The remarkable acceleration of traffic produced by the aid of the motor-driven coin registers is shown by the fact that at Park Street fully 8000 people have been handled in one hour with one box. During the summer a baseball crowd of 9000 has been handled at Kenmore Street station, Fenway Park, in twelve minutes with four fare boxes.

One instance of the flexibility of the all-cash system is found at the Devonshire Street station of the East Boston Tunnel. Here, in accordance with municipal requirements, a toll of 1 cent is charged for passengers



BOSTON FARE COLLECTION—COIN REGISTER FOR CENTER-ENTRANCE CAR AS SEEN FROM THE EXTERIOR



BOSTON FARE COLLECTION—COIN REGISTER WITH NUMERALS DISPLAYED AS SEEN FROM THE CAR INTERIOR going to or returning from East Boston. To take care of this condition, one box is provided for the 5-cent fare and a second box for the 1-cent toll.

ONE-PERSON TURNSTILE STATIONS

With but one exception, stationary motor-driven outfits have been installed only at those stations where at least one person is employed to make change and another to inspect the coins deposited. The exception is a trial box and turnstile at the Park Street station, North. Here the coin register is built directly into the change-maker's booth and behind it is a five-arm Langlow turnstile with a table on which passengers can rest packages while paying fare. The window of the change-maker is so placed that those who have the exact fare can proceed to the cash hopper and turnstile without standing in line. The passenger cannot go through the turnstile until the cashier releases it, following her inspection of the coin deposited. As the turnstile counts every passenger, it can be used as a check on the coin register.

Eventually all light traffic stations may be equipped with a similar combination of coin register and turnstile. A five-arm passimeter instead of a four-arm stile will be used to prevent the registration of but one fare when two passengers go through within one pair of arms, or when one fare is tendered for two passengers who try to get through in this manner.

MOTOR-DRIVEN COIN REGISTERS ON SURFACE CARS

Owing to the satisfaction given by the motor-driven coin register in stationary service, the suggestion was made that it be developed for surface cars.

As early as 1912 the International Register Company had furnished 100 hand-operated coin registers, known as Type C-15. It delivered 275 additional machines during 1913. This machine was an improvement over a money-counting fare box and separate fare register, as the fare register was located on a column over the fare box through which the money counter operated the fare register automatically when the crank was turned.

Nevertheless, it was apparent that even this combination was not the best possible solution for heavy service. When a conductor is handling a rush-hour crowd, he is so busy making change and issuing transfers that he cannot possibly ring up the fares as fast as they are deposited. In practice he must wait until passengers have boarded, whereupon he turns the handle of the cash box and then rings up on the register the number of fares released. Since this registration is made some minutes after the passengers have paid fare, it is impossible to check the fare collection properly.

To overcome the general difficulties existing with a hand-operated box the manufacturer developed a motor-driven coin register of which 173 Type C-25 are now in use and 100 Type C-25 and 170 Type C-26 are on order. These will replace hand-operated money-counting fare boxes. On double-end cars, only the fare box itself is transferred from end to end, while on center-entrance cars the entire equipment remains in place at all times.

When a passenger offers fare on a car equipped with a motor-driven box he is not allowed to deposit pennies or tickets. If a letter carrier or other government employee tenders a ticket of value, the conductor must give him a nickel in exchange therefor, whereupon the passenger deposits the same. If the passenger tenders a 4-cent exchange ticket from the Bay State Street Railway or a transfer, the conductor registers it by hand on the transfer register.

When the passenger drops his nickel in the box it falls on the tilting table, which is hand-operated under the control of the conductor. The money is registered automatically by the motor, which is started by tilting the table, and the fare drops into the bottom of the box where it is immediately available for change.

Therefore, the motor-driven box accomplishes three important things, namely: The conductor does not have to "coffee mill" the fare box or operate a register by cord except to register transfers, 8-cent checks and employees' tickets, and he cannot possibly show an honest difference between the money collected and the indication on the register. Also, on a heavy traffic line, it is no small convenience to the conductor to have change immediately instead of being obliged to interrupt his work by turning the handle of the fare box to grind out the desired change.

The old trick of securing a fractional registration with a penny or clipped nickel is useless, because the register will not record anything below a full fare; furthermore, it is dangerous to the conductor who tries it because such coins drop into a locked receptacle not accessible to the conductor. Naturally a conductor whose box contains several such coins lays himself open to suspicion.

The motor-operated coin register is very popular with the great majority of the conductors because it relieves them of much work and worry. It is probable that the hand-operated coin registers will gradually be transferred to cars which are operated in less congested districts.

PREPAYMENT AREAS AND BODILY TRANSFER

About 60 per cent of all fares on the Boston Elevated Railway system are now collected on the prepayment plan. The proportion will be increased to about 70 per cent when the extension of the Cambridge-Dorchester subway permits various surface lines to be run into the subway.

Aside from the abolition of paper tickets in the operation of subway and elevated lines, the company is trying to reduce the issue of paper transfers to a minimum by installing areas for bodily transfer wherever possible. The company holds the saving of time, unnecessary labor, accounting and paper, as well as the convenience of interchange of passengers, to be so important that it has purchased several pieces of property for prepayment areas in which bodily transfers can be made rapidly.

Record of Operation Over Switches

An interesting record in the way cars of the Louisville (Ky.) Railway have taken the temporary cross-overs which have been in extensive use for several months past on account of construction work is presented by Charles L. Christopher, superintendent of construction for the company. He says: "A remarkable record has been established during the summer of 1915 with the use of temporary cross-over switches, as cars have passed over them in different parts of the city more than 1,700,000 times with but sixteen derailments to date. Cars on the Market Street and Fontaine Ferry line alone have crossed the switches more than 500,000 times, and this record reflects commendable credit upon the motormen and trackmen—only one derailment out of 500,000 cross-overs on this line. The company also has 474 tongue switches which are used many times every day and from Jan. 1 to Dec. 1 last, the cars used receiving or leading switches about 20,000,000 times with only 107 derailments due to split switches."

Estimating Cost of Track Constuction on a Unit-Time Basis

The Author Outlines a Logical Plan for Estimating Costs, the Method Herein Described Being Particularly Adapted to Labor Costs, and Illustrates This with an Example for Which Approximate Data Are Given

By **CARL H. FULLER**
Associate Member American Society of Civil Engineers

IN the estimates of cost of constructing a specific piece of track work, the quantity of material to be used may be readily determined and usually is listed quite accurately, especially the heavier materials such as steel and ties which seldom vary appreciably from actual requirements. The estimator will price this material, frequently from specific quotations that are virtually contracts to supply the materials at the prices named, so that material estimates frequently check within a fractional per cent.

But when it comes to the item of labor, an entirely different procedure is usually followed, a lump sum for the job or a price per unit of length being added, no reference being made to the quantity of labor required, or, if the quantity is mentioned or required it is figured backward from the unit prices instead of from unit-time data. It is not unusual for the labor item to be the veriest guesswork, hence variations of 25 per cent and 50 per cent over the estimates are of common occurrence and variations of 100 per cent are all too frequent. Should the estimator be asked how much time a certain operation will require, his ideas on the subject will be found to be more or less hazy depending on how intimately he is connected with the labor problem. Many large organizations endeavor to maintain accurate detail cost records of the various jobs handled, and these are frequently supplemented by the more personal records of the engineering and construction departments, but such data lose much of their value because they are recorded in terms of money. This frequently becomes a most elastic term of measurement because of the varying wages, whereas if such records were based on units of time they would prove of wider and more accurate value, being less affected by variations in locality or date of construction.

While there are many constructors who maintain or have access to reasonably efficient cost records, there is a large majority, particularly on the smaller and medium-sized roads, who have very little reliable data to guide them in the preparation of their estimates. They have to depend to a very large extent on unrecorded observations, previous experience and some other fellow's records, guess work or well intentioned but wholly inadequate stop-watch observations.

That stop-watch observations and records may prove nearly as misleading as guesswork, may be illustrated by an incident. A stop watch was held on a bonding crew of three men. The operation consisted in removing the pair of plates from the joint, drilling two holes, installing a compressed terminal bond and replacing the plates. With men feeling fresh, knowing they were being timed and ambitious to make a record, tools in good order and bits well sharpened, the installation of the first bond may reasonably be called 100 per cent efficient. The time of installing the second bond showed a distinct loss, the third more loss, and by the time eight or ten bonds had been installed the ratio of efficiency of the men had fallen below their monthly average. It is natural that the stop-watch observer should select the most favorable time for his observations, which cover but limited periods of time. They consequently fail to take account of the fatigue of the men, lost time, moving of equipment and the numerous other things that make for delay, hence such results should be used with extreme caution in the estimating of future work.

It is the purpose of this article to show (1) how dependable detail costs of a job, in time units, can be secured, with a small expenditure of effort; (2) some of the results obtained in this manner; (3) how these results can be used in preparing future estimates.

RECORDING COST DATA

The collection of such data differs in no essential from the approved methods of collecting detailed costs in terms of money, except that such records are made in terms of time. To be reliable, such records must be consistently kept throughout the entire course of a job.

The most practical method is to require each foreman, who is best fitted for this part of the work because of his intimate knowledge of his day's operations, to make a detailed daily report on a suitable printed form. These reports may be designed to suit the individual fancy of the construction manager and the requirements of the job, but as the average foreman is seldom qualified to perform any elaborate clerical operations, they should be planned along the most simple lines possible.

The form should show each operation performed, the number of men engaged in the operation, the quantity of work done, and the total hours required in its performance. On track work, the subdivisions of time into less than hour units only complicates the work and makes no appreciable difference in the results obtained. Two additional columns can be provided, if desired, one for the rate of pay and the other for the extension of time in money, while another column in which the construction manager or his clerk may indicate the standard account numbers can be added, thereby making the report of value to the auditing department in preparing the distribution of the payrolls to such accounts. Of course the totals on the daily report check the hours recorded in the time book.

Spaces should also be provided for the date, foreman's name or signature and the location of the job, while provision for a list of material received from stores is of value. Such a report, if not too complicated, will supply all the information desired from the foreman, stimulate his interest in his work, tend to make him concentrate on the various operations, promote rivalry between gangs, and place the construction manager, who has many jobs to look after, in a closer personal touch with his lieutenants.

The form presented herewith, while not submitted as an ideal one, embodies the essential features and gives results both in hours and money cost.

In the office, a clerk can tabulate the daily subdivisions under proper headings on sheets ruled for that purpose, a separate sheet being provided for each job. On this is a column for the dates, and one for each operation in which the day's totals are recorded. When the job is complete the summary of the tabulated time, or the tabulated time and money cost, can be divided by the previously estimated quantity units of the various operations to give such unit costs. From these results a tabulated statement of the various operations can be prepared much after the manner of the preliminary detailed estimate developed further along. These cost sheets and preliminary estimates when typed and bound in a loose-leaf cover, as described in an article on "Indexing Technical Information," appearing on page 1100 of the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 14, 1914, soon become a veritable mine of valuable estimating material.

SEGREGATION OF COST DATA

From these job-hour cost sheets further segregation under the several detailed operations can be prepared. The following average minute-per-foot of track (m.p.f.) costs are derived from a series of such job-cost data and are given to demonstrate the advantage of keeping such m.p.f. costs rather than to furnish any authoritative cost data on track construction. In making the following selections, only typical average jobs have been used and these averages may be applied elsewhere under similar conditions by multiplying these m.p.f. costs by the wage scale prevailing in the desired locality. Owing to the impossibility of describing, within the limits of this article, all of the modifying conditions to which these jobs are subject, these figures should be used with due caution. To derive the greatest benefit from this kind of data each man should preserve his own cost records.

In the following, examples are taken from three to six jobs and averaged by dividing the total lineal feet of track under consideration into the sum total of the time involved. The results are the average costs, in minutes per foot, of the several jobs.

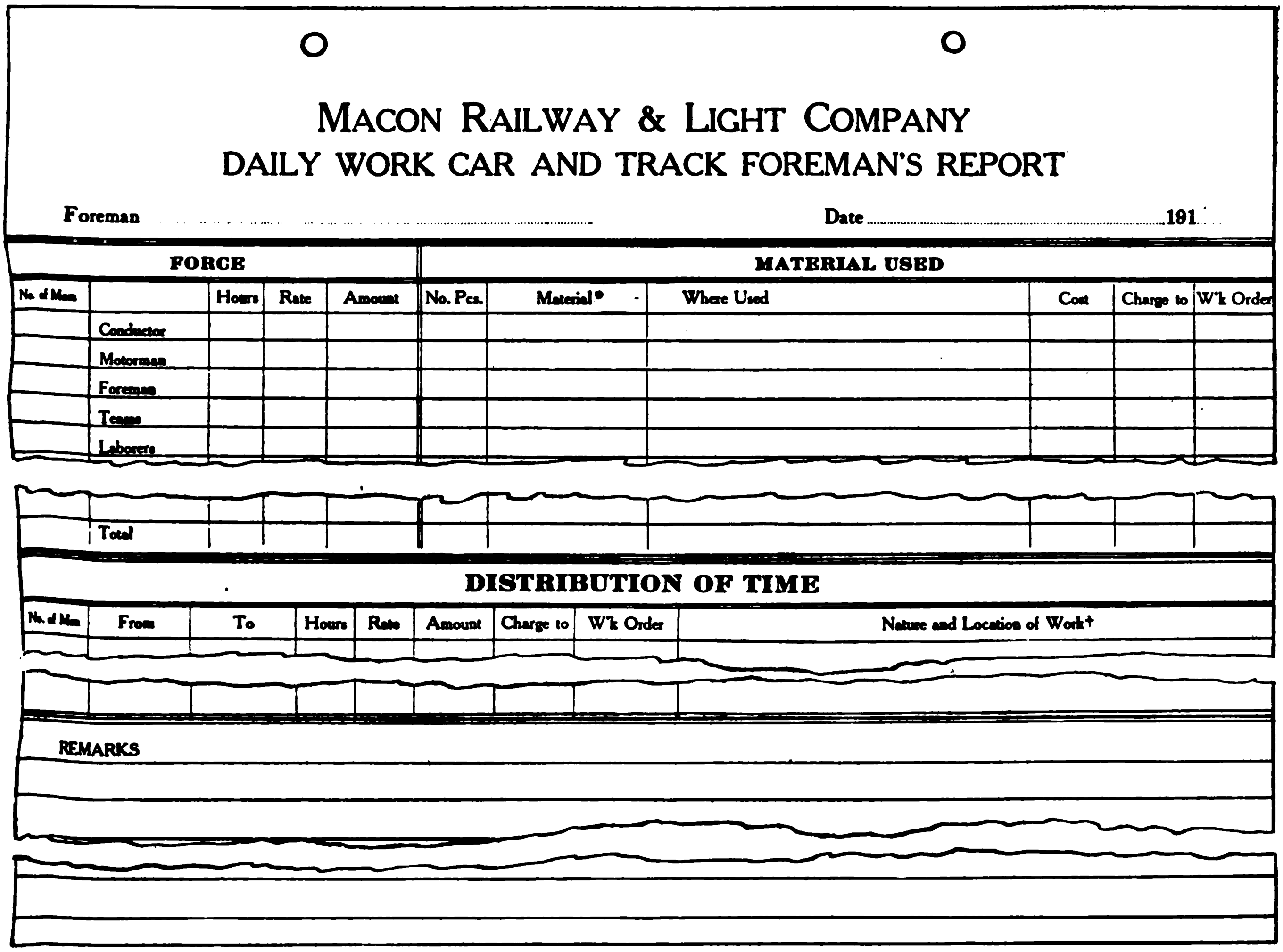
A.—Removing the old paving from the space occupied by the tracks for the purpose of entirely rebuilding track:

3,250 lineal feet in brick paving	at 36.3 m.p.f.
1,500 lineal feet in brick paving	at 35.9 m.p.f.
4,759 lineal feet in asphalt paving	at 42.0 m p.f.
Average of three jobs	39.0 m.p.f.

B.—Tearing out the old track and separating the material preparatory to hauling away:

649 lineal feet track in dirt road	at 16.0 m.p.f.
3,250 lineal feet track in dirt road	at 15.5 m.p.f.
1,560 lineal feet track in paving	at 17.4 m.p.f.
2,780 lineal feet track in paving	at 14.0 m.p.f.
1,860 lineal feet track in paving	at 18.3 m.p.f.
4,290 lineal feet track in paving	at 13.8 m p.f.
Average of six jobs	15.3 m.p.f.

C.—Hauling away old track material with the ordinary utility equipment. No cranes used. Includes motorman's time:



MACON RAILWAY & LIGHT COMPANY

DAILY WORK CAR AND TRACK FOREMAN'S REPORT

Foreman .... Date .... 191 ..

FORCE					MATERIAL USED					
No. of Men		Hours	Rate	Amount	No. Pcs.	Material*	Where Used	Cost	Charge to	W'k Order
	Conductor									
	Motorman									
	Foreman									
	Teams									
	Laborers									
	Total									

DISTRIBUTION OF TIME

No. of Men	From	To	Hours	Rate	Amount	Charge to	W'k Order	Nature and Location of Work†

REMARKS

*In this column appear the following entries: Special work; rail A.S.C.E. 60-lb.; rail 6-in. 72-in.; splices (pairs); track bolts; spikes; inseal bonds; long bonds; ties; guard rail; G. R. lugs.

†In this column appear the following entries: Removing paving; excavation; laying track; surfacing and lining; bonding; ballasting track; removing paving; repaving; hauling steel; hauling ties; hauling ballast; placing special work.

TRACK COSTS ON A TIME-UNIT BASIS—FORM FOR USE IN ESTIMATING TRACK COST IN TIME AND MONEY

649 lineal feet (5-mile round trip)	at 12.0 m.p.f.
3,250 lineal feet (2-mile round trip)	at 10.0 m.p.f.
1,560 lineal feet (3-mile round trip)	at 11.0 m.p.f.
4,290 lineal feet (4-mile round trip)	at 9.0 m.p.f.
Average of four jobs	9.9 m.p.f.

D.—Excavating in dirt road for track. Practically all pick and shovel work:

450 lineal feet of track	at 51.3 m.p.f.
1,500 lineal feet of track	at 48.0 m.p.f.
16,843 lineal feet of track	at 50.8 m.p.f.
Average of three jobs	49.6 m.p.f.

E.—Excavating in street to lay track after paving has been removed but retaining the old track in operating condition until the new rail and ties can be placed. All pick and shovel work. Cars seven and one-half to fifteen-minute intervals.

3,250 lineal feet of track	at 70.5 m.p.f.
4,750 lineal feet of track	at 37.8 m.p.f.
1,560 lineal feet of track	at 54.0 m.p.f.
1,860 lineal feet of track	at 83.7 m.p.f.
4,290 lineal feet of track	at 60.0 m.p.f.
Average of five jobs	58.5 m.p.f.

Note the greater average length of time required for operation E over D due to having track to maintain. The wide range between the five jobs listed is due to variations in car travel, location of the job and condition of the old tracks, etc., all of which variously affect the cost of excavation more than the material itself.

F.—Removal of excavated material from the trench to the various dumping grounds by means of teams and slat-bottomed wagons. All dumps within a half mile from the job:

1,560 lineal feet of track	at 28.9 m.p.f.
2,780 lineal feet of track	at 26.4 m.p.f.
4,290 lineal feet of track	at 30.0 m.p.f.
Average of three jobs	28.6 m.p.f.

G.—Removal of excavated material from the trench to the dump using the ordinary utility equipment of flat and dump cars and hauling from 2 miles to 6 miles for the round trip:

450 lineal feet (2-mile round trip)	at 48.0 m.p.f.
1,500 lineal feet (1-mile round trip)	at 54.6 m.p.f.
1,860 lineal feet (3-mile round trip)	at 65.8 m.p.f.
4,290 lineal feet (4-mile round trip)	at 70.0 m.p.f.
Average of four jobs	64.7 m.p.f.

H.—Hauling steel from stock yard to the job on flats:

649 lineal feet track, 60-lb. 30-ft. steel (6 miles)	at 12.3 m.p.f.
4,290 lineal feet track, 60-lb. 30-ft. steel (4 miles)	at 12.2 m.p.f.
1,560 lineal feet track, 72-lb. 60-ft. steel (1 mile)	at 7.3 m.p.f.
2,780 lineal feet track, 72-lb. 60-ft. steel (2 miles)	at 14.0 m.p.f.
1,860 lineal feet track, 72-lb. 60-ft. steel (3 miles)	at 19.4 m.p.f.
Average of five jobs	13.6 m.p.f.

K.—Hauling ties from the stock yard to the job on flats. Average spacing of ties in track 24 in. on centers:

649 lineal feet track (6-mile round trip)	at 8.1 m.p.f.
3,250 lineal feet track (1-mile round trip)	at 7.8 m.p.f.
1,500 lineal feet track (1-mile round trip)	at 8.7 m.p.f.
2,780 lineal feet track (2-mile round trip)	at 5.5 m.p.f.
4,290 lineal feet track (4-mile round trip)	at 9.2 m.p.f.
Average of five jobs	7.9 m.p.f.

Traffic conditions over the routes on which the hauling is done and the opportunity to unload without switching apparently affect the time costs under K and H more than the distance hauled.

L.—Miscellaneous hauling, such as special work, moving tools, equipment and fittings, cleaning up, etc.:

450 lineal feet track	at 10.0 m.p.f.
3,250 lineal feet track	at 13.8 m.p.f.
4,750 lineal feet track	at 4.3 m.p.f.
16,843 lineal feet track	at 3.9 m.p.f.
Average of four jobs	5.2 m.p.f.

Usually this cost decreases with the length of the job.

M.—Hauling crushed rock ballast from freight yard to the job, including loading and unloading:

450 lineal feet track (2-mile round trip)	at 28.2 m.p.f.
3,250 lineal feet track (1-mile round trip)	at 26.4 m.p.f.
4,750 lineal feet track (3-mile round trip)	at 16.3 m.p.f.
1,860 lineal feet track (3-mile round trip)	at 29.0 m.p.f.
Average of four jobs	22.2 m.p.f.

N.—Fine grading of trench where track is laid on the natural soil:

1,500 lineal feet of track	at 7.1 m.p.f.
1,560 lineal feet of track	at 12.2 m.p.f.
2,780 lineal feet of track	at 8.9 m.p.f.
4,290 lineal feet of track	at 9.2 m.p.f.
Average of four jobs	9.3 m.p.f.

O.—Placing ties and rails, and spiking and bolting joints:

16,843 lineal feet track, 60-lb. 30-ft. steel	at 15.3 m.p.f.
4,290 lineal feet track, 60-lb. 30-ft. steel	at 16.1 m.p.f.
1,860 lineal feet track, 72-lb. 60-ft. steel	at 19.5 m.p.f.
1,560 lineal feet track, 72-lb. 60-ft. steel	at 26.0 m.p.f.
2,780 lineal feet track, 72-lb. 60-ft. steel	at 18.6 m.p.f.
Average of five jobs	16.7 m.p.f.

P.—Tamping lining and surfacing track on dirt ballast for paving operations:

1,500 lineal feet track	at 35.5 m.p.f.
1,560 lineal feet track	at 42.2 m.p.f.
2,780 lineal feet track	at 39.4 m.p.f.
4,290 lineal feet track	at 43.8 m.p.f.
Average of four jobs	41.6 m.p.f.

Q.—Tamping, lining and surfacing track on rock ballast for paving operations:

649 lineal feet track	at 38.0 m.p.f.
3,250 lineal feet track	at 53.3 m.p.f.
4,750 lineal feet track	at 46.0 m.p.f.
1,860 lineal feet track	at 48.3 m.p.f.
Average of four jobs	48.6 m.p.f.

R.—Bonding with compressed-terminal, concealed bonds applied under the splice plates. Average for eleven jobs or 2347 bonds at 21.5 cents each (see article on "Cost of Bonding" in ELECTRIC RAILWAY JOURNAL, July 25, 1914), which gives 90.6 minutes average per bond, or for

30-ft. rails, two joints	at 6.4 m.p.f.
60-ft. rails, two joints	at 3.2 m.p.f.

S.—Replacing paving, using concrete base, sand cushion, vitrified paving brick, all material new:

Lineal Feet of Track	Hauling Concrete Materials	Mixing and Placing Concrete	Hauling Paving Brick	Paving
450	36.3	40.8	45.4	34.4 m.p.f.
1,500	38.4	33.2	45.7	35.6 m.p.f.
1,860	36.5	33.8	40.6	30.9 m.p.f.
Average	37.1	35.7	41.1	33.1 m.p.f.

T.—Where paving was replaced with solid concrete having no top dressing and finished smooth. All material new:

Lineal Feet of Track	Hauling Materials	Mixing Concrete	Placing Concrete	Finishing Concrete	Miscellaneous Labor
1,560	45.3	17.9	15.9	8.5	12.4 m.p.f.
2,780	44.0	18.1	16.2	9.6	13.9 m.p.f.
4,290	46.0	17.7	15.5	9.0	13.6 m.p.f.
Average	45.3	17.8	18.7	9.1	13.5 m.p.f.

Using the preceding hour costs for a basis to determine the quantity and value of labor required we will consider the preparation of an estimate. Assuming that we are to reconstruct 500 lineal feet of double track laid in brick paving which is to be replaced with concrete paving after the new track is laid and new material used throughout. This is equivalent to 1000 ft. of single track, and for the purpose of the estimate we shall consider it such.

Removal of old paving	at 39.0 m.p.f. equals	650 hours
Tearing up old track	at 15.3 m.p.f. equals	255 hours
Excavation	at 58.5 m.p.f. equals	1,078 hours
Requiring a total of		1,983 hours
Placing ties, rail and joints	at 13.6 m.p.f. equals	279 hours
Bonding joints	at 3.2 m.p.f. equals	53 hours
To tamp line and surface	at 48.6 m.p.f. equals	810 hours
Requiring a total of		1,142 hours
Hauling away old track material	at 9.9 m.p.f. equals	165 hours
Removing excavation	at 64.7 m.p.f. equals	1,078 hours
Hauling ties, rails, etc	at 26.7 m.p.f. equals	473 hours
Hauling paving material	at 45.3 m.p.f. equals	766 hours
Hauling ballast	at 22.2 m.p.f. equals	370 hours
Requiring a total of		2,852 hours

Mixing concrete	at 17.8 m.p.f. equals	297	hours
Placing concrete	at 18.7 m.p.f. equals	320	hours
Surfacing and finishing	at 9.1 m.p.f. equals	150	hours
Miscellaneous labor	at 13.5 m.p.f. equals	225	hours
Requiring a total of		912	hours

If any extra labor is required for the placing of special work, bonding rail on curves or placing guard rails, etc., it should be added, as these figures only provide for the operations indicated. We have now determined that it will require 6889 hours to perform this piece of work, and applying our local wage scale could add the whole to our material estimates, but before we do this we can consider the make-up of our crew of men to secure proper balance, something which is practically impossible under the usual dollar and cents method of figuring and which may affect the final results to some extent.

The 500 ft. of double track, or practically two blocks, is to be completed within thirty days, say twenty-six working days, and traffic is to be maintained on either one or the other of the tracks during that period. As the paving is of concrete and the engineer requires that we allow it to set for seven days before permitting traffic over it we lose six more working days, reducing our actual working time to twenty days.

With our equipment, paving operations will require five men loading mixer, two men operating mixer, six men handling material from the mixer, two men finishing concrete, and one foreman, making a total of sixteen men working 160 hours per day. With this crew our 912 hours' labor reduces to 5.7 days' time.

Owing to the size of the job and the time we have at our disposal we expect to increase our regular crew by the addition of a number of green men, but, as it is not an economical proposition to organize a paving gang for less than six days' work and as such jobs come up at irregular intervals, we will assume that our regular track gang, which is about this size, has had paving experience. We shall assume further that it contains two or three utility men capable of operating the concrete mixer and finishing concrete, and we shall assign this work to them and pass to a consideration of the track work.

Track laying requires 1142 hours of labor. As the two bonding men are specialists, from the nature of their job, and have other duties elsewhere, we shall eliminate their fifty-three hours for the present, reducing the time to 1089 hours. Dividing this by the 160 hours per day which the gang makes, we have 6.8 days for laying track.

The removal of the old paving and old track requires 1983 hours of labor. As our track gang still has 7.5 days out of the allotted twenty to account for, and as it is desirable to keep these men on the job as continuously as possible, they can do a part of this work to an advantage, and we are thus able to reduce the green labor to 784 hours. Allowing each extra man twenty days, or 200 hours' time, four additional men will be reqired.

The hauling is a considerable item, requiring 2852 hours. As the utility equipment is limited, we can assign only one crew to this job. Ordinarily the motorman-foreman and six men with the facilities at their disposal can handle the 60-ft. rails, but it is obvious that this crew cannot handle the quantity of work assigned to them, so we shall add two men. Any greater number would result in a loss of efficiency. This gives a ninety-hour day on the work car, or a total of 1800 hours, which will provide for all of the hauling but that of excavated material. This material may readily be handled by teams, as there are various alleys and back lots within a reasonable distance where such material can be disposed of. Referring again to the original data we noted that the handling of this material by teams involves a much different labor ratio per man than when it is handled on the cars, and we derive the following:

Car service	at 64.7 m.p.f. gives 1,078 hours	at 20 cents or	$215.60
Team service	at 28.6 m.p.f. gives 477 hours	at 45 cents or	214.65

As the team work will only occupy about fourteen days to advantage we shall employ four teams for a total of 477 hours.

Tabulating these results we have:

One foreman	20 days	at $3.00	$60.00
Three track men	60 days	at 2.50	150.00
Twelve track men	240 days	at 2.00	480.00
Four extra men	40 days	at 1.75	140.00
Two bond men	6 days	at 3.00 and 2.25	15.75
One motorman-foreman	20 days	at 3.00	60.00
Six work car men	120 days	at 2.00	240.00
Two extra men	40 days	at 1.75	70.00
Four teams	48 days	at 4.50	216.00
Thirty-five men	614 days		$1,431.75

This gives us an average cost per foot of track of 6.14 hours, or $1.43175, to be added to our material estimate.

In addition we know in advance how many extra men will be required and where they should be placed. The weak link in our organization is in the utility service, and that can be provided for by using teams. We can also determine just what tools will have to be provided and just what will have to be done in order to finish up on the date set. We are also in position to forecast each day's work or to check it with our estimates. Lost time and lost motion have been provided for, as these items are cared for in our original data.

DETERMINING PROFIT ON A JOB

If we care to investigate further, we can determine within quite definite limits the possibilities of profit or loss on the estimate just prepared, provided, of course, that our basic data are sufficiently comprehensive. It is safe to assume the impossibility of performing each individual item of this work for less than the individual minimums from which our data are derived, while on the other hand it is equally logical to assume that it will not cost more than the individual maximums involved in the data. We shall proceed, therefore, to tabulate the minimum, average and maximum for the several jobs in order to determine the average possible minimum and maximum.

	Minimum	Average	Maximum
Removing old paving	35.9	39.0	42.0
Tearing out old track	13.8	15.3	18.3
Excavation	37.8	58.5	83.7
Placing rail, ties and joints	15.3	16.7	26.0
Tamping, lining and surfacing	38.0	48.6	53.3
Bonding	1.4	3.2	5.6
Hauling old track material	9.0	9.9	12.0
Removing excavation	26.4	28.6	30.0
Hauling ties, rail, etc	16.7	26.7	42.4
Hauling paving material	44.0	45.3	46.0
Hauling ballast	16.3	22.2	29.0
Mixing concrete	17.7	17.8	18.1
Placing concrete	15.5	18.7	15.9
Finishing pavement	8.5	9.1	9.6
Miscellaneous paving labor	12.4	13.5	13.9
Total average time per foot	308.7	383.1	445.8
Percentages	81	100	117

The above percentages indicate the possibility of a 19 per cent saving over the estimate, but to do this each individual operation would have to be performed for the minimum of any job included in the basic figures. This would require exceptional management, while on the other hand the expenditure of 17 per cent more than the estimate would indicate gross mismanagement. If we have any respect at all for the mathematical laws of chance and averages we are bound to recognize the attainment of the extreme minimum or maximum as a very remote possibility, although it is resonable to expect some variation. Therefore, unless the work is affected by influences either favorable or unfavorable not provided for in our basic figures, we have no reason to expect any marked variation from our estimate. By scanning the table thus prepared we are able to determine at a glance the items that will require greatest attention on account of possible variation.

Had the basic data from which this sample estimate was prepared been recorded in terms of money with no relation to the time value indicated, the difference in the two wage scales would have placed a 48 per cent handicap on the estimate. This the above percentages would indicate as impossible to overcome, consequently we should lose money. Yet such or even a greater percentage or error is always possible, especially when using published cost data recorded in terms of money. Failure to recognize the fact that the average foot-pounds of work delivered by the average laborer is practically constant under similar conditions, and is a value that can be determined within very practical limits, destroys the value of the most carefully prepared cost records and accounts for much of the variation or undervaluation of labor in making estimates.

There is no desire to cast any reflection upon efficient cost-keeping systems where results are recorded in terms of money, but it is desired to impress the need of giving more attention to the performance time and to the keeping of records of such time. A little investigation along these lines, with its supplementary records, even though not as elaborate as outlined, will produce most beneficial results in the preparation of any class of estimates where labor is involved.

Regenerative Braking Tests on the St. Paul

Motor-Generators Handle Large Reversed Loads—Air and Electric Brakes Operated Together

IN recent tests of the regenerative braking system that has been installed on the locomotives for the electrified engine division on the Chicago, Milwaukee & St. Paul Railway, it has been found that the motor-generator sets in the substations have been able to take very large reverse loads. Each of these machines is made up of a synchronous motor driving two 1500-volt direct-current generators connected permanently in series for 3000 volts. In the substation supplying the section of line where the tests were carried out, the generators for each set are rated at 1500 kw., being provided with interpole, commutating and series field windings. Regenerated loads amounting to more than 2500 kw. have been returned through two of these sets without disturbing the equal division of the load between them when the two sets were running in parallel, and the return of power to the line is accomplished without noticeable sparking at the commutator. Owing to the fact that the series field windings act as differential windings when the motor-generator set is reversed, the substation potential is slightly lowered and this tends to equalize the booster potential required in the trolley at the point where the locomotive is operated during regeneration. Consequently, an abnormal rise in trolley potential due to the resistance of the line between the locomotive and the substation is prevented.

On one test a train was made up of seventy-four freight cars to equal a trailing tonnage of 3000, and the experiment was tried of using combined regenerative and air braking, one of the two locomotives on the train being cut out when the train was on a 2 per cent down grade. Because a considerable range of speed is available during regenerative electric braking, this being under the control of the operator, there is sufficient margin to allow for the joint operation with the air brakes. During the test the entire train of seventy-four cars was bunched against the locomotive at the head end and was carried around 10-deg. curves with no mishaps whatsoever. The fact that the train was held only by one locomotive made the load considerably in excess of the rating of the single engine in operation. However, with the assistance of the air brakes the train was handled with perfect ease.

Reducing a Gasoline Fire Hazard

Gasoline Poured Through a Chamois-Skin Strainer Generated Static Electricity, Which Resulted in Fires in Boston—Suggestions Are Made for Eliminating This Danger

THE large number of gasoline automobiles employed by electric railway officials makes the fire hazard of such machines important. Recent fires accompanying the handling of gasoline in electric railway and other services lend special interest to an investigation concluded not long ago at Boston, Mass., by Walter L. Wedger, chemist, of the Massachusetts District Police. The apparently mysterious origin of some of these fires was found to be a comparatively simple case of static electricity generated while pouring gasoline through a chamois-skin strainer and also through a rubber-lined hose. Recent tests prove that as high as 500 volts may be generated by forcing gasoline over non-conducting surfaces in clear, dry atmospheric conditions.

To avoid fire from these causes it is necessary to maintain good metallic contact between can nozzles, hose nozzles, funnels and the frame of the vehicle. Thus, in drawing gasoline from a pump into a can, the can and pump should always be in metallic contact, so that all electricity generated can pass off through the pump to the ground. Wooden handles or other insulating substances on the bails of cans should be removed at once. In filling the tank of a motor-vehicle with gasoline from a can through a metal funnel containing a chamois-skin strainer, care should be taken that the metal of the funnel is in contact with the metal of the tank and also that the can is in metallic contact with tank or funnel.

The use of blocks of wood or other insulating substances around the filling hole of the tank, to make the funnel stand upright during filling, is undesirable, as it insulates the funnel from the tank and creates a pocket for the accumulation of electric charges in the metal of the funnel, which would otherwise pass off to the metal of the vehicle in harmless intensity as fast as formed. If it is inconvenient to rest the mouth of the can upon the funnel edge while pouring, a piece of clean copper chain should be soldered to the mouth of the can and the end of the chain allowed to rest in contact with the funnel or the tank. Neglect to take these precautions resulted in five fires.

Similarly, in filling motor-vehicle tanks with gasoline run through a hose with a metal nozzle, fires have been known to occur from frictional electricity generated by the passage of gasoline through the rubber hose, and the concentration of charges in the nozzle, with resulting discharge when brought near any substance. Contact between the nozzle and the tank or funnel is most important, and a hose with a metallic lining is very desirable. A bare copper wire passed through the inside of the hose and soldered to the metal of the nozzle at one end and to the pump connection at the other, prevents the accumulation of electricity in the gasoline inside the hose by conducting it off to the pump and ground as fast as formed. Attention to these inexpensive and simple means of safeguarding the handling of gasoline is an important matter in the present rapid development of motor vehicles as accessories in electric railway administration.

ASSOCIATION NEWS

Additional Details of the Program for the Mid-Year Meeting—Biographical Sketches of the Newly-Elected Denver Tramway Section Officers—Meeting of Manila Company Section—Proposed Amendments of the Constitution and By-Laws—Committee Activities

Mid-Year Meeting Program

Further details of the program of the mid-year meeting of the American Electric Railway Association, to be held in Chicago on Feb. 4, have been announced. The principal address on the subject of "Valuation" will be given by N. T. Guernsey, general counsel American Telephone & Telegraph Company. The discussion on this subject will be led by P. J. Kealy, member board of control Kansas City Railways, and by George Weston, engineer for the Board of Supervising Engineers, Chicago Traction. There will also be a topical discussion on the subject of "Rate of Return." This discussion will be led by James D. Mortimer, president Milwaukee Electric Railway & Light Company, and will be participated in by leading executives.

At the dinner, which will be held in the evening in the Congress Hotel, Senator Oscar W. Underwood, who will speak on "Government Regulation and Our Transportation Systems," will be introduced by Judge Jacob M. Dickinson, formerly secretary of war. There will also be addresses by the presidents of the American Electric Railway Association and of the Manufacturers' Association.

Mid-Winter Meeting Transportation

Arrangements have been completed between the transportation committee and the New York Central Lines for special equipment on the "Twentieth Century Limited" on Feb. 3. Passenger Agent E. C. Cook will accompany the train. Special equipment will also be added to the same train on Feb. 2, and to the "Lake Shore Limited" and "Wolverine" on both Feb. 2 and 3. Full announcements regarding this service will be mailed to the members of the association shortly.

The Pennsylvania Railroad has also made arrangements for special train service, and announces that on Feb. 2 and 3 special equipment will be added to the "Broadway Limited," the "Manhattan Limited" and the "Pennsylvania Limited," leaving New York at 2.45 p. m., 5.04 p. m., and 11.04 a. m. respectively.

Capital Traction Company Section

As was recently announced in the ELECTRIC RAILWAY JOURNAL, a company section will be formed by the Capital Traction Company in Washington, D. C., on Jan. 13. The meeting will be held in the company's shop on M Street. A committee has been appointed, and is now drawing up a constitution for consideration by the meeting. No set program will be followed but, after the constitution has been adopted and the officers elected, remarks will be made by Martin Schreiber, Public Service Railway, Newark, N. J.; E. B. Burritt, New York, N. Y.; Harlow C. Clark, New York, N. Y.; Charles C. Peirce, Boston, Mass.; H. G. McConnaughy, New York, N. Y., and H. H. Norris, ELECTRIC RAILWAY JOURNAL. President George E. Hamilton, Vice-President D. S. Carll and Chief Engineer J. H. Hanna will speak for the company. Mr. Carll will preside until after the election.

There are already sixty-seven members of the association in the company and it is expected that the number will be considerably increased before the meeting.

Denver Tramway Section

William G. Matthews, the newly-elected president of the Denver Tramway Section, has been superintendent of this company's overhead line and light department for more than ten years. Since 1881 he has been associated with electrical industries, obtaining his first experience in the service of the Colorado Telephone Company as operator. He was later employed by the Rocky Mountain Bell Telephone Company as its local agent in Idaho, with headquarters at Hailey, and was later transferred to Salt Lake City, Utah, as chief operator. When the Colorado Telephone Company extended its lines into New Mexico he was made local agent at Albuquerque.

W. G. MATTHEWS
President,
Denver Company Section

H. G. MUNDHENK
Secretary,
Denver Company Section

Mr. Matthews' decision to enter the electric railway field was formed after a visit to Topeka, Kan., where a trolley line was being pushed to completion. He was impressed by the new method of transportation, and secured employment with the builders, the Thomson-Houston Electric Company. This company had closed a contract to construct the first overhead electric line installed in Denver, the Lawrence Street line, together with the necessary generating plant. Construction work on this job was begun in March, 1890, and Mr. Matthews' first association with the Tramway Company began then. He took part in the erection and installation work of the power house, and in the car and power house wiring, the track bonding and the erection of trolley lines and feeders. During the construction period which followed he remained with the contracting company, but later was retained by the Tramway Company. His headquarters were in the cable power house, which stood on the present site of Denver Civic Center at the corner of Broadway and Colfax Avenue. At first he had charge of the electrical apparatus, the general wiring and the signal system used on the cable lines, finally taking charge of the lighting department, which was merged with the overhead construction department when he assumed control.

Mr. Matthews is well known and effective outside of his immediate technical work. In 1908 he was president of the Colorado Electric Light, Power & Railway Association, and in 1912 of the Colorado Electric Club. For many years he has been an enthusiastic member of the American Electric Railway Association, and has been active in the company's section movement since its inception.

H. G. Mundhenk, who was re-elected secretary of the Denver Tramway Section, is now in his fourth year of service in that capacity. A biographical sketch of him was given on the Association News page in the issue for Dec. 26, 1914.

Manila Company Section

The regular meeting of joint company section No. 5 was held in Manila on Nov. 2. The section received the official announcement of the award to J. M. Bury of the association medal for the best paper presented before a company section. His paper, which was on the subject "Courtesy," was read on April 6, 1915. It was abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for May 29, page 1033. L. S. Cairns, assistant general manager of the company, presented a paper on "The Public Utility Right to Protection," and it produced a lively discussion.

Mr. Cairns' argument was substantially as follows: Public utilities have a right to protection which is gradually being recognized. They are like pioneers who push forward into new, undeveloped fields, endure hardships and ofttimes suffer financial reverses. Their aims are no more selfish than those of other pioneers, and their achievements benefit others at least as much as themselves. Some utilities have been subjected to deserved criticism, but others have received undeserved criticism which has hampered their development.

Investors are entitled to a fair rate of return which is generally insured with fair regulation. Fair regulation and protection will insure the credit necessary to attract capital for improvements and extensions. Publicity is now the slogan of the utilities, which are informing the public as to the physical and financial conditions of their properties. The operating conditions in these utilities are increasingly difficult, and only the possibility of increasing the gross income and reducing operating expenses will encourage investors to keep up their faith in the ultimate success of these enterprises. Fewer laws, better laws, less politics and more sound principles injected into the laws, a better understanding of the rights of all parties and more confidence in public utilities are the elements necessary for the proper relations of the utilities and the public.

In the discussion of Mr. Cairns' paper H. P. L. Jollye, assistant auditor, pointed out the importance of convincing the public that the utilities want to give the best service possible at a minimum cost. He thought that fairer legislation would be thus secured. W. R. McGeachin, manager railway department, stated that with a complete and comprehensive franchise no necessity for regulation would exist, but such a franchise could not be produced as it would not be practicable to provide for flexibility. Fair regulation removes the necessity for such a franchise. J. C. Rockwell, manager electric department, deplored the tendency to criticise the utilities, and stated that very few people know what constitutes a fair return on investment, and that even if more did know this they could not determine whether or not this return was being received. C. N. Duffy closed the discussion by broadening it to include the government's need of protection from ownership or operation of public utilities. He illustrated the failure of such ownership and operation by means of statistics. He elaborated a definition of a corporation given by Mr. Cairns, showing that an organization of individuals in a corporation for profit is not essentially different from one organized not for profit, such as charitable organizations, etc. Mr. Duffy also explained the purpose and functions of holding companies which are a means of diversifying risks, stating that 80 per cent of the utilities in the United States are organized in such companies.

Proposed Amendments to the Constitution and By-Laws

Secretary E. B. Burritt has sent to company members of the American Association notice of a special meeting to be held in Chicago on Feb. 4, at 10 a. m., for the purpose of considering and acting upon the amendments to the constitution and by-laws as recommended by the special committee to consider recommendations made by the president at the San Francisco convention.

The proposed changes are in Art. III of the constitution and Art. XIV of the by-laws. The new words are indicated by italics in the following paragraphs:

"III. The membership of this association shall consist of *the following* classes:

"(*a*) Company members, consisting of American urban and interurban railway companies, or lessees, or individual owners of urban and interurban railways, or steam railways having electrified sections, *and of companies, firms or individuals engaged in the business of manufacturing or selling apparatus, equipment or supplies used in electric railway operation.* Each member company shall be entitled to one vote, which shall be cast by the properly accredited delegate.

"XIV. *Company* members shall pay an admission fee of ten dollars ($10) and annual dues payable in advance based on gross earnings from electric railway operation, *or from the business of manufacturing or selling apparatus, equipment or supplies used in electric railway operation* during the preceding fiscal year of the respective *members* as follows:

	Gross Receipts			Annual Dues
Under	$50,000			$25
Between	50,000	and	$100,000	50
Between	100,000	and	250,000	75
Between	250,000	and	500,000	125
Between	500,000	and	1,000,000	175
Between	1,000,000	and	2,000,000	225
Between	2,000,000	and	3,000,000	275
Between	3,000,000	and	4,000,000	325
Between	4,000,000	and	5,000,000	375
Between	5,000,000	and	6,000,000	425
Between	6,000,000	and	7,000,000	475
Between	7,000,000	and	8,000,000	525
Between	8,000,000	and	9,000,000	575
Between	9,000,000	and	10,000,000	650
Between	10,000,000	and	over	750

Committee Activities

A meeting was held in New York on Jan. 6 of the committee on heavy electric traction, of the Engineering Association. The members met at the office of the chairman, E. R. Hill, of Gibbs & Hill, New York.

As this issue is going to press a meeting is being held in New York at the association headquarters of the representatives of the American Electric Railway Association on the safety code committee and others. W. J. Harvie is presiding.

J. K. Punderford, vice-president and general manager The Connecticut Company, has been appointed chairman of the new committee on street traffic, authorized at the last meeting of the executive committee of the American Association.

The United Railways of St. Louis have fitted their cars with banner boards reading "Rear Platform of Car Stops 50 Ft. from Curb Line." The attention of the public is being called to this fact for its convenience and to reduce the time consumed in stops, thereby making it possible to speed up schedules. These boards have been found particularly valuable as a means of educating the occasional rider in the territory outside the business district.

COMMUNICATIONS

Lighting of Interurban Cars

LEHIGH VALLEY LIGHT & POWER COMPANY
ALLENTOWN, PA., Jan. 5, 1916.

To the Editors:

Referring to the complaint of the ordinary series of lighting of interurban cars in the communication of Mr. Gelder of the Travelers' Protective Association of San Francisco in your Jan. 1 issue, I would suggest that Mr. Gelder make a trip east and travel over the 60 miles of high-speed line of the Lehigh Valley Transit Company between Allentown and Philadelphia. On the cars of this line he will find a lighting equipment entirely independent of the trolley, designed by the writer, consisting of ten Edison cells, in two trays weighing about 100 lb. each, supplying twenty 20-watt, 12-volt, Mazda lamps direct from the battery without regulation, which is not required between full charge and discharge. The original cost of the equipment was approximately $200 per car, and the total maintenance costs during a period of approximately three years have consisted of the expense for one charging of the batteries with the proper solution.

A small, 110-volt motor-generator set in the carhouse is used to charge the batteries in series. They are pulled out of the compartments under the cars during the day time and replaced in time for use during the dark hours. The labor charges for this work are considerably less than those involved in the changing and maintaining of the ordinary arc headlights. Even some of the original lamps were still discovered in service a few days ago. As this battery equipment will maintain the lamps burning continuously for a period of approximately eight hours and there is no connection between the lighting circuit with the overhead system, the scheme is ideal for its purpose.

No patents have been taken out on the idea.

A. H. S. CANTLIN, Vice-President and Manager.

[NOTE.—An article describing the equipment of the Lehigh Valley Transit Company's line and car equipment, including the lighting plan described by Mr. Cantlin, appeared in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 2, 1912, page 940.—EDS.]

Causes of Rail Corrugation

THIRD AVENUE RAILWAY
NEW YORK, Dec. 31, 1915.

To the Editors:

The article by R. C. Cram on rail corrugation which appeared in the Dec. 25 issue of the ELECTRIC RAILWAY JOURNAL must be of unusual interest to anyone interested in this subject. The writer is of the opinion, based on a very careful study of rail corrugation, that Mr. Cram hit the nail on the head when he said that this trouble is caused by load concentration, due to the reduced area of contact as the result of irregularities or of a difference between the contours of the rail head and the wheel treads. It would, therefore, seem that the suggestion made by him regarding the use of a curved rail head, which will more readily conform to the contour of worn wheels, thereby giving a wider area of contact, would go a long way toward relieving this trouble.

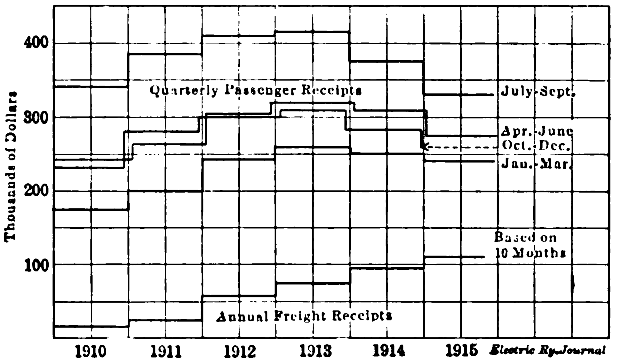
The primary cause of rail corrugation, however, according to the views of the writer, is the result of modern methods used in track construction, where the ties and rails are embedded in a solid mass of concrete and granite which holds the track in a vise-like grip of such rigidity as to eliminate any spring action or give and take. This rigidity prevents the rail from adjusting itself to irregular wheel contours, and also prevents the cushioning effect which would otherwise take care of vibrations which must necessarily result from the rolling of a wheel carrying a heavy load. In the nature of things such a wheel cannot have a perfectly smooth surface, and its rolling over a rail having a similar surface causes a vibratory motion of the wheel. Such a condition does not exist on steam or other roads where the ties and rails are not buried in concrete, thus permitting the rail to take care of these vibrations.

J. S. MCWHIRTER,
Superintendent of Equipment.

Relative Growth of Freight and Passenger Business

Decrease in Passenger Receipts Due to War and Increase in Freight Receipts During the Last Five Years Shown by Large Interurban Railway

THE accompanying graph, which shows the relative growth during the past five years of freight and passenger receipts on a large interurban railway, indicates the importance of the freight business as a growing field for future traffic. From the graph it will be seen that increases in passenger receipts were registered for every year until 1914. The decrease that occurred during the first two quarters of that year were small and the really large losses took place only after July, 1914, the influence of the war in Europe being thereby made apparent.



FREIGHT AND PASSENGER RECEIPTS ON INTERURBAN LINE

With regard to the receipts from freight, however, an increase was registered for 1914 and for 1915, both years showing a practically normally regular increase. It would appear, therefore, that the extraordinarily heavy losses occurring in passenger receipts for the past two years have not been effective in the case of receipts from freight and express, and although the passenger losses have brought receipts from this source to a point actually below that registered five years ago, the freight receipts have been increased by more than 300 per cent in the same period.

The Public Works Department in Rome, Italy, has approved a new project for the construction of a double-track electric railway from Rome to the sea at Ostia. For the urban section the overhead system will be used at 600 volts, while on the interurban section current will be collected from a third-rail at 1200 volts. Express trains will make the run in twenty-four minutes and local trains in thirty-five minutes. The rolling stock will include eighteen motor and thirty trail cars with two electric locomotives and twenty freight cars for freight traffic. The cost of construction is estimated at about $1,737,000 and of the equipment about $386,000.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electrical Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Recent Lightning Arrester Experience

B. L. F. COFFIN

Master Mechanic Beaver Valley Traction Company, New Brighton, Pa.

The protection of electrical apparatus from lightning on the property of the Beaver Valley Traction Company has always been difficult due to the fact that the valleys of the Beaver and Ohio rivers, meeting at Rochester, form a storm center which seems to be the collecting and distributing point for all stray storms. Our records for the season just closed show thirty-one storm periods of lightning discharges ranging from fifteen minutes to two and one-half hours in duration, and during the season of 1914 there were about fifty-five storms. The average over a period of years was about forty-three storms per season.

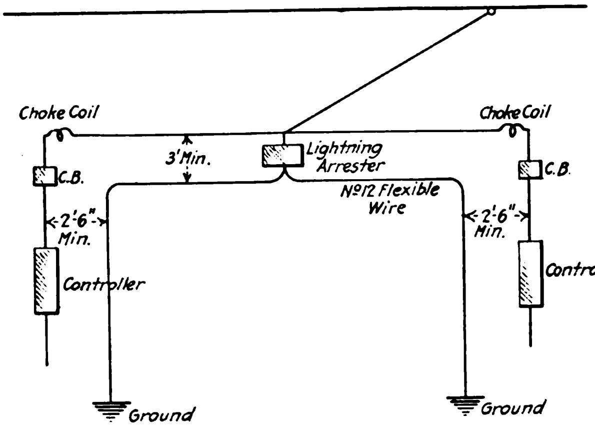
The switchboard in the Junction power house has been equipped for eight or ten years with a home-made arrester, often scouted by visitors as being worthless. Nevertheless our chief engineer, W. H. Braunbeck, has been so enthusiastic over it as to equip our Economy plant with the same type. This arrester consists of wire extensions from the main positive and negative busbars, parallel and about 8 in. apart. These two wires, No. 00 trolley, are bridged by ten No. 24 single cotton covered copper wires, separated by transite boards. The positive and negative wires are also separated by transite board so that no arc can carry across and form a destructive short-circuit. The effective thickness of insulation between positive and negative busbars is 0.007 in. of cotton, which under tests averages a breakdown voltage of 750. In other words, we have an arrester which relieves all line stresses above 750 volts. Our normal line voltage is 550.

With one exception the arresters installed in parallel with this arrester for years have never been known to discharge while the pop of the fuses of No. 24 wire is quite common. The operation of this arrester demonstrates the correctness of the recommendation of the 1915 A. E. R. E. A. committee on lightning protection when it prescribes "That the flash-over point of the arrester be set at a voltage as close to the maximum operating voltage of the system as may be practicable."

The one arrester which has been excepted in the above statement is the aluminum cell arrester, one of which was installed on May 10, 1915. Since that date neither the home-made arrester nor any other than the aluminum cell has ever been known to discharge. In other words, the aluminum cell arrester will relieve line disturbance at less than 750 volts, probably at 625 or 650 volts. This is commonly known, but the above facts should be proof to the unbelieving.

The net result of this protection over a period of years has been that our power houses have been practically free from lightning damage. In June, 1915, however, one generator was grounded by a lightning discharge, but this was due to weakening of the insulation to such an extent that a ground at normal line voltage would probably have occurred soon without any lightning to help it along.

The proper protection of overhead lines and the maintenance of this protection at an effective value is so important to power house and rolling stock protection that its value can scarcely be over-estimated. During the season of 1914 our overhead lines were protected by forty-one arresters, or 1.47 per mile of double track, these arresters being Westinghouse MP and Garton-Daniels, principally the former. During the winter of 1914-1915 plans were laid for an improvement in this protection. A plat was made of our entire system, showing by various symbols the following information: points of damage by lightning in 1914; feeder taps in 1914, and effective arresters in 1914. From this information and from a study of geographic and traffic conditions this plat was further marked with symbols to indicate feeder taps in 1915 and suggested locations for arresters in 1915. The number of arresters proposed was much in excess of the number installed in 1914, the additional arresters to be obtained by removing those of the magnetic blowout type from cars and applying to overhead lines. The actual improvements made were not quite as extensive as planned, as only certain portions of the overhead lines were equipped with arresters as per notations on the plat. In the installation of line arresters, grounds were made by soldering ground wire to rods driven into the ground, and also in most cases by bonding to the rail. We use no automatic signals.



LIGHTNING ARRESTER EXPERIENCE—LIGHTNING ARRESTER WIRING ON CAR

The protection of car equipment, aside from that afforded by effective overhead line arresters, is the particular phase of lightning protection in which the writer is most interested. Rolling stock in 1914 was protected almost entirely by GE MD and MD-2 magnetic blowout arresters, purchased during the years 1911 to 1913. These arresters were properly installed with choke coils and so wired as to reduce inductive effects to a minimum. It was considered advisable to carry two of these arresters per car, one being hung from the lower side of the hood in each vestibule, thus giving each car double protection. All arresters were inspected and tested at the opening of the season to break down at 1600 volts. After each storm the arresters were inspected and immediately replaced if found defective. The net result of this protection was the loss of thirty-five armatures and of six lighting circuits in cars during the 1914 season, a poor record but the best obtained on our system as far back as our records go.

As a result of the above-described experience it was decided to install GE aluminum cell arresters on all regular cars. All arresters were mounted in the center of the cars on the roof. We noted that this is recommended practice, i.e., "The lightning arrester of whatever type and choke coil should be located as near the trolley base as practicable." The A. E. R. E. A. committee reports a small minority following this practice. Instead of using only one ground wire, two No. 12 ground wires were used in parallel, one running to each end of car, thus giving sufficient current-carrying capacity and at the same time reducing by one-half the inductance of the ground circuit. No lightning arrester wires were run in metallic conduit and all splices were soldered. Inspection of these arresters was made regularly every two weeks during the season.

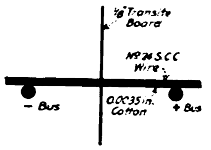
The record for the season of 1915 after the installation of the aluminum cell arresters on May 6 is as follows:

One incandescent lamp burned out on an extra car protected by Garton-Daniels arrester; probably due to lightning.

One K-10 controller blow-out coil grounded on an extra car protected by GE MD-2 arrester.

One K-10 controller blow-out coil grounded on a regular car protected by an aluminum cell arrester, but operating where the overhead line was unprotected.

This is a total lightning damage amounting to $8.10. While lightning discharges during the past season have been comparatively light, our cars on June 13, 1915, passed through the worst electrical storm in the history of Beaver Valley, when for two and one-half hours the sky was continuously illuminated by terrific lightning discharges. Not a cent's worth of damage was done to our rolling stock by lightning in this storm. It has, therefore, been conclusively proved that by the installation of electrolytic arresters on rolling stock, assisted by adequate overhead line protection, an electric railway may be immune from lightning damage.



HOME-MADE LIGHTNING ARRESTER

That the adoption of this type of arrester has not been more general has been due partly to the much feared high cost of maintenance. A few figures for one year of operation may be interesting:

Double-Truck Cars, Twelve Equipped

Cost of aluminum cell arresters at $12.38	$148.98
Renewals	nothing
Cost of inspection	nothing
(This item is readily absorbed in a day's work, not requiring more than five minutes every two weeks.)	
Cost of installation of arresters and wiring at $2.10	$25.20
Cost of removing, cleaning and storing for the winter at $0.12	1.44
Total cost	$175.62
Cost per double-truck car	$14.66

Single-Truck Cars, Ten Equipped

Cost of aluminum cell arresters at $12.38	$123.80
Renewals of cells, electrolyte, etc	42.13
Cost of installation at $2.10	21.00
Cost of removing, etc., at $0.12	1.20
Total cost	$188.13
Cost per car	$18.81

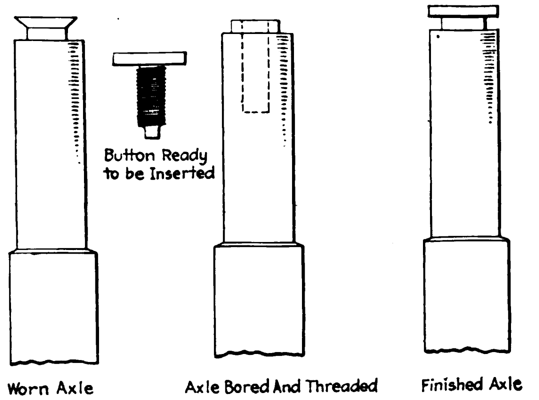
The high cost of renewals on single-truck cars is due to the continual oscillation which gradually bridges over the creepage surface between the positive and negative plates, causing a deposit and finally partially short-circuiting the two plates. This in turn causes the electrolyte to boil away. Though affording practically as good a protection on single-truck cars, this type of arrester will need further development before its maintenance can be reduced to the low level attained on double-truck cars. Allowing a cost of $10 per armature for removal, repairs and replacement of one grounded by lightning, our cost for damage done to armatures by lightning in 1914 was $350. Our total cost of lightning protection in 1915 was $363.75 and total damage resulting in 1915 was $8.10. Our return on the investment of new arresters is therefore 96 per cent the first year.

Reclaiming Worn Button-End Axles

BY J. N. GRAHAM

Master Mechanic Rockford & Interurban Railway,
Rockford, Ill.

A practical method of reclaiming worn button-end axles has been developed by the mechanical department of the Rockford & Interurban Railway, Rockford, Ill. A worn axle is first placed in a lathe with the worn end of the axle toward the tailstock. In this position the jaws of the chuck are tightly clamped on the axle to keep it perfectly centered. A steady rest is then placed at the opposite end of the axle, the tailstock center is withdrawn and the old button is turned off. The end of the axle is also bored and threaded for a 1½-in. standard thread. If a 1½-in. stub tap is at hand it may be used to save cutting the thread in the lathe. This method of threading, however, is more practical than to use a stub tap because the lathe keeps the threads in perfect alignment with the axle.



BUTTON-END AXLE, BEFORE AND AFTER RECLAIMING

New buttons are made from sections of old axles cut in 4-in. lengths. These pieces are centered on both ends, and one end is turned to the diameter and thickness of the button required. The remainder of the piece is turned down and threaded to fit the axle. The best way to do this is to have the finished buttons ready to fit into the axle as the threads are being cut. The axle should be left in the lathe and the button screwed into it. In order to insure results the threads of the button and axle should fit very tightly, requiring a large pipe wrench to tighten the button in position.

When this has been done, the tailstock center may again be inserted, the steady rest removed and, if the axle needs truing which is frequently the case, it may be turned and polished. After the axle is taken out of the lathe, a ½-in. hole is drilled radially through the plug and the axle. This hole is countersunk on both sides of the axle, and a ½-in. countersunk rivet is inserted and riveted. The rivet is afterwards filed or turned off and polished to conform with the axle. The purpose of the rivet is to secure the button in the axle. When the buttons of the reclaimed axles become worn, the rivet may be drilled out and a new button inserted at a very small cost. This method of reclaiming worn axles has proved very satisfactory. It prolongs the life of the axle indefinitely, and by keeping good buttons on the axles the life of the check plates is increased since a worn axle soon cuts through a check plate and renders it useless.

Starting Currents of Interurban Car Motors

BY D. D. EWING
Assistant Professor of Electrical Engineering, Purdue University, LaFayette, Ind.

Within the past couple of years there have been made, under the writer's direction, a number of tests on different types of electric cars. In view of the present interest in railway motor overload ratings it is thought that some of the data secured in these tests may be of general interest.

In Table I is listed some general information regarding the equipments tested. It will be noted that in making the nine test runs listed, five different motor cars were used. These cars were operated during the tests by their regular crews on their regular schedules. In general, ordinary operating conditions prevailed and the results obtained may be considered as typical for the operating conditions which obtain on central and nothern Indiana interurban railways. The tests were all made in the winter, the air temperatures ranging between 0 deg. C. and 10 deg. C.

In Table II the lines of figures beginning "Maximum motor current (series)" give the maximum, minimum and average values of the motor currents which obtained at the instant of starting for the number of starts listed in the line beginning "No."

In general only runs where the controller was notched up steadily, at least to the full series position, were selected. Thus in the entire run of 137.5 miles, in only fourteen starts was the controller notched up steadily to the full series position during the test of car No. 1. Few of what might be called "typical" starts, in which the controller was notched up steadily to the full multiple notch, the car continuing thereafter to accelerate on the motor characteristics until balancing speed was attained, were made. When starting in a town or city the motorman in most cases alternately ran on one of the series notches and coasted until private right-of-way was reached. On this account it was generally possible to secure a larger number of "Motor current at balancing speed" readings than "Motor current at end of three minutes" readings. Irrespective of the manner in which the start was made, however, in no case were the maximum currents at starting greater than those listed in the table.

Although not indicated in the table the first notch in the multiple position ordinarily gave the maximum motor current for the parallel connection of the motors, and this notch was usually reached about thirty seconds after the start, so that the figures in the lines of the table which begin "Maximum motor current (multiple)" approximately represent the motor currents at the end of thirty seconds.

The balancing current of a car is, of course, affected by the profile of the roadway, the current-time curve for a run at balancing speed having undulations corresponding to the undulations of the roadway. The tabulated values were secured by averaging the current-time curve for the corresponding period of balancing speed running.

The data on "Motor current, average thirty seconds," and "Motor current, average one minute," were secured by averaging the current-time curves for the corresponding periods of time.

The average voltages were obtained by averaging the voltage-time curve for each run.

In order to better compare the average motor currents for the various times during the starting period

TABLE I—GENERAL DATA

Test number	1	2	3	4	5	6	7	8	9
Motor car number	1	2	3	3	4	4	4	5	5
Number trailers	....	....	....	....	....	1	2	1	....
Service	passenger Limited	passenger Local	passenger Local	Local passenger	Freight	Freight	Freight	Freight	Freight
Weight, empty, tons	40.5	39.15	41.7	41.7	37.6	37.6	37.6	33.4	33.4
Weight, loaded, tons	43.1	40.5	44.0	44.3	42.0	46.7	47.1	44.6	45.0
Weight, trailers, tons	....	....	....	....	....	17.5	41.0	22.9	....
Weight, total train, tons	43.1	40.5	44.0	44.3	42.0	64.2	88.1	67.5	45.0
Number motors	4	4	4	4	4	4	4	4	4
Make of motors	GE-73	GE-73	West. 303-A	West. 303-A	GE 205-B	GE-205-B	GE-205-B	GE-73	GE-73
Gear ratio	1.78	2.12	2.67	2.67	3.35	3.35	3.35	2.12	2.12
Wheel diameter, inches	35.6	34.1	36.3	36.3	35.0	35.0	35.0	32.4	32.4
Length run, miles	137.5	137.5	114.2	114.2	63.2	25.0	26.0	28.3	109.2

TABLE II—MOTOR CURRENTS DURING STARTING

Test Number		1	2	8	4	5	6	7	8	9
Maximum motor current (series), amperes	Maximum	255	180	180	185	195	140	255	160	170
	Minimum	180	116	105	110	100	105	170	120	120
	Average	206	147	145	150	150	125	200	140	143
	Number	14	26	36	23	6	5	4	3	9
Maximum motor current (multiple), amperes	Maximum	122	116	130	132	132	145	175	105	105
	Minimum	76	60	80	65	102	100	145	87	72
	Average	106	83	97	89	115	120	160	100	86
	Number	8	20	36	22	7	5	4	5	9
Motor current at end of one minute, amperes	Maximum	100	80	82	82	61	70	120	...	80
	Minimum	56	48	50	52	47	50	52	...	48
	Average	78	68	68	67	53	56	77	80	68
	Number	9	18	36	23	7	5	4	1	9
Motor current at end of three minutes, amperes	Maximum	64	56	62	55	40	42	52	...	70
	Minimum	52	44	40	40	35	35	44	...	48
	Average	56	48	45	46	37	40	48	...	53
	Number	6	12	17	11	5	6	3	...	10
Motor current at balancing speed, amperes	Maximum	62	50	50	52	42	40	44	46	66
	Minimum	48	40	37	37	30	37	42	42	30
	Average	56	47	44	46	35	38	43	44	47
	Number	17	14	19	17	7	6	3	3	17
Motor current, average thirty seconds, amperes	Maximum	168	120	150	145	110	100	170	...	140
	Minimum	104	72	90	90	90	70	125	...	88
	Average	130	97	120	118	100	88	150	...	115
	Number	14	26	36	22	6	5	4	...	8
Motor current, average one minute, amperes	Maximum	122	100	112	118	102	93	147	...	105
	Minimum	100	64	82	80	83	86	110	...	80
	Average	105	83	96	95	90	85	125	...	93
	Number	8	18	36	22	6	5	4	...	6
Average voltage for run		630	636	525	522	532	532	532	585	606

TABLE III—MOTOR CURRENTS DURING STARTING IN PER CENT OF BALANCING CURRENT

Test Number	1	2	3	4	5	6	7	8	9	Average
Balancing current, amperes	100	100	100	100	100	100	100	100	100	100
Motor current at end of three minutes, amperes	100	102	104	100	106	105	112	...	113	105
Motor current at end of one minute, amperes	139	145	155	145	152	147	179	181	145	154
Maximum motor current, motors in parallel, amperes	189	176	220	193	328	316	372	227	201	247
Maximum motor current, motors in series, amperes.	368	313	330	326	428	329	465	318	304	353

Table III has been prepared. In each case the average balancing-speed current has been used as the basis of comparison, it being expressed as 100 per cent, the other currents being expressed in percentages of balancing-speed current. It will be noted that in general the motor current at the end of three minutes is practically the same as the balancing-speed current, and that at the end of one minute it is only about one and one-half times the balancing-speed current.

The tests were made with the graphic-recording, portable car testing set described in the issue of the ELECTRIC RAILWAY JOURNAL for July 24, 1915.

The writer wishes to express his indebtedness to the Fort Wayne & Northern Indiana Traction Company and the Terre Haute, Indianapolis & Eastern Traction Company, through whose co-operation the tests were possible, and to a number of students of Purdue University, who, in the course of their thesis investigations, collected the major part of the original data.

The Protection of Car Finishes

BY CARL F. WOODS
Secretary Arthur D. Little, Inc.

In our research and testing work for electric railways nothing has proved more enlightening than the analyses of car-washing soaps, paints and varnishes. These products lend themselves easily to deception of the buyer because he cannot readily detect their purity or suitability. The alternatives "purity" and "suitability" are used deliberately, for it is one thing to assert that a manufacturer is dishonest and another to state that he has furnished an unsuitable product.

The buyer and not the seller is at fault if a paint which is not resistant to corrosive influences is purchased for use in a salt-laden atmosphere, or if a short oil varnish intended for interior work is used for the exterior finishing of cars. Too frequently the buyer purchases a product which he knows has given satisfactory service in some other place and perhaps for some entirely different purpose without consideration of the special requirements of his own service. It is essential that the manufacturer should be fully advised of the exact conditions to which his product will be subjected and, then, that the buyer should take the necessary steps to insure delivery of the products required. The specialized knowledge obtained by the reputable paint manufacturer regarding various pigments, vehicles and combinations of these is of great importance to the user, and no buyer is justified in neglecting to obtain all of this information, which is readily at his disposal.

An Experience with Car-Washing Soaps—About a year ago we were requested by one of the largest Eastern electric railways to analyze a number of brands of soap which had been brought to their attention for car-washing purposes, with a view to determining which was the most economical for their purposes. The following table shows the result of this investigation:

Sample	1	2	3	4	5
Price per pound, cents.	3.5	4.13	6	4.5	5.75
Moisture, per cent.....	32.96	79.50	64.74	63.60	3.08
Total fat, per cent.....	53.00	12.90	27.19	29.34	79.74
Comb'd alkali, per cent.	9.14	0.98	4.63	4.63	13.57
Free caustic, per cent..	None	None	None	None	None
Free carbonite, per cent	0.26	5.57	0.11	0.09	0.13
Glycerine, per cent....	4.64	1.05	3.23	2.34	3.48
Effective soap, per cent	62.14	13.88	31.82	33.97	93.31
Price per pound of effective soap, cents..	5.6	29.7	18.9	13.3	6.1

It will be readily seen that while the difference in price per pound as received was not great the price of the actual soap received, due to the varying content of moisture, ran from 5.6 cents to 29.7 cents per pound. Soap No. 4, for instance, although much cheaper than No. 5 as purchased, actually cost twice as much for the soap received. Soap No. 2, on the other hand, was found to contain a large quantity of free alkali and was not comparable with the others as it was a soda soap and inferior to the others for this purpose, all of the rest being potash soaps.

As a result of these tests it was found that the soap which best combined economy, purity and suitability was neither the 6-cent nor the 30-cent soap, but one of the medium priced soaps. As a result, the company is now purchasing its car-washing soaps on a carefully drawn specification, which insures a satisfactory article and permits the benefits of competition.

What general manager or purchasing agent would pass a requisition for an article at a much higher price if he lacked such proof as was gathered in this instance?

Another Soap Experience—Not long ago one of our clients experienced serious trouble in revarnishing cars, due to the crawling of the varnish in spots. Suspicion was naturally directed to the varnish, but this proved to be an eminently suitable varnish for the purpose and an investigation showed that the real trouble lay in the car-washing soap. This soap, although free from the harmful caustic alkali, contained a large percentage of uncombined fat, so that when the car was washed before varnishing thin films of this greasy fat remained on the surface, to which, of course, the varnish would not cling. Here, again, information of decidedly practical value was obtained at the trifling expense of a soap analysis.

Paints and Varnishes—If it is important to find the soap that will best maintain car finish it is even more important that the most suitable paints and varnishes should be applied to the car. Frequently a color is selected for the cars without reference to the pigments which must necessarily be used to obtain the exact shade desired, with the result that either an excessive expense is incurred for the finish or that rapid deterioration takes place due to the use of unsuitable pigments. There is a wide range of car-body colors which are eminently suitable for the purpose, which can be readily obtained from any number of reputable manufacturers and whose composition can be quickly checked by chemical analysis, affording the manager all of the range necessary in selecting a shade for his cars.

The selection of varnish is by no means a simple matter, as it is impossible from chemical analysis alone to obtain all of the necessary information. On the other hand, purchasing the highest-priced varnish is not necessarily a safeguard, as the varnish furnished may be much better than necessary for the purpose. Chemical analysis can, however, readily detect adulteration and the presence of substances like rosin, turpentine substitutes, etc., which either seriously impair the wearing qualities of the varnish or reduce its intrinsic value. A combination of this kind of testing with service tests of those varnishes which are free from objectionable ingredients will rapidly enable the railway company to obtain a satisfactory article at a reasonable price.

The introduction of quick-drying methods has introduced another important phase of the question. The elimination of idle car-hours by cutting down paint-shop time from a week to twenty-four hours offers a tempting prospect to the manager. It is essential, however, in reductions of this kind that intelligent care be used, as not all quick-drying methods produce satisfactory results. The character of the wood, the paint and varnish employed and the facilities for drying demand scientific study to the end that the economies effected may be real.

The increasing use of steel cars particularly necessitates a careful selection of the finishing materials. It is too commonly assumed that steel will withstand practically any service conditions; the fact is overlooked that the ⅛-in. or 3/16-in. side girders, now common in car building, will not maintain their strength very long if not protected against corrosion. Rivets are also particularly vulnerable places in the car armor.

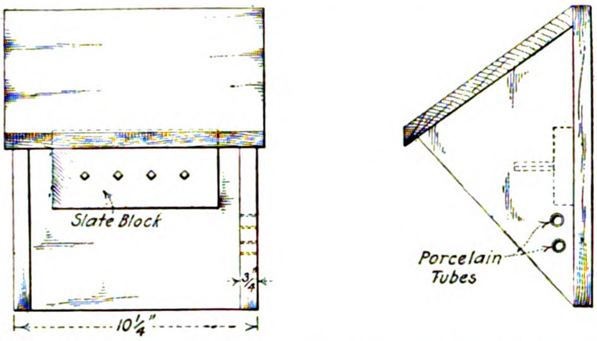
In brief, the diverse conditions under which car-finishing materials are employed should absolutely preclude their purchase on the basis of price, prejudice or past experience in other localities. Only a thorough knowledge of the various materials available, together with a comprehensive system for insuring the receipt of the proper materials, will enable the application of that foresight which is worth so much more than hindsight.

Remodeling a Railway Telephone System

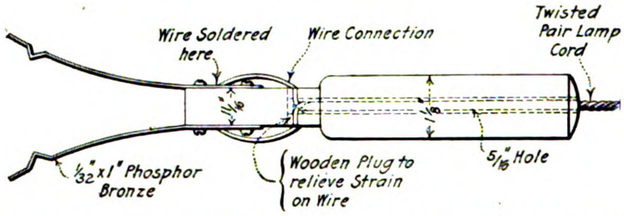
During the past summer the Buffalo, Lockport & Rochester Railway reconstructed its telephone system, doing away with booths located along the tracks and substituting portable telephone sets carried on the cars, the wall sets being reconstructed for this purpose at a nominal cost.

The road was formerly outfitted with twenty-five telephone booths distributed along the 55-mile right-of-way between Rochester and Lockport, N. Y. Stromberg-Carlson wall sets were used in these booths. Along the right-of-way there are duplicate telephone lines of No. 12 bare copper wire, the line designated as No. 1 being used for power dispatching and miscellaneous communication, and that designated as No. 2 being used for train dispatching. The passenger and freight stations are normally on the No. 2 line also. The lines are run at the top of the distribution line poles and are transposed every fifth pole to eliminate induction, as the 60,000-volt transmission line is located on the opposite side of the track from the distribution line. Both telephone lines run through all power substations and passenger stations, and section switches are placed at these points to permit the localization of trouble.

On account of the cost of new portable telephones with the necessary jack boxes, etc., and of the impracticability of disposing of the wall sets to advantage, it was decided to convert the latter into portable sets and to construct suitable jack boxes for use in connection with them. The results are shown in an accompanying illustration.

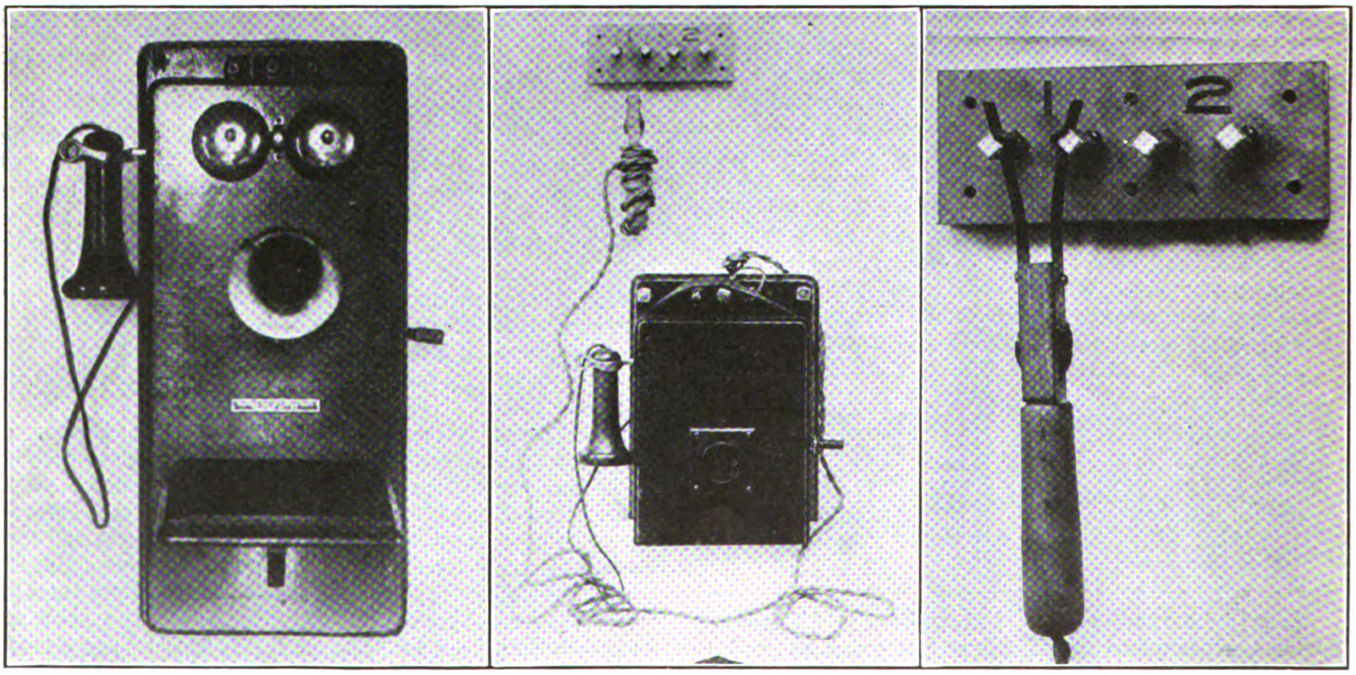


PORTABLE TELEPHONES—WOODEN SHELTER FOR PEG BLOCKS

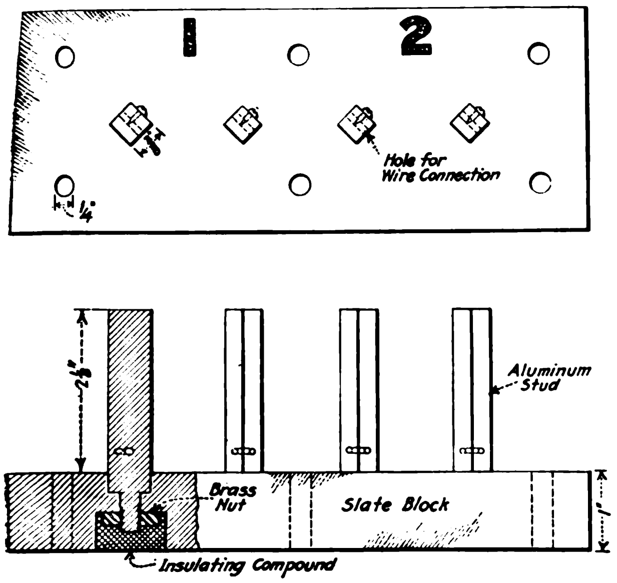


PORTABLE TELEPHONES—MAPLE JACK HANDLE WITH PHOSPHOR BRONZE CONNECTION SPRINGS

In converting the telephone sets the transmitter arms were removed and the transmitters were placed inside the box with the mouth pieces protruding, wooden blocks being fitted around them to eliminate breakage. The boxes were cut off below the magneto supports and bells were removed, small dry cells being fitted inside the boxes at the top behind the former location of the bells. Leather straps were bolted to the box top for convenience in carrying, and on each box a piece of ⅛ in. x 1 in. flat iron bent to form two pockets was attached. These pockets were of suitable size to hook over two hooks, made of ⅛-in. x 1½-in. flat iron which were



PORTABLE TELEPHONES—WALL SET FORMERLY USED, REMODELED SET WITH JACK AND CONNECTING CORD, AND CONNECTING JACK SHOWN ON A LARGER SCALE fastened to the side of the car to support the sets. Felt strips were secured to the backs of the boxes at the bottom to hold them in line with the side of the car and to prevent vibration. Fifty contact blocks were distributed along the line, each consisting of a slate back with square aluminum pegs set into them.

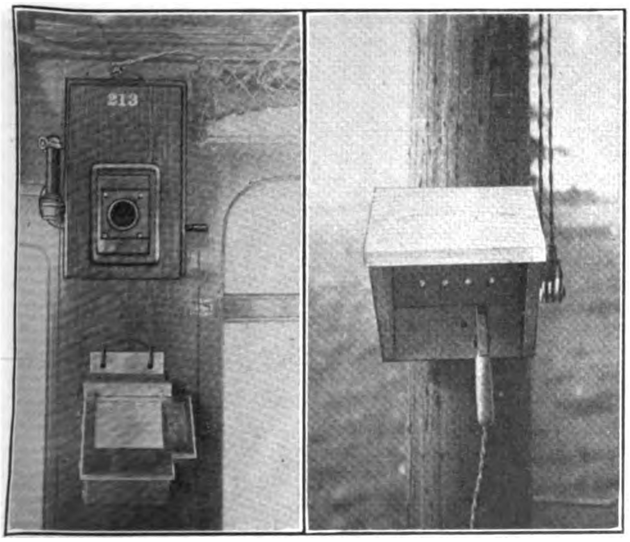


PORTABLE TELEPHONES—SLATE CONNECTING BLOCKS WITH ALUMINUM PEGS

The pegs were secured by nuts at the backs of the blocks, countersunk holes being provided for this purpose. After the pegs were clamped into position electrical compound was run into the holes. Holes were drilled in the square portion of each peg to permit taps from the telephone line to be attached and held firmly in place by means of set screws.

For the connection from telephone to jack box the jack illustrated was made, and a piece of maple 1 in. x 1¼ x 7 in. was used to form a handle and a support for the contact strips. The latter were made of phosphor-bronze strips 1 in. x 1/32 in. x 5½ in. in size, with a "V" formed near the end of each to facilitate the making of good electrical contact with the pegs in the jack box. Connecting wires were brought out through the wooden handle and attached to ordinary twisted pair lamp cords.

Wire baskets which were used on the cars for holding flags were relocated and placed near the telephones so that the jack handles and wire could be easily placed out of the way after use. This convenience appears not to have been appreciated by the train crews, who ordinarily coil the wire around the telephone after use.



PORTABLE TELEPHONES—SETS AND REGISTER IN CAR AND CONTACT BLOCK SHELTER ON POLES

Connections between the overhead telephone line and the jack boxes were made with twisted pairs of telephone wires, the lines being brought down the poles on porcelain knobs. Wooden shelters, as illustrated, were provided to protect the plug bases, and the wires were taken into these shelters through porcelain tubes. The figures 1 and 2 were painted at the top of each plate block to designate the line, but these were really unnecessary as the No. 1 line is always connected to the left-hand pair of plugs and the No. 2 line to the right-hand pair.

The jack boxes were installed at each end of double-end sidings and at each side of the switch at single-end sidings and they were placed at a height convenient for access from the cab door of the car.

In connection with the portable sets it was decided to use Egry registers for taking train orders, and a holder was provided for these registers directly below each telephone set at a height from the floor convenient for writing. Each motorman is furnished with one of these registers and is directly responsible for its care. All telephone sets have the numbers of their designated cars painted at the top, and a few extra sets marked "Spare Telephones" are kept on hand at the car shops in Rochester and at the line foreman's workshop at Albion, N. Y. These are used to replace temporarily car sets which are undergoing repairs.

The cost of the change from wall sets to portable sets is given in the following table:

	Labor	Material	Total
Fifty wooden shelters for jack boxes....	$12.35	$10.68	$23.03
Fifty slate bases with aluminum contacts	.....	30.00	30.00
Twenty-five jack handles, including wire	5.58	12.06	17.64
Twenty-five portable telephones — cost conversion	18.35	9.00	27.35
Relocating wire baskets and installing telephone support hooks in twenty cars	19.52	2.15	21.67
Insulators, wire, connectors, etc., for connection overhead telephone lines to jack boxes, including installing jack boxes..	45.20	71.93	117.13
Total	$101.00	$135.82	$236.82

The change to the portable phones was made about the middle of the summer and since then no trouble worthy of note has been experienced. The extent of the saving in first cost can be appreciated by comparing the costs given in the above table with those of new portable sets and jack boxes. The advantages of this system over that in which wall sets are used in booths have been shown by the experience of this railroad to be as follows:

There is a saving of approximately two minutes on every call of train crews for the dispatcher. The jack box is so simple that there is no difficulty in keeping it up. Telephone maintenance is less, repairs being made in the shop instead of in the booths formerly used.

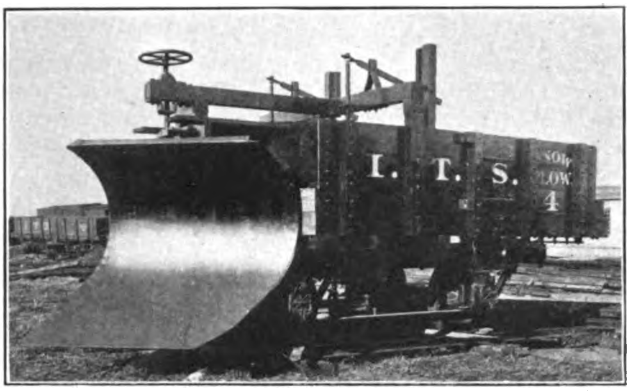
The system is very flexible because telephone communication can be established from any point by installing a simple jack box.

At highway crossings where the view is obstructed and considerable automobile traffic obtains, the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., has installed warning signs on the highways 300 ft. each way from the crossing. These signs are placed on the right side of the highway and in large letters warn the automobile driver that he is 300 ft. from the track. This is considered ample braking distance for an automobile which is approaching the tracks at a high rate of speed.

An Independently Mounted Snow Plow

Deep snow drifts are removed from the lines of the Illinois Traction System, Peoria, Ill., and the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., by standard snow plows having nose-type shares mounted on independent trucks. One of these plows is shown in the accompanying illustration. Essentially the plow consists of an adjustable nose plowshare supported on a wooden body which in turn is mounted on two pairs of standard car wheels. The plowshare is 4 ft. 8 in. high and 8 ft. wide, and as shown on the line cut, the lower point of the share is 3 ft. 4 in. in advance of the top. This tends to keep the share down when in service. The share is made of ¼-in. steel plate secured to an angle-iron frame with rivets countersunk on the plow face. The plow is so mounted on the projecting end of the truck frame that the share may be raised or lowered by a hand wheel and screw having a maximum range of approximately 6 in. The purpose of this adjustment is to clear the share of obstructions and to lower it practically onto the rail when necessary. After the plow has been raised or lowered to any desired position, the mechanism can be locked. Besides the large plowshare, which is designed to clear the track through heavy drifts, flangers are provided to clean the rails. These flangers can be raised or lowered to any desired position by hand levers operated from the truck body.

The car body proper is built of wood, and it is 8 ft. wide by 11½ ft. long by 2½ ft. deep. It is mounted on two pairs of standard car wheels which are bolted direct to the body underframe. As will be noted in the illustrations, the front pair of wheels is attached to the underframe slightly in advance of the front of the body. This construction provides stability against overturning, by counteracting the tendency to press the share down into the ties when plowing heavy drifts. The other pair of wheels is attached to the underframe 7 ft. 6 in. behind the front wheels. The wheel mounting consists of strap-iron journal box yokes bolted to the underframe, and 4-in. x 4-in., 12.8-lb. angles bolted between the bottoms of the yokes hold the wheels rigidly in position. Other details of the plow are shown in the illustrations.

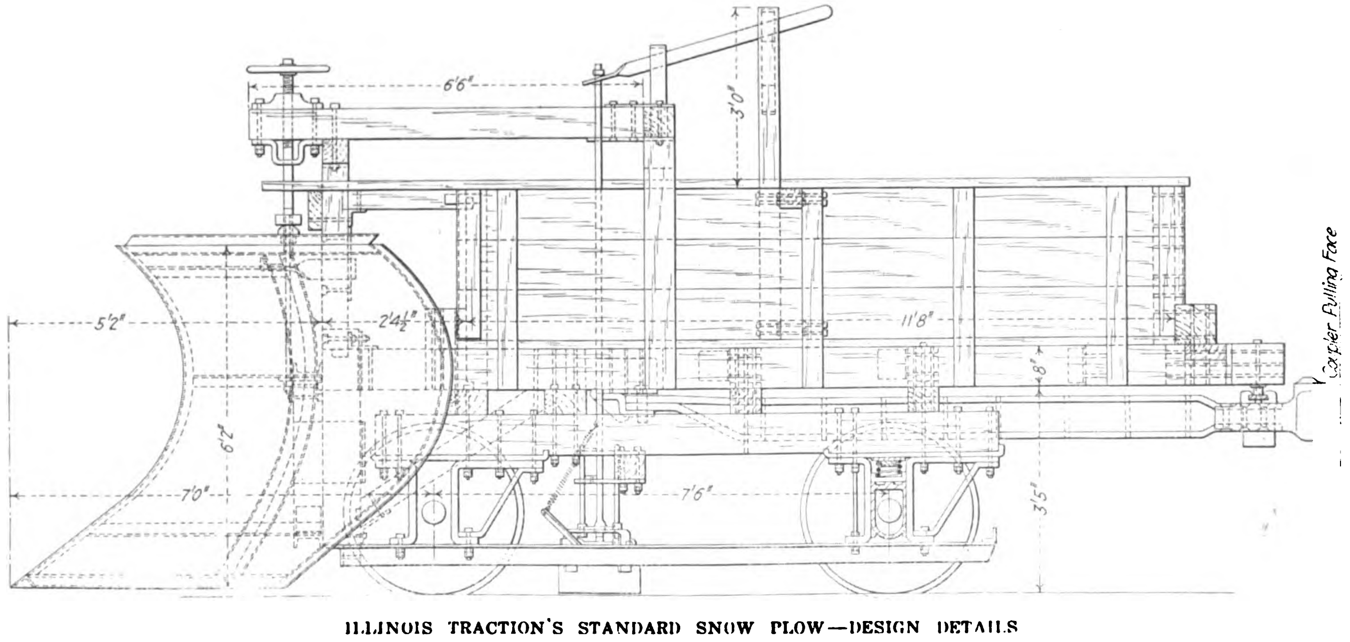


ILLINOIS TRACTION'S STANDARD SNOW PLOW—GENERAL VIEW

In service this plow is coupled to the front end of a motor express car. Ballast, usually consisting of boulders and scrap iron, is deposited in the body. The plow complete, together with the ballast, weighs about 17 tons. Experience has demonstrated the advantages of independently mounting the plow. It is always ready for service, thus eliminating the delay incident to the use of a plow that must be mounted on a car. The plow is relatively inexpensive in construction, as compared with a self-propelled plow, and the combination of the adjustable, large share and the flangers makes it serviceable for both paved streets and open-track construction. This plow is one of three which have now passed through three winters and have given satisfactory results. J. M. Bosenbury, superintendent of motive power and equipment of the Illinois Traction System, is responsible for their design and construction.

Copper Production by Countries

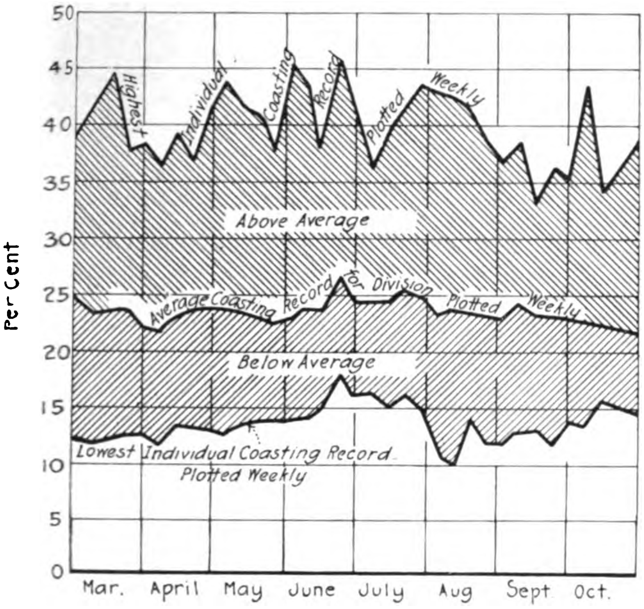
The world's output of copper is normally about 1,000,000 tons per year, this figure having been practically exceeded in 1912. The United States produced 55 per cent of the whole, and the whole of North and South America, 73 per cent. Japan is the next biggest producer with 65,500 tons, and other countries' contributions are as follows: Spain and Portugal, 59,000 tons; Russia, 33,000 tons; Australasia, 47,000 tons; the combined product of Germany, Hungary, Turkey and Bulgaria, when on a peace footing, 35,000 tons; and Great Britain, 300 to 400 tons. The total production of the British Empire is about 100,000 tons, or about one-tenth of the world's output. The four biggest consumers in 1912 were: North America, 365,922 tons; Germany, 243,173 tons; Great Britain, 147,551 tons, and France, 106,753 tons.



ILLINOIS TRACTION'S STANDARD SNOW PLOW—DESIGN DETAILS

Graphic Coasting Record at Boston

Several users of the Rico coasting recorder have originated valuable features for making the records more interesting and forceful than they would be in figures alone. A recent contribution is that of the Boston Elevated Railway, which has devised the graphic record presented in the accompanying illustration to show the relative number of men above or below the average coasting record. On the original the "plus" men are represented by an area of solid blues, and the "minus" men by an area of solid red. The record reproduced is that of Division 4, surface lines, Boston Elevated Railway. Similar records are made also for the subway and elevated lines. The Boston Elevated Railway is now using 419 Rico coasting recorders.



GRAPHIC COASTING RECORD USED ON BOSTON ELEVATED RAILWAY

Treated Car Roofing

The desirability of using a roof covering that will effectively withstand severe weather conditions and the fading due to strong sunshine led to the introduction some time ago of "Bayonne" car roofing by John Boyle & Company, Inc., New York. This car roofing is a special woven cotton fabric treated with a waterproof preservative preparation. This liquid preservative is applied evenly and smoothly to the fabric as the latter is fed into a machine. The fabric is then run through heavy pressure rollers, which force the liquid into the cloth so that every fiber is thoroughly permeated.

The advantages of this treated car roofing over ordinary canvas roofing are stated to be as follows: It is absolutely waterproof, and does not need to be made so after installation, as is the case with cotton duck. Cotton duck is usually painted to make it waterproof. When the paint comes in contact with the cotton it has a tendency to burn or char the cotton fiber, which necessitates covering or patching the roof in a very short time.

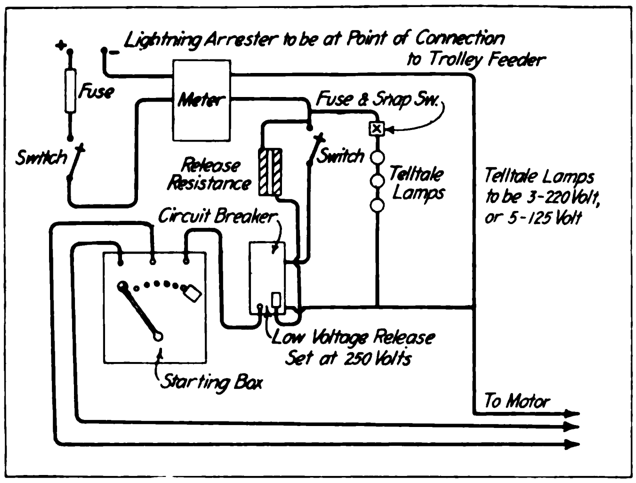
A roof covered with treated roofing is said to be neater in appearance than an ordinary canvas roof, because a man cannot paint a roof as evenly as the machine finishes this fabric. This roofing saves paint enough to more than offset the additional cost of painting an equal weight of untreated cotton duck, and saves the time necessary to apply the paint.

This treated roofing is made in but three weights, any of which will stand considerable wear and tear. On the other hand, cotton duck is made in all weights from a fabric as open as cheesecloth up to weights as heavy as the fabrics used for Bayonne roofing. After cotton duck is painted one cannot tell from its appearance what weight or thickness it is and whether it will last for years or for months.

This roofing is made in yellow and brown and in all widths from 22 in. to 120 in., so that it is possible to cover car roofs of different sizes without waste.

D.C. Motor Insurance Reduced in Indiana

Until recently the electric interurban lines in Indiana have been more or less barred from entering the power field because the national electrical code made no allowance for d.c. motors taking current from grounded railway systems, except when they were housed in an entirely fireproof room. In other words, even when they were installed under ideal conditions the insurance rate remained the same. This made the cost of installation to obtain the minimum rate prohibitive, consequently few d.c. motors have been put in service. All d.c. motor installations not placed in a fireproof room were assessed with a minimum insurance rate of $1 per $100. Recently the Indiana Inspection Bureau, of which E. M. Sellers is the head, through its engineer, W. I. Stone, promulgated a standard method for the installation of d.c. motors which is shown in the accompanying diagram. When this method is followed no extra charge is made in the regular insurance rates. However, where the different protective devices shown on this diagram are not included, charges are made for their absence. In connection with this standard method, d.c. motors are required to be of the totally inclosed or inclosed ventilated, compound-wound, commutating-pole type. All other types of motors must be in a standard inclosure, except that inclosed motors having ventilated openings of No. 16 or smaller wire mesh may be installed under certain conditions, provided that motors of this type are not placed in rooms containing combustible materials, vapors, gases or dust. Aside from these exceptions the d.c., electric interurban lines of Indiana are now on the same basis as the a.c. power companies so far as motor installations are concerned.


+
−
Lightning Arrester to be at Point of Connection to Trolley Feeder
Fuse
Meter
Fuse & Snap Sw.
Switch
Release Resistance
Switch
Telltale Lamps
Telltale Lamps to be 3-220 Volt, or 5-125 Volt
Circuit Breaker
Low Voltage Release Set at 250 Volts
Starting Box
To Motor

STANDARD D.C. MOTOR INSTALLATION ON GROUNDED CIRCUIT

Owing to an alleged interference with telephone circuits in the neighborhood of the electrified section of the London & Southwestern Railway, the opening of electrical operation to the public of the Kingston "Roundabout" line has been postponed.

NEWS OF ELECTRIC RAILWAYS

NEW FRANCHISES SOUGHT IN PITTSBURGH

Officers of Pittsburgh Railways Outline Need of Grants Desired in Downtown Section to Improve Service

Traffic problems in Pittsburgh, Pa., were discussed at the luncheon of the Chamber of Commerce on Dec. 27 at the Fort Pitt Hotel. The speakers were J. D. Callery, president of the Pittsburgh Railways, who suggested a downtown subway as one means of relieving congestion; Attorney Edwin W. Smith of the company, who reviewed the history of the traction ordinances pending in City Council, and Mayor Armstrong. There was a large assemblage of business men at the luncheon.

The question of increased transit facilities for Pittsburgh has been under agitation for more than ten years. Despite the efforts of the Pittsburgh Railways, however, the company has been able to do only such constructive work as lay entirely within its own province under existing franchises and grants. The whole question has again become a matter of public discussion through the renewed effort of the company at this time to secure the passage in its interest of ordinances authorizing track changes, requests for which were made by it originally in 1906.

In 1909 the Railroad Commission of Pennsylvania appointed Emil Swensson, an engineer of Pittsburgh, to examine and report to it on conditions in the city. He made his report on March 26, 1910. Many of the recommendations made by the commission as a result of Mr. Swensson's report were adopted by the company. He suggested among other things that the company replan, reroute and reloop the terminal district. He also said: "The additional extensions, connections, curves, turnouts, switches, etc., should be authorized by the city, or the improvements in the system and in its efficiency cannot be made." Stone & Webster also reported for the commission in 1909 and Bion J. Arnold for Mayor Magee in 1910. It is said that Mr. Arnold recommended every one of the curves for which the company now seeks authorization from the city.

In addressing the Chamber of Commerce Mr. Callery said in part:

"While we should like to have all of the cars pass all of the great retail stores, it is impossible to do so without causing delay and congestion. The operation of the cars thus through the city would not be such a serious matter if it were not for the blockades caused by automobiles, wagons and other vehicles. We have other problems to meet at the congested hour, at the Westinghouse works, East Pittsburgh, where 18,000 to 20,000 working people are dismissed at one time.

"The great mills at Braddock, Homestead, Duquesne and McKeesport dismiss employees at the same hour. Even if we had the cars, it would be difficult to get a force of men to work for the few hours at the peak load. I was wondering whether, with the lately established branch of your association known as the Retail Merchants' Association, it might not be possible for the merchants to agree to open and close their stores at different hours. This might be done by an agreement with each other to alternate monthly the time of opening and closing. I think that it should be the duty of the employers of labor to look after the welfare of their employees, and one of the most important things to my mind would be to see that they are properly transported from their homes to their work.

"Within the past year we have purchased and installed more than 300 double-truck cars, eliminating a like number of single-truck cars; and we have now under order for delivery beginning in April, 1916, 240 double-truck, low-floor, side-entrance cars, which cars we have adopted as standard. This new purchase involves an outlay of more than $1,250,000.

"If the city were disposed to build a comprehensive subway through the congested portion of the city the railways would be inclined to negotiate for the use of this subway on a reasonable basis. To build a subway to any one of the outlying districts would involve such heavy fixed charges that it would not justify either the city or the railways to construct it. It seems to me that unless the business portion of the downtown district is spread over a larger area the principal streets now in use will have to be double-decked, one street to be used for cars and vehicles and the other for pedestrians."

Mr. Smith said in part:

"There is now pending before Council a series of ordinances granting franchises to the Pittsburgh Railways, or its underlying companies. These ordinances are for the main part grants of curves or short pieces of track and unimportant except as bearing upon the matter of enabling the company to reroute some of its cars. There are also certain ordinances for an agreement between the city and the different railways as to the removal of tracks on certain streets under this act. These ordinances were presented to Council on Dec. 17, 1915, and final action has been postponed largely upon the insistence of the representatives of the Chamber of Commerce.

"In connection with these franchises the paramount duty of the city officials and the managers of the railway is to determine what is the greatest good for the greatest number, and how the most people can be taken where they want to go in the quickest and most comfortable way.

"Each of these ordinances has a definite purpose. My wish is to outline to you, if I may, the attitude of the railway in the matter of service, and what I say must be very general.

"A company operating such a complicated system as that of the Pittsburgh Railways cannot and does not expect every part of its system to pay. It can only ask that its whole operation shall be profitable. The company hopes for no added profit from the grant of these franchises. It reaches no more people thereby, who will travel, but it may increase the riding habit to some extent by a more convenient service. The expense to it in doing the work required under these ordinances will be great. The company is anxious that these franchises be granted by the city as speedily as possible. The ordinances have not been rushed. In November of 1909, there was a meeting of the Railroad Commission in this city upon the complaint of the city of Pittsburgh to investigate the street railway situation. At and before that time the company had appreciated the difficulty of handling its cars in the downtown district, and had been desirous of obtaining the grants of additional facilities. Some of these grants had been asked for as early as 1906.

"The company was and is anxious to have these ordinances passed. Is that not quite natural? There has been an election, and after Jan. 1, 1916, there will be three new members who have not taken part in the discussion, and cannot be expected to give their approval without serious consideration. It is extremely unfortunate that the final action was delayed to so near the close of this Council, but it required time to prepare these ordinances to determine, among other things, to which of the underlying companies it was best to have the grant made. Then after the railway had done its part of the work, the drafts of the ordinances had to be prepared by the legal department of the city, submitted to, and be approved by, the Department of Public Works before they reached the Mayor and the members of Council. They were presented in final form on Dec. 17, 1915.

"More drastic terms the company is not in a position to accept. Owing to conditions over which perhaps nobody now has any control, the street railway business in Pittsburgh has not been profitable, and even if it were, these grants of curves and switches are not such as in fairness ought to carry any compensation to the city. The public is to derive as much, if not more, advantage from them than is the railway. They are distinctly for the improvement of the service, which improvement cannot be made without the action of the City Council. They have been recommended, at least in part, by experts who have examined the situation. The general necessity of additional facilities have been recognized by the Railroad Commission. We welcome the opportunity which your invitation to Mr. Callery gave us to present to you our views of the importance to the public of these grants. We do not hesitate to ask your approval of all the ordinances which are now pending."

STRIKERS ENJOINED AT WILKES-BARRE

Striking motormen and conductors, their union officials and leaders and anyone acting in their behalf have been enjoined by a preliminary injunction granted by Judge J. B. Woodward from interfering in any way with the business of the Wilkes-Barre (Pa.) Railway, which is operating its cars. The injunction granted by the court is sweeping in its character and enjoins the striking forces as follows:

"From unlawful picketing; assaulting or intimidating by force or show the company's new employees; from congregating in groups about the company's place of business; from gathering about any place where employees lodge or board for the purpose of enticing them to leave the service; from molesting and annoying by threats, intimidations, menaces or otherwise any passenger who while boarding or alighting from company cars is at or near the boarding or alighting points; from assaulting or maltreating any employee of the company; from interfering with, endangering or destroying or in any manner attempting to injure or destroy any company property."

The court ruled that the matter of allowing $200,000 to the company for damages suffered by the strike was not immediately before the court and could not be adjudicated until a hearing is held. The court said that "the company has a right to carry on its business for which it was chartered without hindrance or damage to its property, and that its employees have a right to work without molestation, and that the public has a right to travel without annoyance."

It was reported from Wilkes-Barre on Jan. 5 that the injunction granted the previous day against striking carmen broke up temporarily at least all attempts at picketing along the lines on which cars are now operated. The Grand Jury has refused to return a true bill against Frank Walker, who was arrested by detectives of the company on a charge of attempting to burn a railway bridge, but William Carr, who was arrested during strike riots, has been indicted. It is alleged he threw a stone into a trolley car.

CHICAGO TRACTION FUND RATE OF INCREASE CUT

Based upon an estimate made by the comptroller of the city of Chicago, the public has been informed of the fact that the rate of increase in the traction fund which is now approaching $20,000,000 will be materially reduced by the increase in wages granted the employees. It is estimated that city's 55 per cent of the net earnings of the surface lines for the year 1915 will approximate $2,017,985. This is more than $550,000 less than the city's share of the net earnings received in April, 1915. The amounts paid into this fund by the surface lines since the passage of the traction ordinance in 1907 are as follows: 1908, $1,556,809; 1909, $1,386,877; 1910, $1,276,252; 1911, $1,705,550; 1912, $1,870,908; 1913, $2,529,992; 1914, $3,002,453; 1915, $2,558,383; 1916, $2,017,985.

It has been estimated that the increase in wages to the employees would amount to approximately $1,000,000 a year, 45 per cent of which is borne by the company and 55 per cent by the city. In addition to the increase in wages, the surface lines income has been reduced by reason of the two-day strike, June 14 and 15, 1915. The general business depression has also been reflected in the company's gross earnings. All of these causes have reduced the city's share of the net earnings to the approximate amount shown. It is also of interest to note that this fund has earned in interest since 1908, $854,286. This together with the principal fund is available for local transportation improvements and will probably be employed in subway construction and elevated railroad extensions, or any other improvements recommended by the Chicago Traction Commission, which is in process of formation at the present time.

EDITORIAL TRIBUTE TO MR. GOODRICH

The Minneapolis *Journal* contained in a recent issue the following editorial on the late Calvin G. Goodrich, president of the Twin City Rapid Transit Company:

"In the death of Calvin G. Goodrich Minneapolis loses another of her strong men who have helped to make the city's greatness what it is. While yet a man in his prime, he was one of that sturdy generation that formed the connecting link between the early settlers and the Minneapolis of to-day.

"He was an active figure in Minneapolis up to the time of his death, having devoted thirty-eight years of his life—practically all his business career—to building up the local transportation system of the Twin Cities, as well as that of Duluth and Superior in more recent years.

"His one lifelong ambition was to build up a system unsurpassed by that of any other city. Nor were his activities confined to his own business. No worthy movement was ever undertaken for the community's good that did not secure his ready and generous support. He believed in the Twin Cities, and esteemed it a privilege to serve them in any way.

"But best of all, Mr. Goodrich was a real friend. He had a big, kind heart that was always responsive to distress or to a friend's needs. With his bubbling humor and his perennial youthfulness, he never ceased to be a boy. Tolerant in his views, forgiving in nature and with a broad and deep charity, 'The Colonel, as he was affectionately called by those who knew him best, never went back on a friend, even if that friend had gone back on him. Once a friend, always a friend. He had an unbounded capacity for friendship.

"Simple and modest in his manner, he was one of those natures that instinctively draw men to them and call forth not only respect and admiration, but real, sincere affection. Perhaps his keen sense of fairness, and his large fund of common sense, coupled with his lively sense of humor and quaint philosophy, were the cause.

"His sympathies were large. He had that great gift of being able to put himself in the other man's place. Thousands of men of all classes have come under him in the years of his connection with the company, and they all attest that not only was he always just to them in every dealing, but more than that he was always generous.

"He built a monument for himself in the great transportation system to which he gave his life, but better than that, with his engaging personality he still lives in the hearts of those hundreds of employees and friends who were fortunate enough to know him and to come under his gentle influence."

ANOTHER NEW YORK COMMISSIONER RESIGNS

Governor Charles S. Whitman of New York has accepted the resignation of Robert Colgate Wood as Public Service Commissioner for the First District. In a letter presented to Governor Whitman by J. P. Archibald, Commissioner Wood's secretary, Commissioner Wood reviewed the circumstances leading up to his action and tendered the Governor his resignation. The Governor wrote an answer, accepting the resignation, to take effect immediately.

The commissioner asserted that the charges made during the Legislative investigation of the commission were nothing but an attempt to besmirch his good name and were without foundation. Nevertheless, Commissioner Wood said, he felt that because of the attack his usefulness as a member of the commission was impaired, and he therefore tendered his resignation.

The resignation of Commissioner Wood is believed to mean an end to the investigation by the Thompson committee. Edward E. McCall, chairman of the commission, was recently removed by Governor Whitman on charges preferred by the committee. Commissioner George V. S. Williams has resigned to take effect on Jan. 31, and the term of office of J. Sergeant Cram expires on Feb. 1, so there is no other member of the old commission left to investigate.

Mr. Wood was appointed by Governor Martin H. Glynn in May, 1914. Mr. Wood is forty-five years old. He was graduated from Harvard University. After leaving Harvard Mr. Wood engaged in the banking and brokerage business with J. Craig Havemeyer.

PASADENA CONSIDERS MONO-RAIL LINE

The general transportation committee of fifty members which is considering the transportation problems of Pasadena, Cal., met on Dec. 17 to receive the report of a subcommittee on the mono-rail plan for improving interurban service between Pasadena and Los Angeles. The sub-committee announced, according to press reports, that the mono-rail line could be built for $150,000 per mile, or $1,500,000 for the entire line, exclusive of right-of-way, and that a twelve-minute running time between Pasadena and Los Angeles could be maintained. Twenty cars with a capacity of sixty-eight passengers each, to cost $5,200 apiece, would be sufficient to afford five-minute service between the terminals. The committee thought that the cost of operation would be so low that a 5-cent fare would be feasible. Owing to the interest in the question the mono-rail sub-committee of five members was increased by the appointment of six additional members, and Jan. 15 was set as the date of the next meeting for considering the question. It is proposed to install the system of the National Suspended Mono-Rail Company.

In addition to the report of the mono-rail committee, reports on improving the present Pacific Electric Railway service and on the possibility of auto-bus service were presented. Paul Shoup, who represented the Pacific Electric Railway, read a paper which explained in detail the possibilities of changes on this system. He spoke of the possibility of elevating that part of the system in Los Angeles between Aliso Street and the Main Street depot, and of grade separation where the lines cross the Southern Pacific Railroad. With these changes completed he thought a twenty-three-minute running time would be possible.

HYDRO-RADIAL RAILWAY APPROVED AT POLLS

The ratepayers of Toronto, Ont., carried the hydro-electric radial by-law on Jan. 1 by a majority of more than 15,000. Sir Adam Beck stated that if the other municipalities endorsed the scheme as had Toronto and London the Hydro-Electric Power Commission of Ontario would go ahead with the preliminary work. The only expenditure necessary for the present will be for completing surveys, preparing plans, drawing up definite estimates, etc. The commencement of construction will depend upon the duration of the war.

One effect of the Toronto vote will be the resumption of negotiations with the Mackenzie interests for the purchase of the Metropolitan division of the Toronto & York Radial Railway. Sir Adam told the people of North Toronto on Dec. 28 that he would consider approval of the by-law a mandate to open the way for the purchase of this railway by the city. The engineers of the Hydro commission and the Metropolitan company will now attempt to reach an agreement as to the actual value of the road. This will form the purchase basis, since Sir William Mackenzie has offered to sell at cost plus 10 per cent.

The vote in London was small, 2763 voting for and 2087 against. A by-law to expend $100,000 on terminal connections for the newly electrified London & Port Stanley Railway was carried. The ratepayers in Berlin gave the suprisingly large majority of 665 in favor of the by-law despite the small vote polled. The vote in Guelph was 932 for and 306 against. The by-law was carried by a large majority in Mimico. The vote in New Toronto was 175 for and sixteen against the by-law. It was expected that with the results of these places before them the ratepayers in the remaining municipalities betwen Toronto and London would on Jan. 3 endorse the project.

The attempt made by means of injunction proceedings to prevent the submission of the hydro-radial by-law to the people of Toronto on Jan. 1 failed on Dec. 29 when Justice Latchford ruled that irremediable damage would not be done to anybody by the taking of the vote on the by-law. In his summing up, the justice said it was evident the by-law applied to the whole city. He did not think that any elector would be misled. Besides, the petitioner had the right to move to quash the by-law if it carried.

The second injunction application against the by-law, that in which the township of Etobicoke was respondent, was allowed. In this case, because of some confusion in certain by-laws whereby property in North Toronto was described as assessable in Etobicoke, the injunction to restrain the latter township from submitting the by-law to the ratepayers was granted by Justice Latchford. It was practically a printer's error which brought this remarkable situation about, as one schedule of the by-laws of Etobicoke and New Toronto was transposed. The judgment does not preclude the matter being put before the electors of Etobicoke at a future date.

CONSTRUCTION OF CLEVELAND BRIDGE APPROACHES DELAYED

Although it had been decided at committee meetings to put through the City Council of Cleveland, Ohio, at its meeting on Dec. 27 an ordinance authorizing the then present director of public service to enter into an agreement with the Cuyahoga County Commissioners for the construction of subway approaches to the new high-level bridge across the Cuyahoga River, the measure was held up because of fear of protests from the people. Public meetings will now be held at which the subject will be discussed. The first of these meetings was slated for the evening of Dec. 30. The commissioners are ready to proceed with the construction of the approaches. Further consideration of the subject will delay the work. An attempt will be made to have the ordinance ready for a vote at the next meeting. Unless an emergency clause is attached, however, a referendum vote may be called on it.

CLOSE OF PAN-AMERICAN SCIENTIFIC CONGRESS

The second Pan-American Scientific Congress came to an end in Washington, Jan. 8, after sessions which have lasted two weeks and which were participated in by delegates officially sent to Washington by the governments of twenty American republics in addition to those of the United States. The first congress was held in Santiago, Chile, in 1908, and the second one was held in Washington because of the changed conditions brought about by the war in Europe and the desire thus caused for closer co-operation between the American republics which was given its first official impetus at the Pan-American Financial Conference held in Washington last May.

While many of the newspapers of the country in their reports of the proceedings of the second Pan-American Scientific Congress have paid principal attention to the political aspect of the congress, many questions of scientific interest were taken up by the delegates to the congress, in engineering, electrical, metallurgical, chemical and transportation fields.

Conversion of Canadian Line Completed.—Operation by electricity has been begun by the Schomberg & Aurora Railway on its line extending from near Bond Lake, Ont., to Schomberg, 14.4 miles, hitherto operated by steam.

Freight Line Proposed as Adjunct to Cincinnati Rapid Transit Belt.—Charles R. Hebble, industrial manager of the Cincinnati Chamber of Commerce, has suggested that the Rapid Transit Commission consider the construction of a belt line for railroad freight in connection with the passenger entrance for interurban cars.

Mysterious Disappearance.—It was reported in the daily papers early in the week ended Jan. 8 that W. R. W. Griffin, who resided at East Liverpool, Ohio, as receiver of the Tri-State Railway & Electric Company, had mysteriously disappeared from one of the steamers of the New England Steamship Company during the trip to Fall River on the night of Jan. 1. Up to the day of going to press no further light had been thrown on the apparent mystery.

Fort Smith Bridge Contract Signed.—The Fort Smith Light & Traction Company, Fort Smith, Ark., and the Board of Bridge Commissioners have entered into an agreement covering the use of the bridge across the Arkansas River between Fort Smith and Van Buren, by the company's cars. The contract is subject to ratification by the voters at an election to be held on Feb. 8. Cars are being operated across the bridge under an interim agreement.

Discussion of Detroit Extensions on Jan. 18.—The Street Railway Commission of Detroit, Mich., will meet representatives of the Detroit United Railway on Jan. 18 to discuss the matter of extensions and rerouteing of a number of existing lines. Following this meeting the commission will make recommendations to the Common Council covering the betterments to the traffic situation upon which its members agree. The commission has elected James Wilkie as chairman for the coming year.

Bay State Street Railway Carhouse Burned.—The Bass Avenue carhouse of the Bay State Street Railway, at Gloucester, Mass., was burned on the night of Jan. 4. Three horses, ten single-truck open cars and other equipment are reported as destroyed. The first horse car ever run on Cape Ann was among the cars burned. The carhouse was a wooden structure, and according to C. F. Bancroft, superintendent of motive power and machinery, will not be rebuilt. A rough estimate of the loss is $50,000.

Curtailing the Philadelphia Loan.—According to the Philadelphia *Ledger* of Jan. 6, it was decided in a conference between the Mayor and other officers of the city on Jan. 5 to prepare a new and smaller loan bill to replace the $95,000,000 bill which was killed some time ago. The new loan bill will not appear in Councils until after Feb. 1. It is not believed that it will provide for any but the Broad Street subway and Frankford elevated parts of the Taylor rapid transit plans. Other portions of the plans are to be "considered later." The resignation of A. Merritt Taylor as director of city transit is referred to elsewhere in this issue.

Boston Elevated Vice-Presidents Receive Equal Rank.—By vote of the board of directors of the Boston (Mass.) Elevated Railway, the offices of the vice-president and second vice-president were abolished on Jan. 1, and one or more vice-presidents were authorized. Charles S. Sergeant, who has held the title of vice-president for some years, has been named as vice-president in charge of the bureau of elevated and subway construction, and Matthew C. Brush, formerly second vice-president, has been elected vice-president in charge of the bureau of transportation. In general, the duties of each official remain the same, but by the change both are established on the same executive plane, and the directors' vote makes the executive organization more flexible.

Southwest Missouri Annual Dinner.—The annual dinner of the employees of the Southwest Missouri Railroad, held recently at the club rooms of the employees' organization at Webb City, was addressed by J. R. Harrigan, general manager of the Kansas City, Clay County & St. Joseph Railway, who told of his experiences while handling electric lines in other places, notably Eau Clair, Wis., and Des Moines, Iowa. The men were particularly interested in his methods of overcoming operating obstacles in Wisconsin, and in the outcome of a delicate and serious labor situation in Des Moines. F. J. Munagle, editor of the *Electric Railway Trainman*, Kansas City, spoke on the advantages of social and efficiency organizations among the trainmen. Allen McReynolds, an attorney of Carthage, presided.

Cincinnati Traction Company Settles Claim of City.—On Dec. 30 attorneys for the Cincinnati (Ohio) Traction Company consented in Common Pleas Court to a judgment in favor of the city of Cincinnati for $12,500, which represents 6 per cent of a balance of 2 cents on each fare collected on the Millcreek Valley route between Jan. 1, 1911, and June 1, 1915. The company receives only 3 cents of each 5-cent fare on lines operated over its track which are not the property of the Cincinnati Traction Company. It had claimed that its contract with the city calls for 6 per cent on its gross receipts and not on this balance of 2 cents on each fare which it does not receive. It seems that a suit carried up some time ago indicates that the company must pay on this portion of the fare, however, and the company decided not to carry the litigation further.

Chicago Again Studies Electrification.—At a recent meeting of the railway terminals committee of the City Council of Chicago, Ill., the Railway Terminals Commission, composed of members of the Council and outside experts, was directed to make another report on the electrification of the steam railroads within the corporate limits of the city. In connection with this investigation, the recent report of the smoke abatement and terminal electrification committee of the Chicago Association of Commerce was also referred to the commission for study and report. At this meeting Charles L. Dering, past-president of the Chicago Association of Commerce; Harry A. Wheeler and Harrison B. Riley, members of the smoke abatement committee, urged the co-operation of the city to bring about a gradual abatement of the smoke nuisance.

Clay County Road Increases Wages.—J. R. Harrigan, general manager of the Kansas City, Clay County & St. Joseph Railway, simultaneously with the distribution of the usual Christmas gifts to employees, announced a special gift in the form of an increase of wages to trainmen, effective on Jan. 1. Heretofore the schedule has been 25 cents an hour for the first six months, 26 cents the second six months, and 27 cents thereafter. The new scale is 26 cents the first six months, 26½ cents the second six months, 27 cents the second year, 28 cents the third year, 28½ cents thereafter. Mr. Harrigan announced that the fine and loyal spirit displayed by the trainmen and their response to the suggestions and plans of the company for improving service and preventing delays and accidents were important factors in making the advance possible. The entire personnel of the road received this Christmas, as previously, baskets containing Christmas dinners.

New Michigan Railway Operating Organization.—J. F. Collins, vice-president and general manager of the Michigan Railway, Jackson, Mich., following the consummation of the leases whereby this company took over the operation of some 550 miles of electric road in Michigan, announced its new operating organization. The new appointments became effective on Jan. 1. They include the following: C. E. Morgan, general superintendent; F. W. Brown, traffic manager; G. B. Hunt, general passenger and freight agent; J. H. Weldon, chief of the tariff bureau; H. D. Sanderson, chief engineer; R. C. Taylor, superintendent of equipment; G. B. Ross, purchasing agent; F. W. Haak, electrical superintendent; F. M. Farley, general roadmaster; A. J. Bray, auditor; F. N. Aldrich, auditor of disbursements; J. W. Slater, auditor of receipts; O. H. Degener, auditor of freight accounts and car accountant; H. D. Swayze, general superintendent and traffic manager, Kalamazoo, Lake Shore & Chicago Railway; C. A. Floyd, superintendent Northwestern and Western divisions; C. H. Smith, superintendent Northeastern division; A. E. Green, superintendent Kalamazoo city lines; C. L. McMahan, superintendent Battle Creek city lines; D. McLaughlin, superintendent Jackson city lines; W. E. Maloy, superintendent Lansing city lines, and J. A. Rosenberger, superintendent Owosso and Corunna city lines.

Status of Rapid Transit Contracts in New York.—The Public Service Commission for the First District of New York expects to complete the award of construction contracts on city-owned lines of the dual system during the coming year. At the present time contracts have been awarded for seventy-two out of eighty-nine contract sections into which the work is divided, leaving only seventeen yet to be advertised. The commission also announces that the third tracks on the elevated lines in Manhattan and The Bronx will be opened for traffic early in the new year. It also plans to place in operation during the year the new White Plains Road extension of the Lenox Avenue branch of the existing subway, the new elevated railroads in Queens Borough leading to Astoria and Corona, with connections to Manhattan by the Second Avenue elevated railroad, and the Queensboro Subway (Steinway Tunnel). This winter the new rapid transit work will reach high water mark. On Dec. 1 the commission had completed or under contract construction work on the new lines to be owned by the city of New York aggregating $167,606,989. In addition, the Interborough Rapid Transit Company and the New York Municipal Railway Corporation, the two operating companies which entered into the dual system agreements with the city, had under way or completed construction work on third tracking and extensions of existing elevated railroads aggregating about $26,000,000, making the total contracts to date upwards of $193,000,000.

PROGRAM OF ASSOCIATION MEETING

Western Society of Engineers

The forty-sixth annual meeting and dinner of the Western Society of Engineers will be held at the Hotel Sherman, Chicago, Ill., on Wednesday evening, Jan. 12, at 6.30 o'clock. The principal speaker will be Samuel Insull, president of the Commonwealth Edison Company, Chicago.

Financial and Corporate

FORECAST FOR 1916

Mr. Moody Thinks Country Is Entering Larger Sphere of Activity—Does Not Anticipate Tight Money and Scarcity of Investment Capital After War

According to the well-known financial writer, John Moody, the year 1915 has shown a steady strengthening of the fundamental position of United States business, and, quite regardless of the final outcome of the European conflict, the United States is entering a distinctly new and vastly larger sphere in its relations with the civilized world. How far this tendency will go forward depends to large extent, of course, on the length of the war. A prompt ending of the war would naturally make a change in this prediction, but every indication worth while points to a continuance of the conflict for at least a year to come.

In Mr. Moody's opinion, it is perhaps hazardous to make predictions, except in a broad way, as to what will actually occur after the war is over. Yet, while there is no doubt a great deal of truth in the contention that certain lines of enterprise will suffer, those who anticipate tight money and a scarcity of investment capital in this country after the war will be fooled. Mr. Moody believes, as he did a year ago, that the demand for capital will not increase (in the aggregate) in Europe after the war, but will decline absolutely far more than will the supply. For this reason interest rates will more likely fall to a low level and remain there for a long time than rise or even hold at the relatively high levels existing during the actual hostilities while the governments are floating their big loans.

Barring the special demand for certain types of commodities brought about by the disturbed commercial relations existing during the war, there will be a downward movement in world commodity prices for some time after hostilities are over. The "cost of living," which has been steadily rising the world over for a decade or more, is sure to decline sharply. Falling prices for goods mean increased purchasing power for bond incomes, and therefore bond values will tend to rise. The very decrease in per capita consumption, Mr. Moody asserts, will sharply reduce all demand for new capital and thus cause interest rates to fall. With money cheap it pays better to buy bonds than to loan money, and this buying will tend to maintain and raise bond prices. Furthermore, with a good and sustained market for long-term, low interest-bearing bonds, corporations will cease the issue of high interest-bearing convertibles, debentures or notes. The elimination of these will still further widen the markets for permanent issues, and also open the markets more freely for first-class, dividend-paying stocks.

BOND MARKET WIDE OPEN

The outlook for the bond market at the beginning of 1916 is far more cheering than it was at this time last year. The public is now buying bonds in a fashion that proves confidence to be the watchword. In fact, for the first time in years the bond market has far outdistanced the stock market in activity and breadth, and buyers are found in every quarter and of every character. It is, of course, the period when buying is particularly high on account of the investment of interest and profits now secured, but the improvement has been too sustained and too voluminous for other basic reasons not to be involved. The stimulus of foreign business, the reaction from the reverses of last year, the improved commercial and industrial situation all play their part in the present investment activity. In the face of such conditions, it seems certain that public utilities, offering as they do in most happy combination the various advantages that are sought by investors, are proving and will continue even more so to prove attractive investment propositions. Consequently public utility financing through long-term obligations rather than through short-term securities is quite likely to be in greater evidence from now on.

ANNUAL REPORT

Kentucky Securities Corporation

The combined comparative statement of income, profit and loss of the Kentucky Traction & Terminal Company and the Lexington Utilities Company (the operating companies owned by the Kentucky Securities Corporation), exclusive of inter-company charges, for the years ended June 30, 1914 and 1915, follows:

	1915	1914
Operating revenue	$811,628	$782,271
Operating expenses	432,402	412,509
Operating income	$379,226	$369,762
Miscellaneous income	28,288	32,022
Gross income	$407,514	$401,784
Fixed charges, etc.	237,230	245,184
Surplus for dividends, etc.	$170,284	$156,600

While the railway gross earnings during the last fiscal year reflected the marked slowing down of business in all communities served, the number of passengers carried did not decrease sufficiently to allow the company to reduce the service. The present indications, however, are that the railway department receipts should show gains upon business conditions becoming normal. The appropriations for maintenance on the railway lines were equivalent to 16.7 per cent of the gross earnings, in comparison with 15.6 per cent in 1914. There has been an unusually large amount of repaving in the city of Lexington, and the city main lines have been for the most part entirely rebuilt.

During the year there was no change in the main line mileage of the system, which consists of 24.2 miles of city track and 71.3 miles of interurban track. The companies, however, spent $67,519 on additions and betterments. These expenditures were in accordance with the construction program as planned early in the year, and no new work was either delayed or deferred. The large sums spent in the preceding three years placed the entire property in such physical condition, that in 1915, and in the future, the capital outlays were and can be restricted to merely providing for the normal growth of the business, or any further extensions of service desired.

In its annual report the management calls attention to the fact that since the formation of the company the financial policy has been to raise capital only by means of the sale of stock or of long-term bonds, and, by adhering to this policy, the properties have not been embarassed by early maturities and the difficulties of refunding at a time of unsettled financial conditions. There has been a material increase in the local Kentucky investment in the properties, and the management is much gratified that local capital is looking with increasing favor on their securities.

CURRENT KEY ROUTE REVENUES

President Weeks Shows Relationship of Exposition Business and Jitney Competition to Recent Reduction in Shop Working Time

G. K. Weeks, president San Francisco-Oakland Terminal Railways, Oakland, Cal., in reply to inquiries regarding the recent reduction in working time at the shops of the company, has issued a statement showing that the passenger revenue on the Key division for the eleven months ended Nov. 30, 1915, amounted to $1,374,860, as compared to $1,121,013 for the same period in 1914. This increase of $253,946.69 is attributed almost entirely to Exposition business. The "direct ferry" contributed $169,688, and the dates of increase in the Market Street service indicate that the Exposition was responsible for this gain also.

As compared with this increase of the Key division, the passenger receipts of the traction division for the eleven months of 1915 amounted to $2,606,210, a loss of $256,793 from the returns of the same period in 1914. This appears to be caused entirely by jitney competition. In fact the traction lines which were free from jitney competition showed a substantial gain as compared with 1914, indicating that the loss from the jitneys was really greater than the net loss in traction division revenue shown.

Continuing, Mr. Weeks says:

"What happened this year was that we used the extra revenue from Exposition travel in maintaining our operations on a normal basis. Every dollar that we received was spent on the property. It does not require an expert to figure that with the Exposition business at an end, if the traction division earnings for 1916 continue at the low ebb shown for 1915, we shall have $245,000 less to spend next year than was spent during 1915. This is what has made necessary a reduction of time in the shops, much to our regret.

"We had prepared complete plans and specifications for a new type of low-step, center-entrance car designed primarily for Key division service on Twelfth Street, as well as for a new type of modern P. A. Y. E. traction division car designed specially for operation in the East Bay cities. It has been the desire of the directors to begin the construction of these cars in our own shops, where we have suffficient facilities to permit the building of three cars at a time, thus materially increasing our force and joining in the movement to encourage home industry. But we have been forced to decrease rather than increase expenditures at our shops until such time as the receipts of our traction division are restored to a normal level.

"On Dec. 12, 1914, we had 211 men in our shop force, which was increased to 255 by Jan. 16. We have now reduced this to 173 men and have been forced to cut 4½ hours a week off the working time. Our track force on Dec. 12, 1914, stood at 319 men, and it was built up to 353 men on Jan. 16, 1915. We have now reduced this force from 299 men on Dec. 12 to 199 men."

COMMISSION APPROVES KANSAS CITY PLAN

Plan of Reorganization for Kansas City Railway & Light Company, as Outlined by Judge Hook, Is Accepted and Commended

The Missouri Public Service Commission on Dec. 29 approved the new franchise ordinance in Kansas City, Mo., and the plans for the reorganization of the Kansas City Railway & Light Company. The commission fixed the valuation of the railway property as of May 31, 1913, at a total amount of $28,000,000. The necessity for the issuance of certificates to cover $3,500,000 for making immediate physical additions to the property and paying off outstanding judgments also was considered by the commission, which intimates that it will consent to a supplementary issue of certificates to meet these requirements.

By the decree the electric light company is effectually separated from the railway company and henceforth they will be separate corporations. The heating company, which has been a part of the street railway and electric light properties, is combined with the lighting company. The fair value and the amount of capitalization for the new heating and lighting corporation will be determined in a supplemental order.

The commission is a unit that the franchise is a public benefit, and one demanded for public convenience. Not a single word or provision is criticised. Instead, the plan of reorganization as outlined by Judge Hook is especially approved and commended. On this point the commission says:

"The franchise ordinance and plan of reorganization evidence great labor and apparently mutual concessions. The numerous documents presented to the commission plainly show that constant publicity and free discussion marked these proceedings step by step. The unification of the entire street railway system, the proposal to reduce the capital stock, the separation of the railway and light properties and the discarding of a holding company, all appeal to the commission as most commendable features of this reorganization."

Referring to the obstructive tactics of certain persons to destroy the franchise, the commission says:

"There is no ground whatever to justify the commission in seeking to give effect to the sentiments or desires of those who now oppose the granting of the certificate."

Frank Hagerman, attorney for the receivers of the street railway, has issued the following statement:

"The opinion of the commission sustains every contention of the receivers and the city. It unconditionally declares that it cannot modify or change the franchise, absolutely approves Judge Hook's plans of reorganization, grants the certificate of necessity, orders the light and street railway properties separated and a new light company formed, and says that the value is ample to warrant the issue now of $28,000,000 in bonds and stock, plus $3,500,000 hereafter.

"Under Judge Hook's plans, this is sufficient to cover all bonds and leave a substantial surplus for stock, which goes to trustees and is entitled to earn all the franchise permits. The amount of this stock is in fact immaterial, because under the plan the stockholders get no stock, but only beneficial certificates without par value, giving them their proportionate part of the earnings. It remains for Judge Hook only to set a date for final hearing and enter a decree selling the property."

American Railways, Philadelphia, Pa.—As a result of the acquisition of control of the American Railways by the United Properties Company, Van Horn Ely, John Gribbel, Henry P. Scott, John J. Henderson, Alexander C. Robinson and Thomas W. Wilson, representing the new control, have been elected to the American Railways board. Other members, who remain on the board, are J. J. Sullivan, E. Clarence Miller and Charles R. Miller. Previous items describing the amalgamation of the National Properties Company and the American Railways were published in the ELECTRIC RAILWAY JOURNAL of Nov. 6 and 27.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—The Arkansas Valley Railway, Light & Power Company has sold to H. M. Byllesby & Company $450,000 of 6 per cent notes, dated Jan. 3, 1916, and due on July 1, 1919. The notes will be offered at 98½, yielding 6.5 per cent. In addition to these notes the company recently sold $240,000 of 7 per cent cumulative preferred stock. Proceeds of the new securities will retire all the floating indebtedness of the company and provide funds for extensions and additions to the generating and transmitting equipment of the company.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—It is reported that five accepted verdicts aggregating more than $16,000 were recently returned by Judge Cushing's jury in the Common Pleas Court against the Cincinnati, Dayton & Toledo Traction Company and in favor of the owners of debenture bonds issued by the Dayton Traction Company in March, 1898. The bonds (total issue $50,000) matured on March 1, 1913. The owners of the bonds claimed that the Cincinnati, Dayton & Toledo Traction Company had assumed them and was responsible for their payment. Payment was refused, however, and suits were filed by five of the bondholders. A previous reference to a similar settlement was published in the ELECTRIC RAILWAY JOURNAL of Aug. 14, 1915.

Cities Service Company, New York, N. Y.—At a meeting of the directors of the Cities Service Company, George A. Archer, president Commercial National Bank, Columbus, Ohio, was elected a director to fill a vacancy.

Duluth-Superior Traction Company, Duluth, Minn.—The Duluth-Superior Traction Company has passed the semi-annual dividend of 1 per cent on its common stock, due on Jan. 1. The company paid quarterly dividends of 1 per cent on this stock up to April 1, 1915, when the quarterly dividend was passed, and a semi-annual dividend of 1 per cent payable on July 1 was declared. In a statement regarding the passing of the common dividend the directors say that the company has not yet recovered from the effects of the strike in 1912, and also that the earnings in the current year have fallen off because of business depression and jitney competition. Business conditions have now greatly improved, however, and earnings are now showing an increase. Ordinances have been passed regulating the jitneys, and it is believed that when these ordinances, now held up by court proceedings, are declared valid, the jitney competition will come to an end.

Forest Grove (Ore.) Transportation Company.—Interests controlling the Forest Grove Transportation Company, a 2.7-mile line connecting Forest Grove and South Forest Grove with the Southern Pacific depot, have sold their stock, and the company has now gone out of business. No receiver was appointed.

Fresno (Cal.) Interurban Railway.—The California Railroad Commission on Dec. 31 authorized the Fresno Interurban Railway to issue 2125 shares of common stock of a total par value of $212,500 in lieu of a like amount of stock authorized on Nov. 23, 1914; also $350,000 of first mortgage 6 per cent twenty-five-year bonds in lieu of a like amount previously authorized, and certificates of indebtedness for $350,000.

Interborough Rapid Transit Company, New York, N. Y.—Guy E. Tripp, A. D. Juilliard and A. J. Hemphill have been elected directors of the Interborough Rapid Transit Company and the Interborough Consolidated Corporation. Two of these filled vacancies caused by the deaths of E. R. Bacon and Andrew Freedman.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—Motion for the dismissal of the receivers of Kansas City, Clay County & St. Joseph Railway was made in Judge Bird's division of the Circuit Court by Frank Hagerman on Dec. 24. I. D. Hook and J. G. L. Harvey were appointed on July 14, after the Interstate Railway had obtained a verdict of $1,500,000 damages for the taking of right-of-way on which it held options. The motion sets forth that the receivers must be dismissed since appeal bond has been perfected in the Supreme Court.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.—Brown Brothers & Company, New York, and Alexander Brown & Sons, Baltimore, are offering at 91 and interest, to yield 5.65 per cent, $2,000,000 of first and refunding mortgage 5 per cent gold bonds of the Newport News & Hampton Railway, Gas & Electric Company, dated Feb. 2, 1914, and due on Jan. 1, 1944. These bonds, which are part of an authorized issue of $7,500,000, are redeemable as a whole or in part at 105 and interest on any interest day. The company was formed in 1914 by a consolidation of all the street and interurban railway, gas and electric companies in and around Newport News, Hampton, Phoebus and Fortress Monroe, and the bonds are substantially a first and only mortgage on the gas properties and on the principal street railways and the electric light and power system in Newport News. They are a general mortgage on the remaining electric railway and lighting properties. It is said that as a result of improvements and increased business, the gross earnings have increased more than 20 per cent and net 47 per cent in the last three years.

New York (N. Y.) Railways.—The New York Stock Exchange has listed $1,772,000 of additional first real estate and refunding mortgage thirty-year 4 per cent bonds of the New York Railways, due in 1942, with authority to add $228,000 of this issue on official notice of exchange for outstanding fractional scrip. The company has purchased to date at $350 per share 5075 shares of an outstanding issue of 6000 shares of the Twenty-third Street Railway and issued therefor these $1,772,000 of bonds and $4,250 face value of fractional scrip. This stock has been deposited with the mortgage trustee.

Nova Scotia Tramways & Power Company, Halifax, N. S.—The Board of Public Utilities of Nova Scotia recently denied the application of the Nova Scotia Tramways & Power Company to increase its capital stock from $6,000,000 to $10,000,000 on the ground that no organization had been effected, and it was therefore impossible to secure a vote of shareholders authorizing the increase, as required by the charter. The increase was desired to finance the acquirement of the Halifax Electric Tramway, Ltd., and other properties, as stated in the Electric Railway Journal of Aug. 14, 1915.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The California Railroad Commission has issued an order revoking its previous order by which the Oakland, Antioch & Eastern Railway was authorized to issue notes to certain stockholders who have made advances amounting to $90,911. The previous order was mentioned in the Electric Railway Journal of Jan. 1. It is reported that the directors of the company have unanimously agreed that the plan of refinancing, first approved by security holders and later authorized by the commission, should be carried out. This plan was described in the issue of Dec. 4. Howard Smith and three other holders of first mortgage bonds are said to have filed a complaint in a foreclosure suit and asked for a receiver. This action is said to be unfortunate and ill-advised on account of the progress of the reorganization plan and the recent increased earnings shown by the system.

Philadelphia Company, Pittsburgh, Pa.—The stockholders of the Philadelphia Company on Dec. 28 voted to increase the capital stock from $69,433,400 to $71,933,400, the new stock all to be common. The proposal of this increase, the purpose of which is to provide funds for paying off floating indebtedness, was noted in Electric Railway Journal of Nov. 6.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has completed, within the six months' grace after maturity, the payment of all coupons of the bonds of its constituent companies falling due last July. The banks which then offered to purchase the coupons from the holders have been paid their advances in full. The same thirteen banks have again offered to purchase the coupons due in January, 1916, and the company will repay the banks from time to time from earnings for the purchased coupons.

Sunbury & Susquehanna Railway, Sunbury, Pa.—Judge Cummings on Jan. 5 filed an order for foreclosure sale of the property of the Sunbury & Susquehanna Railway by Frederick J. Byrod and Charles H. Grant, receivers. The line runs from Selinsgrove to Northumberland, a distance of 8 miles. A previous reference to an attempted foreclosure sale was published in the Electric Railway Journal of Jan. 2, 1915. The receivers were appointed in 1913.

United Railroads of San Francisco, San Francisco, Cal.—An ordinance authorizing an offer to be made by the city officials to the United Railroads of San Francisco for the company's Sloat Boulevard, Twentieth Avenue and Parkside lines was recently approved by the public utilities committee of the Board of Supervisors, and will now go to the board. These lines would be connected with the railway which the city is to construct through Twin Peaks tunnel. The committee estimates that the city will have to pay about $500,000 for these lines.

United Railways & Electric Company, Baltimore, Md.—It is reported that H. Crawford Black has resigned as a director of the United Railways & Electric Company.

Winnipeg (Man.) Electric Railway.—William P. Bonbright & Company, New York, are offering at 100 and interest $750,000 of Winnipeg Electric Railway 6 per cent gold notes, dated Jan. 15, 1916, and due on Jan. 15, 1918. These notes are the direct obligation of the Winnipeg Electric Railway and are specifically secured by pledge and deposit with the Central Trust Company, New York, as trustee, of approximately $970,000 of 4½ per cent perpetual consolidated debenture stock secured by trust deed creating a mortgage on all property of the company, subject only to $5,000,000 of underlying bonds.

DIVIDENDS DECLARED

Bay State Street Railway, Boston, Mass., 3 per cent, first preferred.

Boston Suburban Electric Companies, Newtonville, Mass., quarterly, $1, preferred.

Citizens' Traction Company, Oil City, Pa., quarterly, 1½ per cent, preferred.

Dayton & Troy Electric Railway, Dayton, Ohio, quarterly, 1¼ per cent, preferred; 1¼ per cent, common.

Green & Coates Streets Passenger Railway, Philadelphia, Pa., quarterly, $1.50.

Holyoke (Mass.) Street Railway, 3 per cent.

Iowa Railway & Light Company, Cedar Rapids, Iowa, quarterly, 1¾ per cent, preferred.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Ottawa (Ont.) Traction Company, Ltd., quarterly, 1 per cent; bonus, 1 per cent.

Ottumwa Railway & Light Company, Ottumwa, Iowa, quarterly, 1¾ per cent, preferred.

Rome Railway & Electric Company, Rome, Ga., quarterly, 1 per cent.

Thirteenth & Fifteenth Streets Passenger Railway, Philadelphia, Pa., $6.

Western New York & Pennsylvania Traction Company, Olean, N. Y., 3 per cent, first preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '15	$65,711	*$33,353	$32,358	$17,624	$14,734
1 " " '14	64,570	*30,293	34,277	17,484	16,793
12 " " '15	787,035	*395,785	391,250	212,351	178,899
12 " " '14	777,888	*376,192	401,696	209,014	192,682
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.					
1m., Nov., '15	$98,812	*$61,537	$37,275	$29,623	$7,652
1 " " '14	84,896	*55,377	29,519	29,122	397
12 " " '15	1,071,013	*730,036	340,977	357,315	†16,338
12 " " '14	1,096,462	*694,357	402,105	336,185	65,920
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO					
1m., Nov., '15	$31,862	*$15,773	$16,089	$11,096	$4,993
1 " " '14	29,191	*16,447	12,744	10,880	1,864
11 " " '15	373,318	*201,314	172,004	120,938	51,066
11 " " '14	378,612	*202,461	176,151	120,886	55,265
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
1m., Nov., '15	$277,008	*$154,959	$122,049	$41,197	$80,852
1 " " '14	261,656	*150,457	111,199	39,170	72,029
12 " " '15	3,091,422	*1,833,337	1,258,085	475,142	782,943
12 " " '14	3,063,753	*1,903,810	1,159,943	470,308	689,635
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.					
1m., Nov., '15	$1,323,673	*$674,794	$648,879	$403,980	$244,899
1 " " '14	1,185,319	*613,645	571,674	361,227	210,447
12 " " '15	14,317,036	*7,599,095	6,717,941	4,428,639	2,289,302
12 " " '14	14,097,962	*7,685,481	6,412,481	4,185,446	2,227,035
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.					
1m., Nov., '15	$213,206	*$130,086	$63,120	$66,163	$16,957
1 " " '14	196,249	*121,462	74,787	62,385	12,402
12 " " '15	2,615,620	*1,490,833	1,124,787	789,231	335,556
12 " " '14	2,515,657	*1,448,814	1,066,843	759,912	306,931
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.					
1m., Nov., '15	$219,595	*$127,551	$92,044	$62,679	$29,365
1 " " '14	207,713	*122,761	84,952	58,401	26,551
12 " " '15	2,442,300	*1,441,179	1,001,121	765,081	236,040
12 " " '14	2,648,458	*1,650,308	998,150	676,854	321,296
FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.					
1m., Oct., '15	$115,293	$91,448	$23,845	$54,404	†‡$30,181
1 " " '14	148,821	83,706	63,115	54,381	‡8,873
10 " " '15	1,386,303	827 742	558,561	537,909	‡24,703
10 " " '14	1,521,493	880,754	640,739	527,581	‡116,897
GRAND RAPIDS (MICH.) RAILWAY					
1m., Nov., '15	$99,020	*$66,024	$32,996	$14,223	$18,773
1 " " '14	98,208	*68,834	29,374	13,701	15,673
12 " " '15	1,190,353	*823,215	367,138	164,874	202,264
12 " " '14	1,283,116	*837,226	445,890	162,037	283,853
KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.					
1m., Oct., '15	$73,638	$37,355	$36,283	$20,496	‡$16,925
1 " " '14	71,191	37,362	33,829	29,788	‡15,404
4 " " '15	306,027	155,378	150,649	81,610	‡73,173
4 " " '14	304,561	159,385	145,176	78,888	‡72,241
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
1m., Nov., '15	$112,682	*$74,626	$38,056	$35,992	$2,064
1 " " '14	105,143	*70,098	35,045	35,802	†757
11 " " '15	1,263,332	*821,245	442,087	397,108	44,979
11 " " '14	1,317,848	*816,958	500,890	390,840	110,050
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.					
1m., Nov., '15	$57,229	*$40,667	$16,562	$15,950	$603
1 " " '14	49,437	*37,253	12,184	15,670	†3,486
12 " " '15	729,994	*473,190	256 804	189,531	67,273
12 " " '14	677,269	*466,270	210,999	186,121	24,878
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., Nov., '15	$185,260	*$117,567	$67,693	$42,902	$24,791
1 " " '14	184,099	*104,308	79,791	41,899	37,892
12 " " '15	2,136,817	*1,313,008	823 809	498,720	325,089
12 " " '14	2,240,922	*1,363,748	877,174	497,631	379,543
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., Nov., 15	$341,974	*$200,063	$141,911	$54,241	$87,670
1 " " '14	286,732	*186,008	100,724	50,261	50,463
11 " " '15	3,510 934	*2,155,045	1,355,889	575,269	780,620
11 " " '14	3,319,704	*2,040,013	1,379,691	556,365	723,326
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., Nov., '15	$455,165	*$250,683	$204,482	$182 363	$22,119
1 " " '14	494,626	*257,639	236,987	183 066	53,921
12 " " '15	5,542 900	*3,073,832	2,469,068	2 208,504	260,564
12 " " '14	6,366,154	*3,284,272	3,081,882	2,165,187	916,695
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.					
1m., Oct., '15	$473 072	$218 361	$254,711	$143,304	‡$120 709
1 " " '14	446,704	212,315	234,389	133 732	‡107,620
4 " " '15	1,816,634	870 387	946,247	572,979	‡407,939
4 " " '14	1,761,703	846,890	914,813	543,690	‡399,002

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

NO REDUCTION IN SCHOOL FARES

Massachusetts Commission Enunciates a Policy in Refusing to Change Present Blue Hill Arrangement

The Massachusetts Public Service Commission has refused to reduce the fares of school children on the Blue Hill Street Railway below the statutory half-rate, acting upon complaint of the Canton School Committee. The decision enunciates a policy.

On Sept. 22, 1915, the committee asked the board for an opportunity to present orally a request for a change in the existing arrangement of fares for school children on the Blue Hill road. In accordance with this request, a conference was held at Boston on Oct. 5 at which representatives of the company were present. A petition was presented from residents of Ponkapoag, in Canton, protesting against the rate of fare for pupils to and from the Canton high school and asking that a reduction be ordered.

The finding states that the half-fare rates for school children on all the street railways in Massachusetts except the Boston Elevated Railway, are the result of a special act of the Legislature (Chap. 530, Acts of 1908), which provides that the rate of fare for school children shall not exceed one-half the regular fare. The burden so imposed upon the companies is in the nature of special taxation and rests upon an authority possessed by the Legislature but not delegated to the commission, for there is no claim that it costs appreciably less to transport school children than other patrons of the railways. The commission could indirectly reduce the school rates by making such reductions in the regular rates as might be found reasonable, but it would seem that it has no authority to require direct reductions, in the case of school children, below the standard fixed by the general court.

This complaint grew out of the raised schedule of fares adopted by the Blue Hill company pursuant to an order of the board issued on July 31, 1915. Prior to this revision there were three overlapping fare zones on the main line, the unit fare being 6 cents. In place of these three zones the company was allowed to substitute four, the unit fare remaining 6 cents in the zone from Mattapan to the Blue Hill reservation and being reduced to 5 cents in the other three. Before the revision, pupils of the high school residing in any part of Canton could ride from their homes to the school for a single half-fare, or 3 cents. Since the revision, a similar ride, in the case of some of these pupils, covers a portion of two contiguous zones and requires the payment of two half-fares, or 5 cents.

This revision of fares was the result of a petition by the company for an increase in the prevailing unit fare from 6 to 8 cents. For reasons stated in its opinion in the case the commission found that, while the company was entitled to additional revenue, an 8-cent unit fare was open to objections. The only other method of increasing revenue was by a change in the system of fare zones, and a trial of this alternative method was therefore permitted. The board further says:

"Of course, by making changes in the arrangement of the fare zones a different basis for the fixing of the particular rates for school children might be established but the present arrangement was put into effect only after careful consideration, and the commission believes that its success or failure can only be determined fully by actual trial. For that reason, it fixed a trial period of one year, at the end of which time the question of modifications can be taken up in the light of experience gained under the varying conditions of all the seasons."

Since the adoption of the new zone plan various complaints have been made to the commission by patrons of the road, the one under consideration being the most important. The board does not feel, however, that modifications should be attempted before the new system has had a full and fair test In conclusion the finding says:

"It might be added that half-fare rates for school children are a privilege possessed by the people of Massachusetts which other States have not as a rule seen fit to impose by law upon street railways. So far as this commission has been able to ascertain, the only other State which has a similar law is Vermont, although municipalities in other parts of the country have at times made such fares a condition of franchise grants, and companies voluntarily have put such rates into force."

2,468,970 PASSENGERS HANDLED IN A DAY

Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., stated on Dec. 29 that during the holidays of 1915 the company carried the greatest number of passengers ever transported over the entire system in one day. The passenger traffic for Dec. 20 was as follows: Subway division, 1,385,253; Manhattan division, 1,083,717; total, 2,468,970. A statement of the holiday passengers carried this year compared with the corresponding period for 1914 follows:

	Week Ended Dec. 18, 1915	Week Ended Dec. 19, 1914
Subway division	7,800,828	7,593,295
Manhattan division	6,217,298	6,002,433
	14,018,126	13,595,728

	Week Ended Dec. 25, 1915	Week Ended Dec. 26, 1914
Subway division	7,565,314	6,952,403
Manhattan division	6,093,535	5,645,553
	13,658,849	12,597,956

	Dec. 1 to 27, inclusive, 1915	Dec. 2 to 28, inclusive, 1914
Subway division	29,806,662	27,918,770
Manhattan division	23,544,611	22,399,672
	53,351,273	50,318,442

The company operates 85 miles of track on its subway division and 118 miles of track on its elevated division.

TWIN CITY LINES TO ITS PATRONS

The Twin City Rapid Transit Company, Minneapolis, Minn., published in the *Bellman* for Dec. 25, 1915, over the signature of A. W. Warnock, general passenger agent, greetings and a message of good-will to those who ride on its cars. The ad was in red and black, most artistically displayed. In it was reiterated the general policy of the company. It is reproduced in full as a striking illustration of a forceful statement of a company with an unusual record of successful achievement over a long period of years.

"It is the intention of the Twin City Lines to serve the communities they reach in the best possible way by furnishing first class dependable electric car service at all times; smooth tracks, clean, comfortable, well-lighted, ventilated and heated cars, manned by civil-spoken, courteous, considerate employees who shall be watchful of the passenger's safety and comfort first, last and all the time.

"We welcome constructive criticism with an open mind and endeavor to remedy defects in our service whenever they are brought to our attention. We do not wish to impose any arbitrary or unjust regulations upon our patrons, but, on the other hand, we hope they will recognize that it is necessary to adopt some rigid rules, but this is always with the idea of being reasonable and just to both the company and its passengers.

"Our conductors deal with more persons every day than the average man encounters in many weeks. In all weathers and at all hours, they meet every fashion of folk, the well and the sick, the pleasant and disagreeable, the worst and the best. Do they fail sometimes? Very probably. They are only men after all, with their own individual characters. But when they do fail, they have broken the rule, the reasonable rule for which we stand. If a man is unfit, sooner or later he is dismissed from our employ. We keep only the best of them in our service and we want all of them to be efficient in their duties as well as civil and courteous in their manners.

"In the same way that the manager of a large store or hotel does not know how his employees are treating customers or guests unless the employees are reported, so it is with us, although the store or hotel manager has the great advantage over us in usually having all his employees beneath one roof and under his own observation.

"When it is considered that we carry an average of nearly 700,000 passengers every day in the year (a number equivalent to the population of Minneapolis, St. Paul, Stillwater, and the suburbs of these cities), each passenger representing a separate business transaction, and that we operate approximately 1000 cars over 440 miles of track, each car in charge of two men, and far away from close supervision, would it not be surprising if all those men were conducting themselves exactly as we expect them to, and waiting on each of those 700,000 customers as they should be waited upon, and as we desire that they should be served?

"We prize very highly the good-will of the people of the Twin Cities, as it is constantly being shown us, and we wish to assure them, in return, that we will strive harder than ever during the year to come to merit their friendliness and confidence."

SAN DIEGO FARE INCREASE ALLOWED

In the case involving the San Diego & Southeastern Railway, San Diego, Cal., the Railroad Commission of California has ruled that the public itself as well as the public utilities should bear a share of the burden caused by business depression. It was found that in addition to business depression, this company had suffered largely both in freight and passenger revenue as a result of the frost of January, 1913, which reduced the lemon crop and affected the prosperity of the territory served.

The company operates 75.08 miles of main track in San Diego County, 61.71 miles by steam and 13.33 by electricity. The electrically operated part of the system does passenger business almost exclusively, while freight constitutes the larger volume of business on the steam lines. The company showed that the earnings for the fiscal year ended June 30, 1915, were $86,287 less than the operating expenses, and that the increase in rates asked was only sufficient to bring the revenue up to a figure which would cover operating expenses and interest on unfunded debt, without giving any consideration to return upon other capital invested in the property.

In granting the application of the company the Railroad Commission authorized an increase in freight rates which will amount to approximately $14,000 per annum, while the passenger rate increase will bring the company $72,000 per annum. In granting the application the commission has ordered that the one-way passenger fare between Third Street, San Diego, and the city limits shall remain at 5 cents and that the one-way passenger fares to other points on the southern division shall be based upon 2 cents per mile for electric road mileage and 3 cents per mile for steam road mileage beyond the city limits instead of beyond Thirty-first Street.

JITNEY BONDING DIFFICULT IN WASHINGTON

I. M. Howell, Secretary of State of Washington, estimates that approximately half of the genuine jitney bonds have been cancelled. It is thought that by Sept. 1, 1916, through a lack of desire on the part of any bonding company to stand sponsor for their operators, as required by act of the recent Legislature, nearly all of the jitneys will have abandoned service. The Pacific Coast Casualty Company, the only concern undertaking this line of business in Washington, withdrew temporarily from the State last September, because it was unable to meet the requirements of the State insurance code. The company is being reorganized, but it is stated unofficially that when it re-enters the Washington field no more jitney business will be written. Other bonding companies are willing to write jitney bonds only if the owners deposit $2,500 in cash or its equivalent.

Group Insurance for New Bedford Employees.—The Union Street Railway, New Bedford, Mass., has arranged for group insurance for its employees, numbering about 500.

Liberal Use of Sand Urged.—Conductors and motormen of the International Railway, Buffalo, N. Y., are to be held responsible for accidents to passengers caused by snow and ice on the car floor, platform or steps. The men have been instructed to use sand liberally to prevent ice and snow from accumulating.

Warning in Buffalo Against Spitting.—Signs are being displayed in all cars of the International Railway, Buffalo, N. Y., warning passengers against spitting on the floor and platforms of cars and calling attention to the penal code, which provides fine and imprisonment for each offense. Police officers have been ordered to enforce this provision of the law. The health authorities are co-operating.

All Brooklyn Employees to Ride Free.—It has been decided to allow free transportation to all employees in the mechanical, electrical and way and structure departments of the Brooklyn (N. Y.) Rapid Transit Company. This will extend the privilege of free transportation to approximately 2500 men, and when the law is in effect every employee in the company's service will be able, either by means of pass books or badges, to ride free on the company's cars.

Ordinance Forbidding Jitneys on Profitable Route.—The City Council of San Diego, Cal., has passed an ordinance forbidding jitneys to operate on Fifth Street, the main artery of jitney traffic and profit. The clause in the jitney ordinance under which the decision was made allows the refusal of license renewals "when adequate transportation facilities are in operation on any certain street; when traffic would be congested by the granting of the license, or when the safety of the public is at stake."

Jitney Accidents in Newark.—Careless driving is running up the number of accidents to jitneys operating in Newark, N. J. On Christmas day two serious accidents were reported. In one of these an auto speeding against a street car skidded and headed for the Roseville cut of the Lackawanna Railroad. The machine broke through the iron guard rail, but the concrete base in which the fence is anchored acted as a barrier for the rear wheels and prevented the machine from falling into the cut. The victims of these accidents required hospital treatment.

"White-Gloved Squad" Used Again in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., had one of its largest holiday-period records during the week preceding Christmas. The company again installed in the shopping district its "white-glove squad" of about seventy-five men whose sole duties were to assist women and children to board the cars. This service was given for the entire week before Christmas. The company also added to its force of front-end collectors uniformed men who collected fares while standing in the safety zones where the front ends of the cars stop.

Mayor Vetoes Newark Jitney Ordinance.—Mayor Raymond of Newark, N. J., has vetoed the ordinance regulating the operation of jitneys. He has sent his message of disapproval to City Clerk Archibald for submission to the Common Council. It is declared that his objections to the ordinance are those to which he gave voice at the recent public hearing when he declared that he regarded the ordinance as loosely drawn and pointed out certain provisions which he said he considered meaningless or a hardship on the jitney men. The attempt made on Dec. 29 to pass the measure over the Mayor's veto failed.

Parked Automobiles a Menace in Kansas City.—The suggestion of the board of control of the Kansas City (Mo.) Railways that more stringent regulations be established for automobile and vehicle traffic downtown to prevent obstruction of street car traffic has received practically an indorsement from the city police court. Judge Kennedy discharged W. H. Miller, who was charged with obstructing traffic at Twelfth and Grand Streets with his livery cars. The Judge declared that Miller's offense in obstructing the street was no worse than that of private owners, the drivers of delivery cars and taxicabs. The chief of the police and the judge are now planning traffic regulations that will free the business streets of automobiles that park at the curbs.

New Equipment on Los Angeles-San Bernardino Run.—Eighteen of the new interurban cars recently purchased by the Pacific Electric Railway were put in service on the Los Angeles-San Bernardino run on Dec. 18. These cars were equipped at the Los Angeles shops of the Pacific Electric Railway and the remaining six of the twenty-four which comprised the order will be ready for service shortly. The cars weigh 105,000 lb. each, are equipped with four 140-hp. GE-254-A motors, and are expected to make as high as 70 m.p.h. Redlands, which is 66½ miles from Los Angeles, is the terminus of the line on which these cars will be used. Under the present program eight trains a day each way will be operated, the normal time for the run being two hours and fifty-eight minutes.

Chicago Elevated Advertises Improvements.—"Millions Expended for Better Service" is the title under which the Elevated Railroads of Chicago, Ill., announce the completion of a new elevated roadway being built by the Chicago, Milwaukee & St. Paul Railroad, the tracks of which are also used by the Northwestern Elevated Railroad from Wilson Avenue to Howard Street, a distance of 4 miles. This work has been under way for some time. The cost will be about $3,000,000. The advertisement calls attention to the improved service and the safer operation which will result by reason of the elimination of forty-eight street crossings. It states that the style of construction received very careful consideration in order not to mar the attractiveness of the residential district.

B. R. T. Monthly.—The Brooklyn (N. Y.) Rapid Transit Company has begun the publication of the *B. R. T. Monthly*. The first issue of the paper is dated January. The publication will be issued on or about the first of each month. A principal feature of it will be reports of the social and business activities of the company's employees during the month previous. Special articles by officials of the company and heads of departments, bearing upon the business of transportation, will be handled individually. Through these articles *B. R. T. Monthly* readers will be kept in touch with the progress of new construction and informed of important improvements contemplated. The first issue contains sixteen pages. It is introduced with a statement by T. S. Williams, president of the company. No advertising is carried. The paper will be edited by Garrow T. Geer, who has been engaged in newspaper work for ten years and was formerly with the New York *Times*.

Safety Watchword Sounded by Baltimore Company.—Special attention of the readers of *Trolley News*, published by the United Railways & Electric Company, Baltimore, Md., is directed in the issue of Jan. 1 to an outline drawing showing how pedestrians should cross the street. The company says: "It is our purpose to publish drawings of this character from time to time, illustrating safety-first ideas that should be indelibly impressed on the minds of every man, woman and child. We are especially anxious to impress upon the children our safety-first messages, and in this particular you can help by making it a point to show and explain these drawing to them. In other words, appoint yourself a committee of one to look out for the safety of others. Many cross the street intersections diagonally, or cross the street in the middle of the block, placing themselves in great danger every time they do it. Play safe with yourself under all conditions, keeping ever in mind that self-preservation is the first law of nature."

Chicago Safety Commission Appointed.—Mayor William Hale Thompson of Chicago has appointed a citizens' traffic and safety commission composed of thirty-three members representing the City Council, the courts, the police, the newspapers, automobile clubs, teamsters and chauffeurs organizations, park boards, the Chicago Surface Lines and other establishments closely related to the question of traffic safety. It will be the duty of this commission to investigate and report to the City Council, concerning street traffic conditions, routing of street traffic, plans and devices for the control of street traffic, treatment of dangerous crossings and turns in streets, accidents in streets and remedies therefor, and ordinances and rules concerning the regulation of the traffic. The ordinance authorizing the creation of this commission has been passed by the Chicago City Council. H. B. Fleming, chief engineer of the Chicago Surface Lines, and H. L. Brownell, chairman of the public safety committee and safety advisor of the Chicago Surface Lines, have been made members.

New Jersey Accident Faker Convicted.—A middle-aged man known as Harry Peterson, was convicted before Judge Boyle in Camden, N. J., on Jan. 4 of a specific charge of obtaining $30 from the Public Service Railway under false pretences. Sentence was deferred. It was shown that on

Aug. 7, while passing through Gloucester City, Peterson supposedly slipped on the car floor and later complained he had fractured his skull. When the claim agents of the company called on him, the man said he had tripped over a nail in the car floor. This nail was later found in the bottom of his shoe. He agreed to settle for the $30, which was paid him. The company's representatives subsequently found that the man was known as James Ryan, Charles and Joseph Miller and Richard Boschart. It was also gleaned he had made similar claims at Rahway, Worcester, New Haven and Gloversville. In each instance he complained of pains in the head and asserted his skull had been fractured. In the Worcester case he collected $125. The case against Peterson was referred to previously in the ELECTRIC RAILWAY JOURNAL of Nov. 13, 1915, page 1013.

Pensions for Omaha Employees.—The Omaha & Council Bluffs Street Railway, Omaha, Neb., put into effect on Jan. 1 a plan of pensions for all employees whose salaries are less than $125 a month and who comply with the provisions as to age and length of employment. The expense of the pension fund is borne by the company. The pensions will range from a minimum of $20 a month to a maximum of about $30 a month. Compulsory retirement is required at the age of seventy years, but retirement is optional upon the part of the company after twenty years of continuous service, if the employee is permanently disqualified for service. Conductors and motormen eligible to pensions, upon going on the pension rolls, will receive $1 a month for each year of service, the minimum to be $20 and the maximum $30 a month. All other employees upon being pensioned will receive 1¼ per cent of their annual wage, multiplied by the number of years of continuous service, the minimum amount to be $40 and the maximum $500 per annum. If an employee desires, he may retire at or after the age of sixty-five, provided he has been employed continuously with the company for twenty years.

Co-operating to Make Suburban Day a Success.—The Louisville & Interurban Railway, Louisville, Ky., is co-operating with two of the Louisville papers in endeavoring to make "Suburban Day" a shopping institution in Louisville. Ten or more of the leading merchants of the city are working with the two papers and the attempt is being made to set aside Thursday of each week as the day on which the merchants will undertake to give special values to the residents of the country surrounding Louisville. Suburbanites will be identified by buttons supplied when they register at the offices of the newspapers. The Retail Merchants' Association of Louisville pays railroad fares to and from Louisville to those whose purchases reach a stated figure. Some of the merchants who are participating in the plan believe that this "Suburban Day" plan will ultimately take the place of the fare-refunding plan. The Louisville & Interurban Railway carries many of those who benefit by the "Suburban Day" bargains and in connection with the special advertising section, prints a schedule of its charges for delivering package freights to stations along its lines.

Toronto Overcrowding Case Before Highest Court.—The Toronto (Ont.) Railway has received word through its solicitors that the Privy Council has granted leave to appeal the decision of the Ontario Appellate Court upholding the decision of Justice Riddell on the overcrowding case. The company was indicted in 1911 and the case was tried in the Assizes before Justice Riddell and a jury. The company was found guilty. The application for a stated case was granted, but before anything was done the company was again indicted early in 1915 by order of Justice Latchford. When the case came to trial before Chief Justice Falconbridge the company was again found guilty of the charge of overcrowding and another application for a stated case was granted. Argument on the first stated case took place before the Appellate Division in the fall of 1915, and the conviction before Justice Riddell was sustained. Counsel for the company decided that a point of law was involved on which the case could be carried to the Privy Council. Petition for leave to appeal was presented by the company's agents in London, England, and this has now been granted. The Toronto Railway is thus granted a year within which it may prepare its case for submission to the highest court in the empire.

Personal Mention

Mr. Robert Colgate Wood has resigned as a member of the Public Service Commission for the First District of New York. Mr. Wood was appointed to the commission by Governor Martin H. Glynn in 1914.

Mr. Edwin T. McMurray, San Francisco, who has been secretary of the Petaluma & Santa Rosa Railway, Petaluma, Cal., has been elected president and a director of the road to succeed the late Elmer M. Van Frank.

Mr. Fielder Sanders, appointed as street railway commissioner by Mayor Harry L. Davis of Cleveland, Ohio, was confirmed by unanimous vote of the City Council on the evening of Jan. 3. Mr. Sanders succeeds Mr. Peter Witt.

Mr. E. H. Maggard, general freight and passenger agent of the Petaluma & Santa Rosa Railway, Petaluma, Cal., has been elected general manager of the company to succeed the late Elmer M. Van Frank, who was president and general manager of the company.

Mr. H. O. Butler, for the last eleven years superintendent of the Grand, Lee and Bellefontaine Divisions of the United Railways, St. Louis, Mo., has been promoted to assistant superintendent of transportation. Mr. Butler has been connected with the company for more than thirty years.

Mr. A. Merritt Taylor has resigned as director of the department of city transit of Philadelphia, Pa. On May 27, 1912, the Mayor of Philadelphia appointed Mr. Taylor transit commissioner to investigate the problems of improved transit. He was later appointed director of the department of city transit. Largely as a result of his work the city has before it a complete plan for transit development. Mr. Taylor is president of the Philadelphia & West Chester Traction Company.

Mr. Manfred Freeman has been elected public utilities commissioner for Lethbridge, Alta., over Mr. Reid, who held the office for the last term. Mr. Freeman is a native of Hamilton, Ont., and has lived in Lethbridge since 1890. He was at different times chief engineer, manager, and secretary of the Lethbridge Waterworks & Electric Light Company during its existence as a private company. As public utilities commissioner he has charge of the Lethbridge Municipal Railway.

Mr. Godfrey Goldmark, a member of the firm of Steele, De Friese & Steele, has been appointed by Chairman Oscar S. Straus of the Public Service Commission of the First District of New York as his private secretary. Mr. Goldmark was born in New York City thirty-four years ago and was graduated from the Cornell Law School in 1902. Upon graduation he went into the office of Judge Steele and in 1903 became a junior partner. He has had very considerable practice, particularly in connection with corporation matters. He collaborated in the preparation of the seventh and eighth editions of "White on Corporations." He is one of the authors of "Non-Stock Corporations" by White and Goldmark.

Mr. George J. Baldwin, president of the Savannah (Ga.) Electric Company, has been elected vice-president of the American International Corporation, New York, N. Y., recently formed to extend and cement the foreign financial and commercial relations of the United States. Mr. Baldwin will in the future spend most of his time in New York, but will not relinquish his connections in Savannah or as president of the Jacksonville (Fla.) Traction Company, Key West (Fla.) Electric Company, Pensacola (Fla.) Electric Company and Tampa (Fla.) Electric Company. It is stated that Mr. Baldwin will have immediate direction of the investigations that will precede affiliations and investments by the American International Corporation. Mr. Charles A. Stone of Stone & Webster, who control the Savannah Electric Company, is president of the American International Corporation.

Mr. Foster Hannaford, son of Mr. J. M. Hannaford, president Northern Pacific Railway, will be the new superintendent of the St. Paul division of the Twin City Lines, to succeed the late Charles H. Rinker. Mr. Hannaford's appointment had been decided upon by President C. G. Goodrich just prior to his death. Mr. Hannaford was born in St. Paul and received his education in the St. Paul public schools. He is also a graduate of the Yale University Sheffield Scientific School. After his graduation, Mr. Hannaford was employed in the Westinghouse shops at East Pittsburgh for two years. A year followed in the Technical University of Karlsruhe, Germany. Returning to America, he was appointed superintendent of substations of the Illinois Traction System, which position he held for one year. He was then appointed chief engineer of the McKinley power house in St. Louis, the largest power plant of the Illinois Traction System. Later he went to Galesburg as operating engineer of the Galesburg Railway, Light & Power Company, and for the past two years has been general superintendent of that property.

Mr. Henry W. Hodge of Boller, Hodge & Baird, engineers, New York, has been named by Governor Charles S. Whitman of New York to succeed Mr. Robert Colgate Wood, resigned, as a member of the Public Service Commission for the First District. Mr. Hodge is an engineer. He started in as one of the field force on surveys of various branch lines of the Chesapeake & Ohio Railroad in West Virginia. Later he became chief engineer of the Union Iron Works, New York City, engaged in steel building construction. In 1895 he served as assistant to Mr. Alfred P. Boller, in charge of bridge design and construction. He became a partner in this firm in 1899, the title of which was Boller & Hodge, afterward Boller, Hodge & Baird. Mr. Hodge is now the senior member of this firm. Mr. Hodge's firm has designed some of the largest bridges and buildings in the country, among others being the Duluth and Superior bridge, the cantilevers across the Monongahela and Ohio Rivers at Pittsburgh and Steubenville for the Wabash Railway, the Municipal Bridge across the Mississippi River for the city of St. Louis, the bridges across the Connecticut River at Hartford, Saybrook, and East Haddam for the State of Connecticut. Mr. Hodge was retained by the Canadian Government as consulting engineer on the new design for the Quebec Bridge. He is a member of the Council of the American Insitute of Consulting Engineers, a director of the American Society of Civil Engineers, a member of the Institution of Civil Engineers of Great Britain, and of the Canadian Society of Civil Engineers. He is also a trustee of Rensselaer Polytechnical Institute, Rensselaer, N. Y.

OBITUARY

Ludwig Talbot Custer, identified with the organization and the financing of several of the companies now included in the system of the Reading Transit & Light Company, Reading, Pa., is dead. Mr. Custer was born in New Holland, Pa., eighty-one years ago. He retired from active business in 1903.

Dwight F. Cameron, at one time president of the South Chicago City Railway, now a part of the Chicago (Ill.) Surface Lines, died in Pittsburgh, Pa., on Jan. 3, 1916. Mr. Cameron was born in Peterboro, N. Y., eighty-one years ago. He practised law in Ottawa, Ill., until 1870, when he went to Chicago. He was later elected an officer of the Second National Bank and was a member of the contracting firm of George H. Norris & Company. Mr. Cameron died at the home of his daughter, Mrs. Williston Fish, wife of the vice-president of the West Penn Traction Company, Pittsburgh.

Otto T. Maier, vice-president and general manager of the New Orleans, Southern & Grand Isle Railroad and Algiers Railway & Light Company, New Orleans, La., died recently from wounds self-inflicted. In addition to being an officer of the two companies mentioned, Mr. Maier was president of the Maier-Watt Realty Company, president of the Burke Electrical Works and had an office in New Orleans, where he dealt in stocks and bonds. Mr. Maier was born in New Orleans on May 27, 1866. At the age of eighteen he entered the employ of the Germania Insurance Company of that city, finally succeeding his father in the presidency. He remained with the Germania company until four years ago, when he became vice-president and general manager of the Algiers Railway & Light Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Vercheres, Chambly & Laprairie Tramways Company, Laprairie, Que.**—This company will ask for a charter to construct a line between Saint Roch de Quebec and Chateauguay and from Laprairie to Chambly, with branches and loop lines to other places in the counties of Chateauguay, Laprairie, Chambly, Vercheres and Richelieu and the right to cross the St. Lawrence River and enter Montreal.

FRANCHISES

Lerna, Ill.—The Decatur, Sullivan & Mattoon Traction Company has asked the Council for a five-year extension of time on its franchise in Lerna.

McCallsburg, Iowa.—The Council has decided to submit to the voters the proposal to grant a franchise to the Iowa Railway & Light Company to erect an electric distribution system in McCallsburg.

Buffalo, N. Y.—The Council of Buffalo has approved the action of the Aldermen in granting a franchise to the International Railway to extend its tracks across Kenmore Avenue preliminary to striking the private right-of-way over which the company will operate a fast passenger and express service to Niagara Falls. The new line is known as the Frontier Electric Railway. The International Railway has received a franchise to construct a line and operate cars on Ohio Street between Illinois Street and Washington Street.

San Angelo, Tex.—The San Angelo Water, Light & Power Company has asked the Council for a street railway franchise in San Angelo. R. J. Irvine, vice-president and general manager.

Bingham Canyon, Utah.—Harry S. Joseph has received a franchise from the Council to construct and operate an electric interurban railway between West Jordan and Bingham Canyon. Under the provisions of the franchise, construction must begin on the line within one year and must be completed within three years. It is understood that the purpose of the franchise is to provide a connection with the Salt Lake & Utah Railroad into Bingham Canyon. [Dec. 4, '15.]

TRACK AND ROADWAY

Birmingham-Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—This company has recently acquired the property of the Tuscaloosa Ice & Light Company.

Fort Smith Light & Traction Company, Fort Smith, Ark.—The Fort Smith-Van Buren Bridge Commission has adopted a resolution awarding the Fort Smith Light & Traction Company a franchise to use the Fort Smith-Van Buren bridge. The contract now goes to the voters of the bridge district for their approval. The board fixed Feb. 8 as the date for this election.

Pacific Electric Railway, Los Angeles, Cal.—Announcement has been made that construction of elevated tracks from the Pacific Electric Building east to San Pedro Street will be begun within the next ninety days. The work of removing the buildings preparatory to the construction of the tracks has been begun.

***Martinez, Cal.**—It is reported that plans are being considered to construct an electric railway to connect Concord and Martinez. Judge Clifford McClellan, San Francisco, is interested.

Municipal Railways, San Francisco, Cal.—Notwithstanding the opposition of the Park Commission, City Engineer O'Shaughnessy has completed plans for a surface line across Golden Gate Park from Tenth Avenue to Fourteenth Avenue. The plans provide for tunnels under the main driveway, but the remainder of the route will extend through an open cut. The city engineer proposes to beautify the line by planting grass and shrubs on either side. Mr. O'Shaughnessy reports that seven-eighths of the residents of the district to be served by this line have indorsed the project.

Chicago & Interurban Traction Company, Chicago, Ill.—A report from this company states that during 1916 it expects to rehabilitate 2½ miles of track in Blue Island, Ill., with 7-in. T-rail on wooden ties, 8 in. of crushed stone ballast and either brick or granite block pavement.

***Atchison, Topeka & Santa Fe Railway, Topeka, Kan.**—It is reported that this company plans to electrify its mountain lines between Raton and Trinidad, and that orders for work will be issued soon.

New Orleans Railway & Light Company, New Orleans, La.—Plans are being made by this company to install a new street lighting system in New Orleans at an estimated cost of $160,000.

United Railways & Electric Company, Baltimore, Md.—This company will construct a 1-mile extension from its York Road line along Regester Avenue to Idlewylde.

Mexico Investment & Construction Company, Mexico, Mo.—This company expects to build 10 miles of new line between Santa Fe and Perry during 1916.

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.—It is reported that interests close to the Lincoln Traction Company have acquired control of this company, and plans are being made to complete the line to Omaha, 50 miles.

Albany Southern Railroad, Albany, N. Y.—Arrangements are being made by this company for the installation of a new lighting system in Rensselaer. The company has submitted a proposal to the city offering to improve the lighting system and to double the present number of lamps at a cost of about $5,000 per year more than the existing contract.

Arbuckle Brothers, Brooklyn, N. Y.—This coffee importing company is considering the construction, subject to the approval of the Public Service Commission, of a connecting freight haulage line, to be known as the Jay Street Connecting Railroad between the foot of Jay Street, where the headquarters of this company are located, and the foot of Fulton Street. Two electric locomotives would probably be needed, although the type of this equipment has not yet been selected. P. H. Grimm is chief engineer.

Buffalo, N. Y.—Former Mayor Laughlin, of Niagara Falls, has leased the Whirlpool Rapids incline railway on the Canadian side of the gorge from the International Railway Company, and proposes to make many improvements before next season.

International Railway, Buffalo, N. Y.—Plans are being made by the Niagara Falls Country Club to request the International Railway to extend its lines from the present terminus at Pine Avenue and Sugar Street out Pine Avenue to the new clubhouse, about 1 mile.

Interborough Rapid Transit Company, New York, N. Y.—In accordance with the dual system contracts the Interborough Rapid Transit Company has made an agreement with the New York Central Railroad for the use of the Putnam division bridge over the Harlem River at Eighth Avenue and 155th Street. At present the Sixth and Ninth Avenue elevated lines terminate on the Manhattan side of the river at this point, where there is a joint station used both by the elevated trains and the steam trains of the Putnam division of the New York Central Railroad operating to Yonkers and other points in Westchester County. Under the dual system arrangement the elevated lines are to be extended across the Putnam bridge and through East 162d Street in the Bronx to a junction with the new Jerome Avenue Rapid Transit Railroad at 162d Street and River Avenue. The Interborough Rapid Transit Company has submitted to the Public Service Commission for the First District of New York for approval the agreement which it proposes to make with the New York Central Railroad for the use of the Putnam bridge. The commission also received a petition from the New York Central Railroad asking permission to discontinue the Putnam division station at 155th Street and Eighth Avenue, and to join the Interborough Rapid Transit Company in the erection and maintenance of a new joint station on the Bronx side of the Harlem River at or near 162d Street. The commission set both matters down for a public hearing to be held on Monday, Jan. 10, 1916, at 10.30 a. m.

Cities Service Company, New York, N. Y.—Plans for improvements and extensions for the coming year on the properties operated by the Cities Service Company, 60 Wall Street, are now being made. Improvements and extensions will be made at St. Joseph, Mo., Elyria and Warren, Ohio, and other cities.

Northern Ohio Traction & Light Company, Akron, Ohio.—Plans are being made by this company to construct an extension of its Canton city car lines to the northeast end mills in the spring.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—This company reports that during the past year it renewed 5 miles of track with concrete foundation, steel ties, 100-lb. T-rail and brick pavements in Oberlin, Elyria, Lorain and Medina.

Scioto Valley Traction Company, Columbus, Ohio.—It is reported that active work will be begun next spring by this company on the construction of an extension from Portsmouth to Chillicothe.

Dayton & Troy Electric Railway, Dayton, Ohio.—During 1916 this company expects to build 1 mile of new track.

Hamilton, Ont.—At a recent meeting held in Hamilton representatives of municipalities interested in the proposed hydro-radials from St. Catharines to Guelph and Hamilton to Lake Erie decided upon a common entrance in the west end of the city, together with a central station in the center of the city. Under the existing agreement with the street railway the city may use the tracks for municipally owned railways. It was decided that a separate freight line should extend through the northern section of the city. The route of the branch from Hamilton to Lake Erie is to be settled by a special committee.

London & Port Stanley Railway, London, Ont.—This company has under construction an extension from Richmond Street to Ridout Street, about 1 mile.

Sarnia (Ont.) Street Railway.—It is reported that this company may be in the market for about 5000 ft. of 60-lb. rail early in the spring.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—It is reported that this company plans to erect a new steel bridge on its line in Stamford Township during this year.

Schomberg & Aurora Railway, Toronto, Ont.—Operation by electricity has been begun by this company on its line extending from near Bond Lake, Ont., to Schomberg, 14.4 miles, hitherto operated by steam.

Toronto (Ont.) Suburban Street Railway.—It is reported that this company's line will be in operation as far as Georgetown, Ont., by February, and throughout the entire length to Guelph by March 1. The line will serve the towns and villages of Islington, Dixie, Cooksville, Meadowvale, Churchill, Huttonville, Norval, Georgetown, Limehouse, Acton, Blue Springs and Eden Mills. The line will be single-track.

Montreal (Que.) Tramways.—It is reported that from April 1 to Oct. 1, 1915, this company spent $500,000 on track laying. Considerable extension work has been done on Notre Dame, Outremont, Point aux Trembles, Montreal East, Verdun and Maisonneuve Streets, the total trackage of the company now being 270 miles.

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—Plans for extension of the Nashville-Gallatin Interurban Railway in central Tennessee have been announced in considerable detail by H. H. Mayberry, president of the company. It calls for certain subscriptions to preferred stock by residents along the line and it is stated if these subscriptions are forthcoming promptly, work of actual construction will begin at once. The project contemplates building of another line to Springfield, Tenn., and organization of the Nashville, Springfield & Gallatin Interurban Railway, the line to touch Goodlettsville, Ridge Top and Greenbrier, an extension from Springfield to Adairville and Russellville, Ky., being a subsequent project. A committee which has been working on the plans consists of James E. Caldwell, president Fourth & First National

Bank, Nashville; C. M. Clark, of E. W. Clark & Company., Philadelphia; H. H. Corson, southern manager General Electric Company; N. S. Keith, Cincinnati, Ohio; and H. H. Mayberry, Franklin, Tenn., According to Mr. Mayberry, E. W. Clark & Company have agreed to build and operate the line upon the plan agreed upon by the committee.

Dallas (Tex.) Electric Company.—This company will spend about $80,000 in paving and laying new rails and ties on Commerce Street between the Houston & Texas Central Railroad and Exposition Avenue. The old rails will be replaced with 103-lb. girder rails, and new steel ties will be laid to take the place of the wooden ties.

***Union Terminal Company, Dallas, Tex.**—This company will construct 15 miles of terminal tracks in connection with the new Union Station. The contract for the construction has been let. C. H. Cana, chief engineer.

Janesville (Wis.) Traction Company.—Plans are being made by this company, which is operated by the Rockford & Interurban Railway, to attach its traction wires to the buildings in the business streets, as all poles have been ordered removed by May 1. Plans have been prepared where contacts with buildings will be necessary. These plans will be submitted to the Commercial Club, whose directors will take up the matter of getting contracts with the property owners for allowing the wires to be attached to the buildings.

SHOPS AND BUILDINGS

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.—Among the improvements being planned by this company is the construction of a new freight terminal at the intersection of Water Street and the Pere Marquette right-of-way in Marquette and a new depot for Muskegon Heights.

Dallas, Tex.—Five hundred tons of reinforced steel have been ordered for the construction of the union interurban terminal in Dallas.

POWER HOUSES AND SUBSTATIONS

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—The board of directors of this company has authorized extensive additions and improvements to its power plants and transmission lines during 1916. One of the large improvements authorized is the installation of a 7500-kw, steam turbine generating unit at the Canon City power plant, together with the necessary boilers, condensers and accessories. A new switchboard will be built, additional high tension transformers installed, etc. The distribution system will be enlarged by the construction of a duplicate 25-mile pole line between Canon City and the Cripple Creek district. The engineering department of H. M. Byllesby & Company will have charge of the work.

Louisville (Ky.) Railway.—This company is operating its power houses on coal bought under a contract which runs until March, 1917, the company consuming at the rate of 100,000 tons annually. This is pea and slack, western Kentucky coal.

Binghamton (N. Y.) Railway.—This company will soon rebuild its local station at Endicott and will install a 300-kw., three-phase, 2300-volt motor-generator set and will also rebuild its transmission line in the spring. E. L. Barnes, Endicott, is manager of the light department.

Cities Service Company, New York, N. Y.—Among the improvements planned for 1916 on properties operated by this company is the installation of four steam turbo-generators at Alliance, Ohio; Athens, Ga., and Hutchinson and Salina, Kan.

Rochester Railway & Light Company, Rochester, N. Y.—Contracts have been placed by this company for the installation of a 15,000-hp. steam turbine and generator at Station No. 3 at Brown's Race and Mill Street.

Halifax (N. S.) Electric Tramway Company, Ltd.—It is reported that this company contemplates extensions to its power system involving an expenditure of about $500,000. The additons will include a complete gas plant having a capacity of 600,000 cu. ft. with provision for further extensions. A machine shop, 146 ft. x 150 ft., will also be erected.

Montreal & Southern Counties Railway, Montreal, Que.—The rotaries for this company's substation at Granby have been received and are now being installed.

Manufactures and Supplies

ROLLING STOCK

Bangor & Portland Traction Company, Bangor, Pa., expects to purchase one passenger car.

Oklahoma Railway, Oklahoma City, Okla., has ordered six 29-ft. semi-steel, double-truck motor car bodies from the St. Louis Car Company.

Mississippi Valley Electric Company, Iowa City, Iowa, has ordered four 28-ft. one-man cars from the McGuire-Cummings Manufacturing Company.

Metropolitan Street Railway, Kansas City, Mo., has exercised its option with the General Electric Company for fifty four-motor and fifty air-brake equipments.

Michigan Railway, Jackson, Mich., has ordered six 53-ft. all-steel interurban trail coaches and four sets of interurban trailer trucks from the St. Louis Car Company.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, has ordered fifteen A-1 suspension type single trucks from the McGuire-Cummings Manufacturing Company.

Athens Railway & Electric Company, Athens, Ga., advises that it may install light single-truck one-man cars, to be operated under shorter headway, if it succeeds in disposing of its double-truck car equipment.

Arbuckle Brothers, Brooklyn, N. Y., coffee importers, are considering the purchase of two electric freight locomotives for use on a proposed connecting railway, as noted in the Construction News of this issue.

Cambria & Indiana Railroad, Colver, Pa., is reported as expecting to purchase an additional storage battery car, somewhat shorter but otherwise similar to the storage battery car which was placed in service on this line about a year ago.

United Railways of Havana, Havana, Cuba, is reported as expecting to purchase about five new storage battery cars within the next two months. This company already has storage battery cars operating between Rincon and San Antonio, but it is said that the new equipment will be used elsewhere.

TRADE NOTES

W. L. Conwell, vice-president and treasurer of the Transportation Utilities Company, New York, has been appointed assistant to the president of the Safety Car Heating and Lighting Company.

Pyrene Manufacturing Company, New York, N. Y., has appointed chief William Guerin, formerly head of the Bureau of Fire Prevention of New York, as head of its new engineering bureau.

E. F. Carry, first vice-president and general manager of the American Car & Foundry Company, has been elected president of the Haskell & Barker Car Company, Michigan City, succeeding W. T. McBride.

Railway Track Work Company, Philadelphia, Pa., in order to meet the growth of its business in the manufacture of the reciprocating track grinder and grinding blocks, has moved its plant to larger quarters at Thirtieth and Walnut Streets in Philadelphia.

Railway & Industrial Engineering Company, Pittsburgh, Pa., manufacturer of Burke horn-gap switching and protective apparatus and out-door substations, has moved its sales department to offices in the People's Bank Building in Pittsburgh.

B. H. Forsyth, who for the past three years has been with the sales organization of Hale & Kilburn Company, Chicago, and previously served as sales manager of the Ford & Johnson Company, has resigned, effective Jan. 1, 1916.

H. E. Walker, who for a number of years has represented the S. K. F. Ball Bearing Company, New York, as railway representative, announces his resignation from that organization. Mr. Walker's plans for the future have not been announced.

Bell Lumber Company, Minneapolis, Minn., has been awarded the cedar on all the tribal lands on the Odanah reservation. This company already had secured all of the other timber on this reservation three years ago, and as the timber covers a number of years' operations, taken together with its previous holdings on the reservations at other points, it insures the company timber for white cedar poles for at least ten to twelve years to come.

Spray Engineering Company, Boston, Mass., reports that the two air washers and coolers installed as auxiliaries to the 35,000-kw. and the 30,000-kw. steam turbo-generator sets in the new A-2 Christian Street station of the Philadelphia Electric Company, are for the largest pair of units in the world. Other recent installations of the Spray air washers and coolers are the following: Commonwealth Edison Company, Chicago, Ill., three each, 80,000 cu. ft. capacity per minute; Toledo Railways & Light Company, Toledo, Ohio, 70,000 cu. ft.; Eastern Pennsylvania Railways, Palo Alto, Pa., 20,000 cu. ft.; New Orleans Railway & Light Company, New Orleans, La., 50,000 cu. ft.

Electric Storage Battery Company, Philadelphia, Pa., manufacturer of the "Exide" battery, the "Chloride Accumulator" and "Tudor Accumulator" and the "Ironclad-Exide" battery, announces that because of changes in the organization of Pierson, Roeding & Company, who have acted as this company's sales agents on the Coast since 1910, its business will hereafter be conducted on the Coast through George R. Murphy, soliciting agent, with offices in the Rialto Building, 118 New Montgomery Street, San Francisco. The Exide Battery Depot which was opened in San Francisco a number of years ago, and where a large amount of stock is carried, will give Mr. Murphy a base of supplies that will insure prompt shipments of batteries and parts.

Mudge & Company, Chicago, Ill., together with the A. O. Smith Manufacturing Company, Milwaukee, Wis., who have for the past two years been manufacturing the Smith motor wheel for application to bicycles, has worked out an application of the motor wheel to the railroad hand speeder or velocipede. The motor wheel is attached behind the velocipede, and employed as a pusher. Special appliances for attaching are furnished. The engine is of the 4-cycle, air-cooled type, 2⅝-in. bore by 2½-in. stroke, and develops 1½ hp. It is magneto equipped and is throttle governed by means of a flexible tubing control fastened to handlebars, or conveniently on seat board. Any speed from 4 to 25 m.p.h. can be set and maintained.

Pierson Roeding & Company, San Francisco, Cal., announces the resignation of Thomas Finigan as vice-president, who has been appointed Pacific Coast manager of the American Brake Shoe & Foundry Company, with offices at 301-303 Call Building, San Francisco. H. S. Whiting of Pittsburgh has been appointed vice-president of Pierson Roeding & Company to succeed Mr. Finigan. Mr. Whiting has already taken up his residence in San Francisco and is in active charge of the new office. Two important changes in this company's agencies have occurred. It has been decided to discontinue the association of this company with the Electric Storage Battery Company, Philadelphia, Pa., as noted elsewhere in these columns, and with the R. D. Nuttall Company, which now will be handled by the Westinghouse Electric & Manufacturing Company at its various offices on the Pacific Coast.

Economy Fuse & Manufacturing Company, Chicago, Ill.—The United States Bureau of Standards has at the request of the Underwriters' Laboratories, Inc., of Chicago, after elaborate investigations, announced its finding in regard to the relative fire hazard involved in the use of the renewable fuses manufactured by this company as compared with the standard inclosed cartridge fuses. The finding states that the evidence does not show either that the fire or accident hazard involved in the use of these fuses is greater or that it is not greater than the risk involved in the use of the standard fuses. It is recommended that, pending the accumulation of more service data, a continuation and extension of their use be permitted by municipal and underwriters' inspection departments under conditions where their performance can be observed by such inspection departments, but that for the present the fuses be not approved for general use on the same basis as those at present listed as standard by the Underwriters' Laboratories, Inc.

ADVERTISING LITERATURE

Searchlight Company, Chicago, Ill., has issued a pamphlet entitled "Oxy-Acetylene Rail Bonding," which is a summary of a talk before the Illinois Electric Railway Association by J. R. Brown, on Oct. 29, 1915.

Chandler Brothers & Company, New York, N. Y., have issued a special market letter describing the stock of the Philadelphia Rapid Transit Company.. It is said that there are few stocks representing a safe and assured business, with an improving tendency, which can be bought at as low a price as the one in question. Although dividends are not in immediate prospect, the outlook is sufficiently good to make the stock one of the most attractive in its class, from the investment as well as from the speculative standpoint.

Stone & Webster, Boston, Mass., have issued a January list of securities that are recommended under present investment conditions. These include the following issues: Baton Rouge Electric Company first mortgage 5's, Cape Breton Electric Company first mortgage 5's, Eastern Texas Electric Company first mortgage collateral trust 5's, El Paso Electric Company first mortgage collateral trust 5's, Galveston-Houston Electric Company 6 per cent cumulative preferred stock, Northern Texas Electric Company 6 per cent preferred stock and Tampa Electric Company first mortgage 5's.

Edison Storage Battery Company, Orange, N. J., has issued a catalog containing numerous illustrations showing the adaptability of the nickel-iron-alkaline battery for commercial vehicle service. The catalog briefly describes the construction of the Edison cell and gives examples of some of its remarkable characteristics such as long life, great mileage, ruggedness, service efficiency, cleanliness and ability to withstand extremes of temperature. The bulletin is illustrated with pictures of trucks from practically all the manufacturers in a great variety of services, among which are included electric railway line repair service, as shown by an illustration of a vehicle used by the Bay State Street Railway.

General Electric Company, Schenectady, N. Y., has issued an artistically designed catalog descriibng and illustrating the Curtis steam turbine-generator. The catalog explains the general principles of this steam turbine, and with the help of illustrations goes into the details of their construction. The last part of the catalog contains views of representative installtaions of turbines operating under various classes of service, such as that required by the Commonwealth Edison Company, Chicago, Ill.; Metropolitan Street Railway, Kansas City, Mo.; Alabama Power Company, Gadsden, Ala., and Halifax (N. S.) Electric Tramways. Bulletin No. 47409 recently issued, describes its small capacity industrial oil switches, type F, form P-10, 30 amp., 600 volts, for three-phase induction motors of 10 hp. or less. Bulletin No. 44,409 describes the 600 and 600/1200-volt ventilated commutating-pole railway motor.

NEW PUBLICATION

Railroad Field Manual for Civil Engineers. By William G. Raymond, C.E., LL.D. John Wiley & Sons, Inc., New York. 390 pages. Morocco bound, $3.

As the title indicates, this field manual was designed for field rather than for office use, although it is adapted for both. The author introduces into his tables the novel feature of dividing the degree decimally instead of sexagesimally. The field of usefulness of this manual is largely confined to steam railroad and electric interurban construction and grade revision problems. Simple, compound and vertical curves with the necessary tables make up an important part of the volume. The theory of the spiral, spiral functions and the American Railway Engineering Associations' ten-chord spiral tables are included. Location theories, and tables, estimating and construction tables, turnouts and crossovers, methods of calculating azimuth, latitude and time, tables for metric curves, adjustment of instruments, logarithms and trigonometric functions and sexagesimal trignonometric functions make up the other important subjects treated. The explanations of the various field problems are complete but brief. No attempt was made to go into demonstrations, as the author believed such matter belonged more properly in a text-book.

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVII NEW YORK SATURDAY, JANUARY 15, 1916 No. 3

MORE INCOME FOR ELECTRIC RAILWAYS

There would undoubtedly be sale for a certain amount of electric power from the grounded d.c. circuits of electric railways if the insurance companies would consent to allow motors to be installed on such circuits without onerous restrictions. Usually it is such a burden to satisfy the insurance inspectors in such cases that there is little incentive to install electric power when only grounded circuits are available for power supply. A step in the right direction was described in a brief article appearing on page 95 of last week's issue of this paper. The Indiana Inspection Bureau has formulated simple requirements, described in the article, so that the minimum insurance rate can be secured on buildings in which totally inclosed or inclosed-ventilated grounded motors are located, or in which other approved types of motors are inclosed in wire mesh. There are some restrictions regarding dust, etc., in the atmosphere, but all seem very reasonable. It is to be hoped that other bureaus will follow this excellent example.

RUNNING EMPTY FACTORY SPECIALS

The practice of running empty extra cars from a carhouse to a factory district in anticipation of the reverse travel soon to be handled might well be investigated on some properties. Where such lines are routed through a business district or even through a populous residential area the public sometimes feels aggrieved that non-stop cars are operated over routes having a relatively long-interval service, and it is a question how far the company should go toward accommodating local patrons bound toward the industrial district at such times. In some cases, the delay to the heavy extra movement might be very burdensome to the company; in others the small number of passengers thus desiring to travel would not interfere noticeably with the main flow of traffic. To pick up these few passengers would be expedient as an accommodation to the public, and would possibly yield enough revenue to make the additional stops worth while. On the whole, unless it can be pretty clearly shown to be injurious to the quality of service on the line as a unit, we are inclined to favor picking up and discharging local passengers by factory-bound empty specials when such traffic is not sufficiently heavy to warrant decreasing, say a five-minute or ten-minute headway on the regular cars. Though the question cannot easily be settled categorically, in our opinion, it deserves analysis, in which full weight should be assigned to somewhat indefinite but none the less important consideration of the effect upon waiting passenger who were passed by the empty cars.

THE BENEFITS OF "CLOSING UP"

On electric railway systems where one or more changes are necessary in making a journey, as often occurs on the Boston (Mass.) Elevated Railway, experience shows that passengers who take advantage of their opportunities to "close up" on the service, to use a military phrase, often make trips in quicker time than riders who give little or no thought to their movements. This point is well brought out in our issue of Jan. 8, page 77, where the acceleration of traffic resulting from the installation of motor-driven fare registers at Boston prepayment stations is emphasized. Here the passenger who is enough of a believer in "preparedness" to approach the fare box with the proper coin in hand saves seconds in reaching the platform of the station, which well may mean the difference between taking the next car or train and waiting, say, from two to five minutes for another. The successful negotiation of city life is intimately bound up with just this sort of forehandedness, and the passenger who "knows the ropes" is sure to make a better average running time including stops and changes than he or she who simply drifts along with the crowd. In other words, there is a reward for intelligent use of the system. Again, the passenger in a subway train who enters a car which will stop nearest the exit at a distant subway station may likewise shorten his trip. Of course, no company can afford to encourage congestion, and as a matter of fact it is only the habit of taking every open advantage in such trips that is to be commended, such advantages being chiefly attainable by passengers who think about how their positions in cars and stations will affect their connections or exit from terminals. This situation emphasizes the advantage of varying the relative locations of the exits in the different stations so that different parts of the train will be utilized by those who think of these short cuts.

WISE DECISION IN KANSAS CITY

In unequivocal language the Missouri Public Service Commission has approved the new franchise for the Metropolitan Street Railway and the plans for the reorganization of the Kansas City Railway & Light Company, as described in last week's issue. Of the many steps that have had to be taken and retaken, this is about the last, and now there should be a quick reorganization of the street railway system and a placing of the property upon a definitely established basis. According to the Kansas City *Journal*, there has never been a local campaign more vindictive, more unscrupulous or more desperate than that conducted during the last five years by certain interests to injure the railway, embarrass the receivers and ruin the stockholders. The dispassionate ruling of the State commission, however, should now put an everlasting quietus on such endeavors. Whether the franchise should solve the present undesirable situation and render the street railway and its operation a business free from politics, whether it should preserve to the present owners the value of property now possessed, and whether it should provide adequately for future expenditures and encourage the investment of private funds—these the commission holds to be questions that have been considered and fully answered by the local authorities and electors of Kansas City. The many protests that "go far afield" are not worthy of consideration, and the commission finds no grounds whatever to justify it in seeking to give effect to the sentiments and desires of the franchise opponents. As it points out, both the franchise and the reorganization plan evidence great effort to reach a mutually satisfactory conclusion and apparently mutual concessions, under constant publicity and free discussion, and rightfully no reason is found for not granting the desired certificate of convenience and necessity for the new electric railway system. We hope that this decision means a really permanent settlement of the electric railway question in Kansas City.

COASTING AND ENERGY CONSUMPTION

One of the axioms of electric railway operation prominent in the minds of transportation men for many years is that, within limits, the lower the speed at the point of application of the brakes, the less the energy consumption. The kinetic energy in the car is proportional to the square of the speed, hence the importance of applying the brakes at the lowest possible speed. This means a reasonably high percentage of coasting. The importance of this subject was realized early in the history of electric railroading, and the fundamental rules were laid down in an article contributed by A. H. Armstrong to the STREET RAILWAY JOURNAL and published on page 312 of the issue for June, 1898. But while the principles necessary in energy saving are accepted in theory there is still a large field for their application, as is indicated by the large savings secured on roads which install energy meters or devices for measuring coasting time. Many years ago meters were installed on cars in Syracuse, N. Y., with the result that remarkable energy saving was secured by some motormen simply through the emphasizing of the possibility of such saving.

The results of one of the most elaborate studies of the savings to be secured by coasting that has yet come to our attention are given in an article by C. C. Chappelle printed in this issue. The writer has analyzed conditions on surface lines in two important cities and has worked out the requirements for the most economical operating conditions for the appropriate schedules used in these cities. While the diagrams given may appear formidable at first sight, they are by no means complicated, being mainly a collection of familiar time-speed graphs arranged systematically to permit deductions to be drawn from them.

One of the most interesting and valuable points made clear in these studies is that up to what might be termed the "saturation point" or the bending point of a curve plotted between the two quantities, the per cent energy saving is inversely proportional to the per cent coasting with a factor of unity. In other words, 1 per cent coasting saves approximately 1 per cent of energy. This is an easy figure to remember, and it is said to be borne out by results observed in many cities.

It is hoped that the publication of Mr. Chappelle's article will serve to dispel some of the air of mystery surrounding the time-speed graph, and that it will impel railway companies to consider carefully the possibility of energy saving on their lines by more scientific operation, no matter what means they employ to produce the desired results.

UNCERTAINTY IN THE TRANSPORTATION FIELD

Ivy L. Lee, in a recent address before the American Association for the Advancement of Science at Columbus, Ohio, made an excellent diagnosis when he said that the particular ailment troubling transportation lines to-day is "uncertainty." This seems like a somewhat intangible disease, more psychological than physical, but it is based on factors that have proved a distinct drain on the physical well-being and growth of the carriers.

For instance, for the last fifteen years there has been a steady and disproportionate increase in operating expenses which the carriers, except in years of great depression, have been utterly unable to control. Yet it cannot be ascertained what future expenses will be enforced. Wages are now determined by arbitration awards, but no principles have been established to fix the relative amount of revenues to be disbursed to employees, while taxes are levied without any uniformity or any reference to the other burdens imposed. Enormous expenditures have been required for improved property and equipment, and no one knows to what this tendency will lead. There is no fixed standard for rate-making, and regulatory and legislative requirements in general show a lack of clear-cut and consistent principles. Even when the premises in regulatory cases have been well established commissions have in many cases shown a tendency not to follow them to the legitimate conclusions, with the result that the principles upon which commissions might be expected to act in the future have been much beclouded, and, as one clear-sighted commissioner has said, nothing has been left certain except uncertainty.

The condition is evident; what is the remedy? It sounds absurdly simple to say, "Remove the uncertainty," but it has taken the government years to decide that the whole subject of railroad regulation needs a deliberate and thorough study by a commission in order that a definite declaration of principles may be made for future guidance. We believe, with Mr. Lee, that no work is more demanded now than a complete determination of the legal principles and economic doctrines that are going to be applied for the depletion of transportation revenues and the increase of transportation expenses, whether they occur in steam or electric railway operation. The past has been burdensome, but human nature is optimistic and all this can be forgotten if the future is deemed to hold promise of improvements. In several instances during the last two years there have been sporadic efforts or at least evidences of passive willingness to help transportation finances. We have welcomed these as signs of a returning public sanity on the railway question, but the need is general and the remedy must be general.

As Commissioner Daniels pointed out in his dissenting opinion in the Western rate case, regulation has now reached the point where one of two courses ought deliberately to be chosen and clearly announced. If, as he says, despite increased costs not offset by increased revenues, increases in rates are to be denied, except where in individual cases gross injustice would be thus occasioned, the carriers ought to be apprised of such a policy so that they may find a remedy if they can. If, on the other hand, commissions are to acknowledge in general what they are compelled to admit in detail, then just and reasonable increases should be permitted, not grudgingly but with such fair measure of allowance as will indicate that the transportation industry is entitled in the interests of the public to earnings sufficient to provide a service commensurate with public needs. Which plan is to be adopted? Are carriers to be allowed increased revenues to cover increased expenses forced upon them or incurred to the public benefit? If not, are the carriers to be particularly devoid of any control over those expenses that show the greatest tendency to mount? In other words, what is the vital basis of future regulation to be? Anything would be better than uncertainty.

LARGE VS. SMALL ELECTRIC LOCOMOTIVES

Since the inception of electric operation for freight trains the capacities adopted for electric locomotives have been generally based upon the idea of providing flexibility in operation through the use of numerous small units, which could be coupled together for handling heavy trains when desired, or operated alone for lighter service. On the Norfolk & Western and St. Paul electrifications, however, the reverse of this principle obtains, the locomotives being of such enormous size that they cannot be operated in pairs at the head end of a train. In fact, the provision of multiple-unit control connections for the locomotives are thus made actually unnecessary, and the designers have, obviously, given up the advantage, inherent in electric operation, of "double-heading" locomotives without necessity for additional engine crews and without the objections that accompany the possibility of independent and conflicting action on the part of the two enginemen required under steam operation.

This apparent reversion to the practice of using extremely large units, which is necessarily imposed upon steam railroads, is due not to a general tendency, as might be inferred from the fact that two electrifications have simultaneously adopted the same plan, but rather to special conditions existing on the installations in question. In one case the service is the equivalent of switching and transfer operations on a gigantic scale, not only as regards the capacities of the individual cars that are handled but also because of the average size of the strings of cars involved in all movements. In the other instance the trains will be operated through a sparsely-settled region where local traffic, in comparison with the through business, approaches negligible proportions, thus permitting the practical establishment of a single standard tonnage for freight trains which may be varied only by the introduction of pusher service over ruling grades.

Neither of these conditions is representative of the general average throughout the country. Under circumstances such as those found in the Middle West for example, where way-station work is an important feature of the daily operation, small units have a definite place in the general scheme. Indeed, the use of a 250-ton engine to spot empties at grain elevators or to switch cars in and out of house tracks having old lightweight rail and no ties to speak of would be incongruous, to say the least. There is, in addition, an inherent advantage in the small locomotive unit that exists because of the possibility of accident or failure of a motor or other part of the equipment. Obviously, as the size of the locomotive decreases and the number increases, the necessity for reserve equipment diminishes, and this consideration is indirectly more important with the electric locomotive, in view of its always-ready-to-run characteristics, than in the case of steam operation, which requires reserve equipment in large numbers in any event, because more than half of a steam locomotive's time is regularly spent at the shop or roundhouse.

Of course, neither one of these advantages accredited to the small locomotive would offset any great increase in the unit cost or price per pound of tractive effort, which might be expected with a decrease in size. Yet indications at present seem to point to a practically constant relation between electric locomotive price and power, so that a fleet of small engines would cost but little more than a few large ones of the same total hauling capacity. The St. Paul engines, for example, weighing 282 tons complete, are reported to be worth an amount which approximates 18.5 cents per pound, while from published reports on the Butte, Anaconda & Pacific Railway—an installation with similar electrical characteristics—it may be deduced that the 80-ton locomotives there in service cost almost exactly the same pound price.

Here is an increase in bulk of some 350 per cent without a material change in unit cost, and upon the basis that this circumstance is representative of at least approximately normal conditions, the flexibility afforded by the small unit is not appreciably penalized by the matter of cost. If subsequent experience, therefore, bears out present indications the original practice established in electrification, whereby locomotives of only 60 tons or 80 tons weight are adopted as a standard, will be retained generally in future installations where flexibility of operation is a consideration of any importance.

New Car for Public Service Railway

After Careful Study of the Requirements on Certain Lines of This Property the Mechanical Department Has Designed a Type of Car Which Seems to Meet These Requirements—The Sample Car Which Is Herein Described Is Now Undergoing Service Tests

By H. A. BENEDICT
Mechanical Engineer Public Service Railway, Newark, N. J.

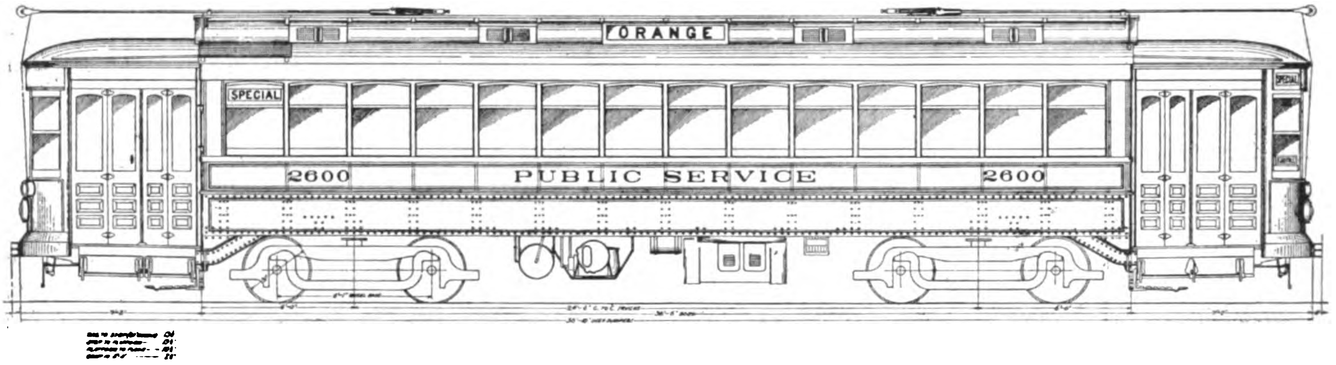
THE Public Service Railway has just completed and put into operation in city service at Newark, N. J., a new car which embodies a number of interesting departures in construction and equipment from the type of car which has heretofore been considered the standard for this system.

The car body has a steel underframe built up entirely of structural shapes and plates, the ¼-in. x 20-in. sill plates with reinforcing angles 2½ in. x 2½ in. x ⅜ in. at the bottom and plates 2½ in. x ⅝ in. at the top taking the entire load. The cross-members serve to stiffen the frame and provide supports for the floor and apparatus under the car. The load is transmitted from the side sills to the trucks by cast-steel bolsters. The steel platform knees are hung on yokes bolted to the end sills, so that they may be easily removed in case a platform is damaged in an accident. Drawbar strains are transmitted directly to the bolsters through the center platform knees, which are attached to the bolster and to the drawhead.

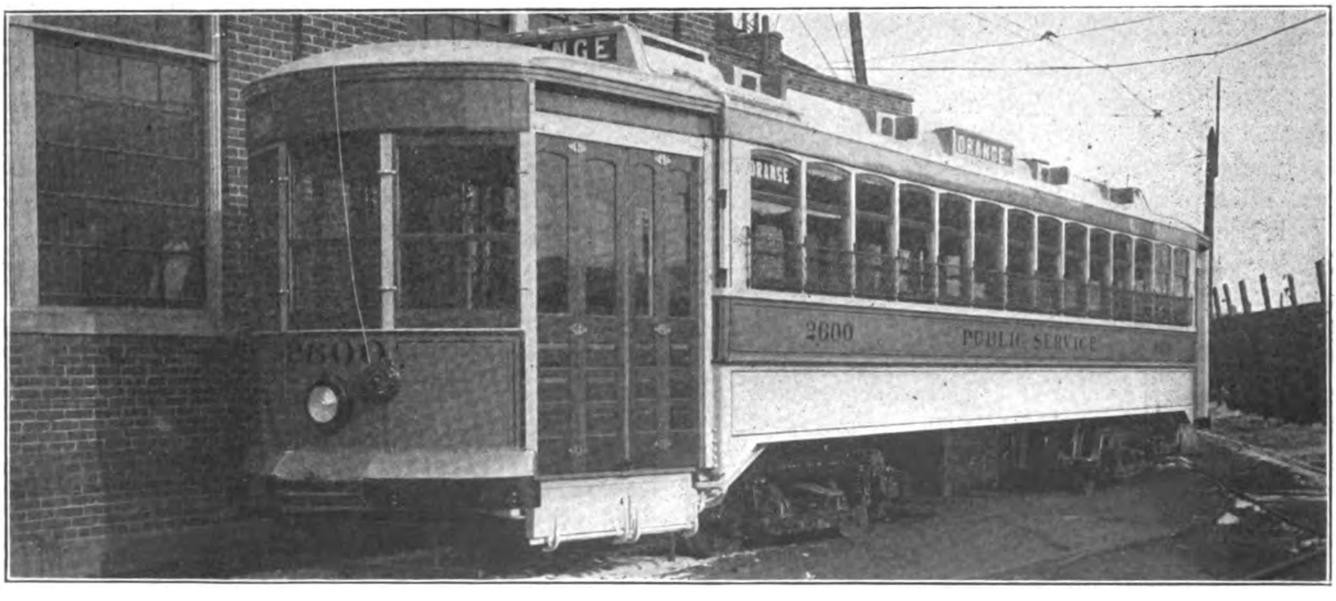
The sill plates are stiffened by soft steel angles 2 in. x 1½ in. x ⅛ in., which serve also as pockets for the ash side posts. The frame of the car body above the sill plates is entirely of wood with the exception of the carlines supporting the roof, which are made of soft steel tees, 2 in. x 2 in. x ¼ in.

The principal dimensions of the car are given in the table on page 115.

The most striking innovation on the car is the compromise-type roof. This is made of ⅜-in. Agasote in eight pieces molded at the factory to the shape required. The Agasote is bolted to the carlines and the joints are covered with canvas imbedded in white lead to make them water tight. To provide the necessary ventilation



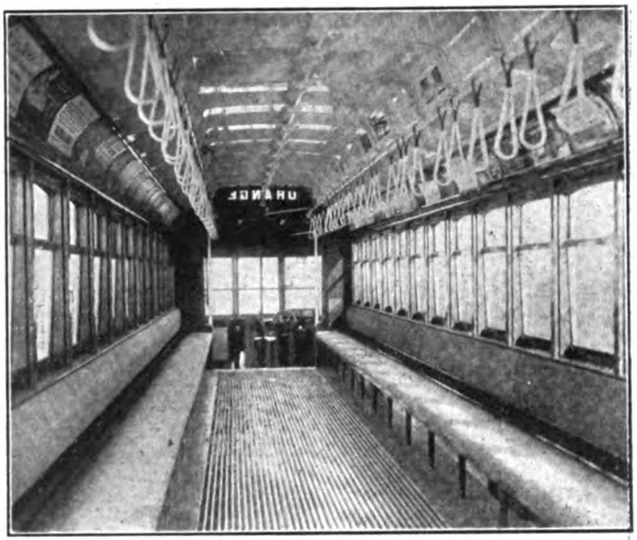
NEW PUBLIC SERVICE RAILWAY CAR—SIDE ELEVATION OF SAMPLE CAR SHOWING OVER-ALL DIMENSIONS AND ARRANGEMENT OF SIDE GIRDERS AND PLATFORM KNEES



NEW PUBLIC SERVICE RAILWAY CAR—VIEW SHOWING COMPLETED SAMPLE CAR WITH MODIFIED MONITOR ROOF AND FULLY-INCLOSED PLATFORMS

PRINCIPAL DIMENSIONS OF THE NEW PUBLIC SERVICE CAR

Length over bumpers	50 ft. 10 in.
Length of body	36 ft. 6 in.
Width over side sills	8 ft. 2½ in.
Width over posts	8 ft. 4 in.
Height over all	11 ft. 9½ in.
Rail to first step	14 in.
First step to platform	13½ in.
Platform to floor of car	10½ in.
Ramp in car	2½ in.
Width of aisle	54 in.
Weight complete	45,900 lb.
Seated passenger capacity	50



NEW PUBLIC SERVICE CAR—INTERIOR LOOKING FORWARD

eight specially designed Automatic ventilators are installed on the roof. Hunter route signs of special design, built into the roof, are used to indicate the line over which the car is operating. Hunter destination signs are placed one on each platform and one on each side of the car at the rear end.

In the interior of the car two white enameled iron pipes, one on each side of the car, are used to support the leather hand straps, which are covered with Rico sanitary hand-strap covers. The register rod and signal bell cord are installed one in each of the grab-strap pipes to eliminate troubles due to passengers ringing up fares and pulling the signal bell. Push buttons are installed on each post for passenger signal to motorman. The seats are longitudinal, one on each side of the car, and both the seats and backs are covered with canvas-lined rattan. As there are no doors between the car body and the platform, the bulkhead is cut away as much as possible but still enough is left to protect the seated passengers from drafts when the doors are opened, and a white enamel grab handle is placed at each side for the convenience of passengers moving to and from the platforms.

The interior of the car is finished in natural cherry and gray-white enamel, all of the woodwork being cherry and the inside of the roof, the carlines and all fixtures above the advertising racks being enameled.

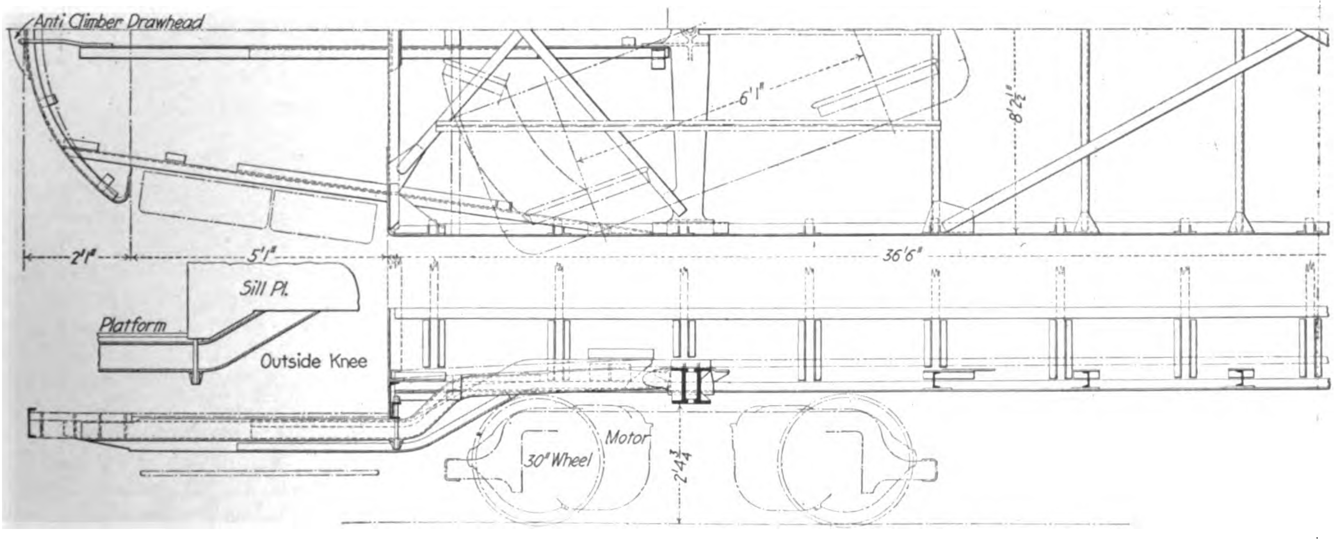
Light is provided in the car body by thirteen 23-watt Mazda lamps in a single row over the center of the aisle, and each platform has five additional lamps on separate circuits. Sixteen electric heaters thermostatically controlled are provided to heat the car body, and an additional heater is installed on each platform.

The platforms are arranged for pay-on-the-platform operation, a dividing rail separating the boarding from the alighting passengers and supporting the fare box and a stool which may be used by either motorman or conductor or swung out of the way. The register may be operated either by foot or by hand. The doors are all hand-operated and fold inwardly, the entrance and exit doors being independent of each other. This is the standard platform arrangement for Public Service Railway cars in city service. As there are no bulkhead doors in the car, the motorman will not be allowed to open the platform window in cold weather, so that a double window was provided to prevent frosting on the inside.

The car is equipped with folding steps which operate in conjunction with the doors. These are of a new design, operated by cams, this method of operation being selected to insure the steps being in their lowest position before the doors are open wide enough to permit a passenger to pass through. This will eliminate accidents, which occur with other types of folding steps due to the passenger stepping on the tread when it is partially raised.

The electrical equipment consists of four Westinghouse 307-CA motors of 40 hp. each and HL control, the control being of the new type in which the switch group and reverser are combined in one unit. This is the first equipment of this type manufactured by the Westinghouse Electric & Manufacturing Company and put into service.

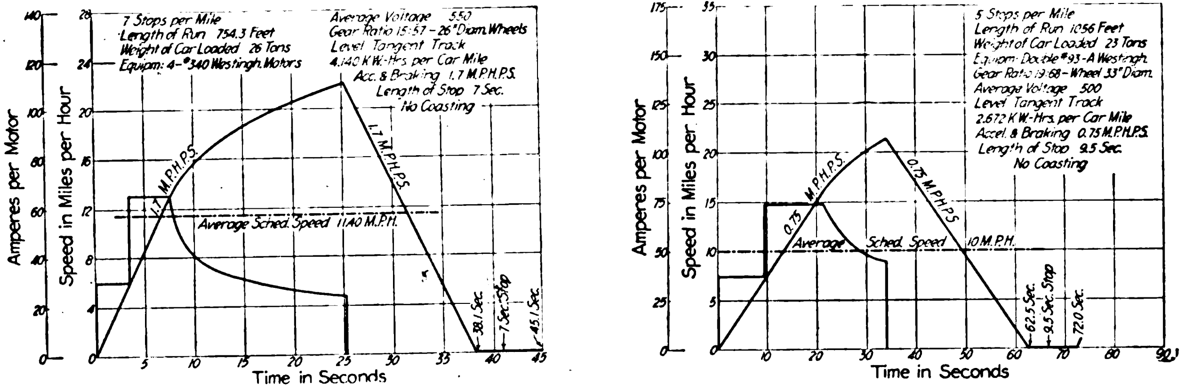
The trucks are the Standard Motor Truck Company's C-50-P having a 6-ft. 1-in. wheelbase and inside-hung motors. General Electric CP-27 compressor and straight air-brake equipment, and H.B. life guards complete the equipment. No arrangements have been made for train operation.



NEW PUBLIC SERVICE RAILWAY CAR—PARTIAL PLAN AND ELEVATION OF UNDERFRAME SHOWING METHOD OF SUPPORTING PLATFORMS

Fundamental Principles of Car Operation Efficiency

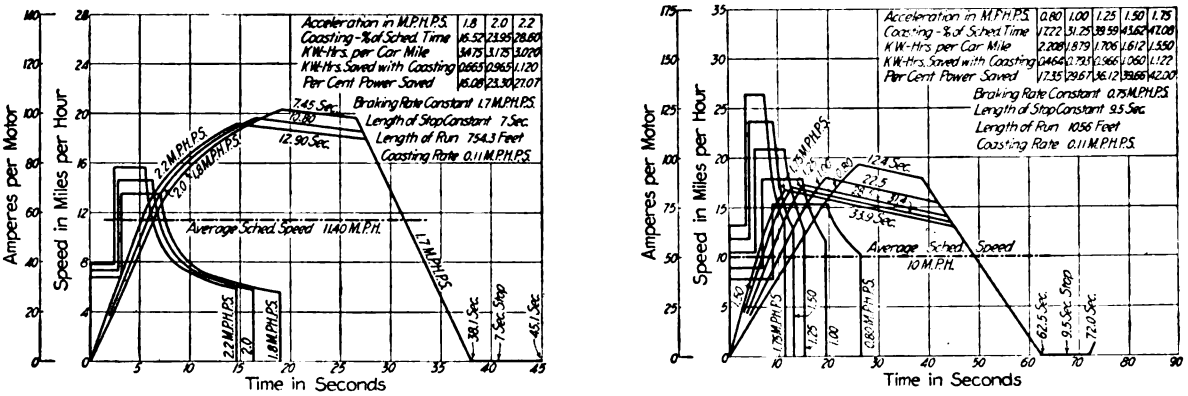
Company A **Company B**



7 Stops per Mile
Length of Run 754.3 Feet
Weight of Car Loaded 26 Tons
Equipm: 4-#340 Westingh. Motors
Average Voltage 550
Gear Ratio 15:57 - 26" Diam. Wheels
Level Tangent Track
4.140 K.W.-Hrs. per Car Mile
Acc. & Braking 1.7 M.P.H.P.S.
Length of Stop 7 Sec.
No Coasting

5 Stops per Mile
Length of Run 1056 Feet
Weight of Car Loaded 23 Tons
Equipm: Double #93-A Westingh.
Gear Ratio 19:68 - Wheel 33" Diam.
Average Voltage 500
Level Tangent Track
2.672 K.W.-Hrs. per Car Mile
Accel. & Braking 0.75 M.P.H.P.S.
Length of Stop 9.5 Sec.
No Coasting

Fig. 1—Speed-Time and Power-Time Graphs for No-Coasting Conditions



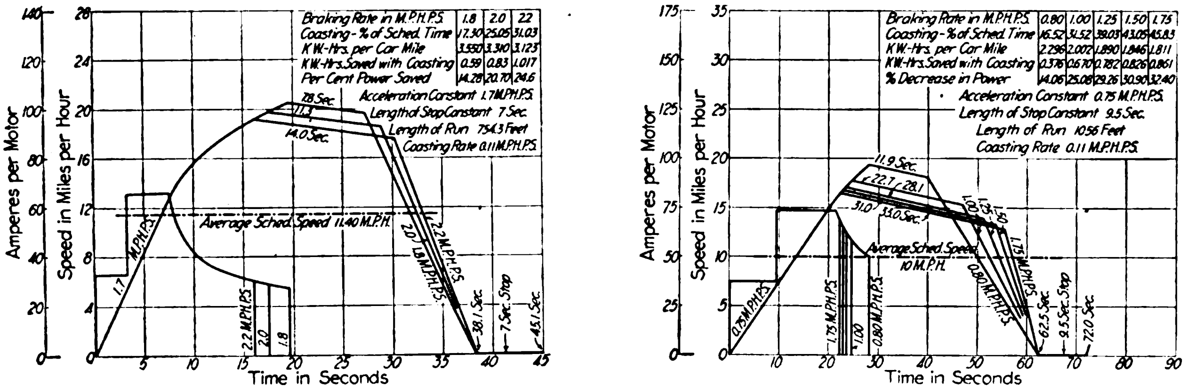
Acceleration in M.P.H.P.S.	1.8	2.0	2.2
Coasting - % of Sched. Time	16.52	23.95	28.60
K.W.-Hrs. per Car Mile	3.475	3.175	3.020
K.W.-Hrs. Saved with Coasting	0.665	0.965	1.120
Per Cent Power Saved	16.08	23.30	27.07

Braking Rate Constant 1.7 M.P.H.P.S.
Length of Stop Constant 7 Sec.
Length of Run 754.3 Feet
Coasting Rate 0.11 M.P.H.P.S.

Acceleration in M.P.H.P.S.	0.80	1.00	1.25	1.50	1.75
Coasting - % of Sched. Time	17.22	31.25	39.59	43.62	47.08
K.W.-Hrs. per Car Mile	2.208	1.879	1.706	1.612	1.550
K.W.-Hrs. Saved with Coasting	0.464	0.793	0.966	1.060	1.122
Per Cent Power Saved	17.35	29.67	36.12	39.66	42.00

Braking Rate Constant 0.75 M.P.H.P.S.
Length of Stop Constant 9.5 Sec.
Length of Run 1056 Feet
Coasting Rate 0.11 M.P.H.P.S.

Fig. 2—Speed-Time and Power-Time Graphs for Several Rates of Acceleration



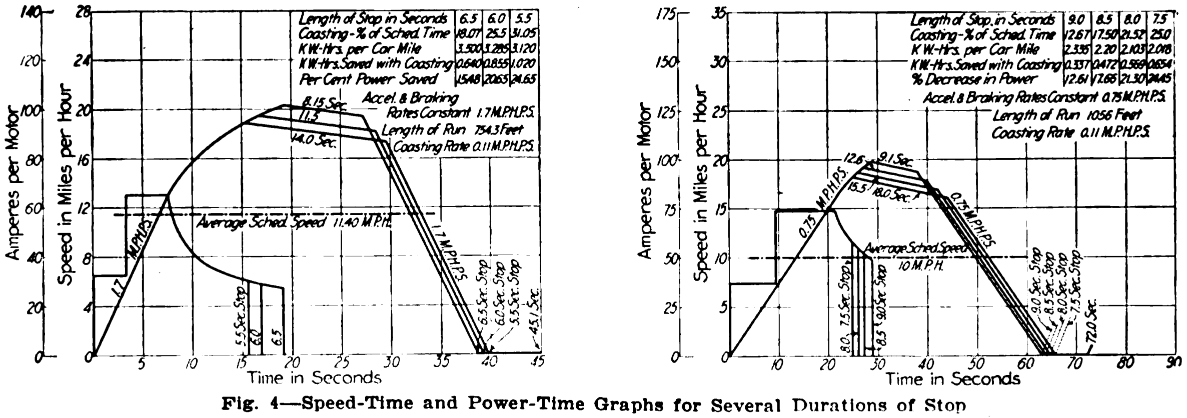
Braking Rate in M.P.H.P.S.	1.8	2.0	2.2
Coasting - % of Sched. Time	17.30	25.05	31.03
K.W.-Hrs. per Car Mile	3.550	3.340	3.125
K.W.-Hrs. Saved with Coasting	0.59	0.83	1.017
Per Cent Power Saved	14.28	20.70	24.6

Acceleration Constant 1.7 M.P.H.P.S.
Length of Stop Constant 7 Sec.
Length of Run 754.3 Feet
Coasting Rate 0.11 M.P.H.P.S.

Braking Rate in M.P.H.P.S.	0.80	1.00	1.25	1.50	1.75
Coasting - % of Sched. Time	16.52	31.52	39.03	43.05	45.83
K.W.-Hrs. per Car Mile	2.296	2.007	1.890	1.846	1.811
K.W.-Hrs. Saved with Coasting	0.376	0.670	0.782	0.826	0.861
% Decrease in Power	14.06	25.08	29.26	30.90	32.40

Acceleration Constant 0.75 M.P.H.P.S.
Length of Stop Constant 9.5 Sec.
Length of Run 1056 Feet
Coasting Rate 0.11 M.P.H.P.S.

Fig. 3—Speed-Time and Power-Time Graphs for Several Rates of Braking



Length of Stop in Seconds	6.5	6.0	5.5
Coasting - % of Sched. Time	18.07	25.5	31.05
K.W.-Hrs. per Car Mile	3.500	3.285	3.120
K.W.-Hrs. Saved with Coasting	0.640	0.855	1.020
Per Cent Power Saved	15.48	20.65	24.65

Accel. & Braking Rates Constant 1.7 M.P.H.P.S.
Length of Run 754.3 Feet
Coasting Rate 0.11 M.P.H.P.S.

Length of Stop in Seconds	9.0	8.5	8.0	7.5
Coasting - % of Sched. Time	12.67	17.50	21.52	25.0
K.W.-Hrs. per Car Mile	2.335	2.20	2.103	2.018
K.W.-Hrs. Saved with Coasting	0.337	0.472	0.569	0.654
% Decrease in Power	12.61	17.65	21.30	24.45

Accel. & Braking Rates Constant 0.75 M.P.H.P.S.
Length of Run 1056 Feet
Coasting Rate 0.11 M.P.H.P.S.

Fig. 4—Speed-Time and Power-Time Graphs for Several Durations of Stop

Fundamental Principles of Car Operation Efficiency

A Study of the Practical and Technical Principles Involved in the Use of the Time-Element Factors in Railway Operation, Particularly in Determining the Most Economical Rates of Acceleration, Braking and Speed from the Standpoint of Power and Platform Costs

By C. C. CHAPPELLE
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EVERY traction company executive and his operating staff are confronted with the necessity for increased economies in operation on account of the greater cost of money needed to meet the constant demand for new capital, and because the general business depression and the competition of the automobile tend to curtail gross earnings. Obviously, increases in gross earnings are not to be expected under conditions generally existing.

In searching for means of reducing operating expenses attention would naturally first be directed to the motor, but the manufacturers of motor equipment cannot be expected to secure efficiencies substantially higher than those already obtained. Economies are, of course, obtainable through reduction in weight of cars and equipment, and the possibilities of one-man operation are well recognized.

Unfortunately in the average case the investment in present equipment is so large that it is rarely practicable to write off the cost of old equipment with the economies obtainable from the new. It follows, therefore, that the logical method of increasing net earnings is to reduce operating expenses by securing increased efficiency with either old or new equipment.

One of the greatest needs of the present time in the railway field is a better understanding of the principles involved in the attainment of the high efficiencies desired, and of the practical application of these principles to the ordinary every-day operations of electric railway systems.

The first point to remember in this connection is that time is the essence of railroading before and after construction. Success depends upon the efficiency with which railway operations are performed in established intervals of time.

In considering and analyzing the effective utilization of time on a railway in operation we must apply the same principles which are used in determining by calculation the power and equipment requirements of a railway prior to its construction.

In determining the capacity of the necessary power plant and selecting the motor equipment for the rolling stock of a projected road, speed-time and energy diagrams based on the proposed schedule speeds, average number of stops per mile, etc., form the basis of the calculations. This same method is applied by motor manufacturers in determining the suitability of new equipment for the average conditions of roads which are actually in operation.

As a basis for such diagrams seven average operating characteristics must be assumed or determined for each car route of a system as follows:

1. The average weight, including average load, of a typical car equipped with typical motors operating with a given gear ratio.
2. The average schedule speed.
3. The average number of stops per mile.
4. The average length of a run, that is, 5280 ft. divided by the number of stops per mile.
5. The average schedule time of a run, that is, the time required to cover the average length of a run at the average schedule speed, including the time consumed in making the average stop.
6. The average trolley-wire voltage.
7. The average gradient and degree of curvature of line.

With the above data in hand for two typical roads, designated herein respectively as Company A and Company B, the accompanying sets of diagrams have been prepared to show the inter-relations of the quantities which affect economical car operation. The studies have been made for level and tangent track, but the several factors shown will remain in the same relative proportions if modified to meet the condition of average gradient and degree of curvature. Each study embraces a series of sixteen diagrams and these have been reproduced in such a way as to permit ready comparison.

Each study begins with the "no-coasting" conditions for the case in hand. These comprise the minimum equal rates of "straight line" acceleration and of braking which will enable the car to cover the required distance in the length of time corresponding to the average schedule speed. The straight-line acceleration is that which is determined by the rate of cutting out the starting resistance. After the starting resistance is all cut out the car continues to accelerate at a constantly reducing rate as the motor counter electromotive force rises. For the no-coasting there is a definite energy consumption, which can be readily calculated from the voltage, current and duration of the "power on" period.

Fig. 1, Company A case, shows the no-coasting conditions for a 754.3-ft. run under conditions existing in that city, while Fig. 1, Company B case, shows the no-coasting conditions for a 1056-ft. run. In the first case, 4.14 kw.-hr. per car-mile are required for a 26-ton car making a schedule speed of 11.4 m.p.h. with seven stops per mile. To do this without coasting requires 1.7 m.p.h.p.s. as the rate of acceleration and of braking. The length of stop is seven seconds. In Company B case the energy consumption is 2.672 kw.-hr. per car-mile for a schedule speed of 10 m.p.h. with a 23-ton car, five stops per mile and a stop of nine and one-half seconds' duration. A lower rate of acceleration and braking, 0.75 m.p.h.p.s., is all that is required for no-coasting conditions in this case.

FACTORS AFFECTING ENERGY INPUT

Before attempting to analyze the diagrams based upon those for no-coasting conditions, it should be noted that the energy input required to operate a car of given weight and equipment, of given gear ratio, at a given average schedule speed with a given average num-

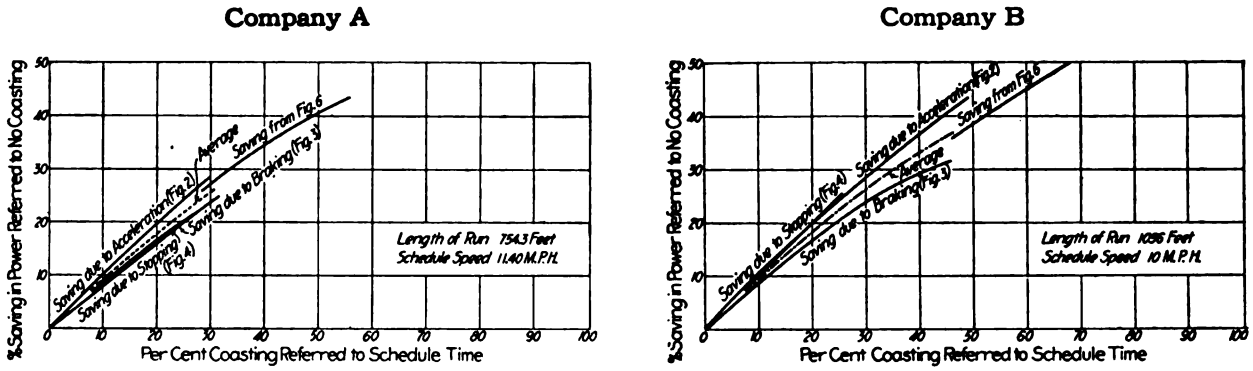
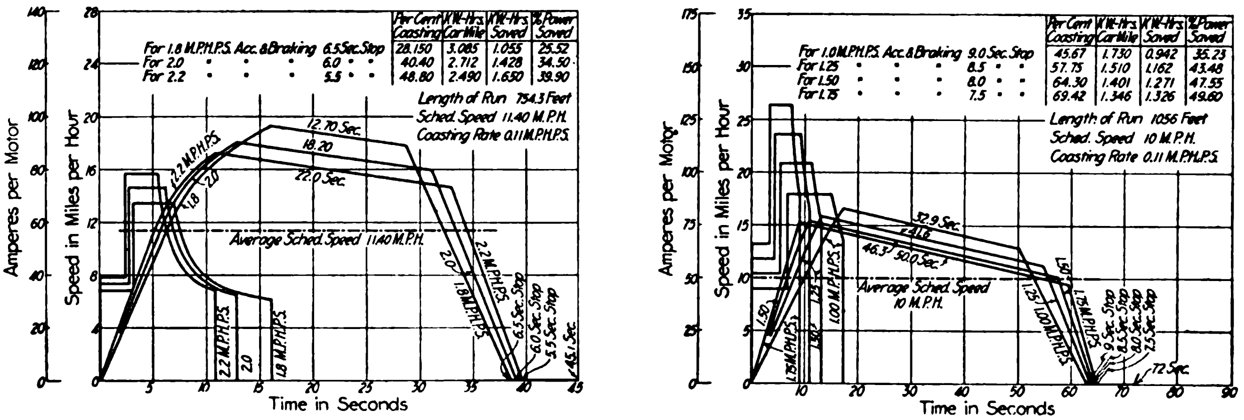


Fig. 5—Curves Showing the Relation of Power Saving to Per Cent Coasting



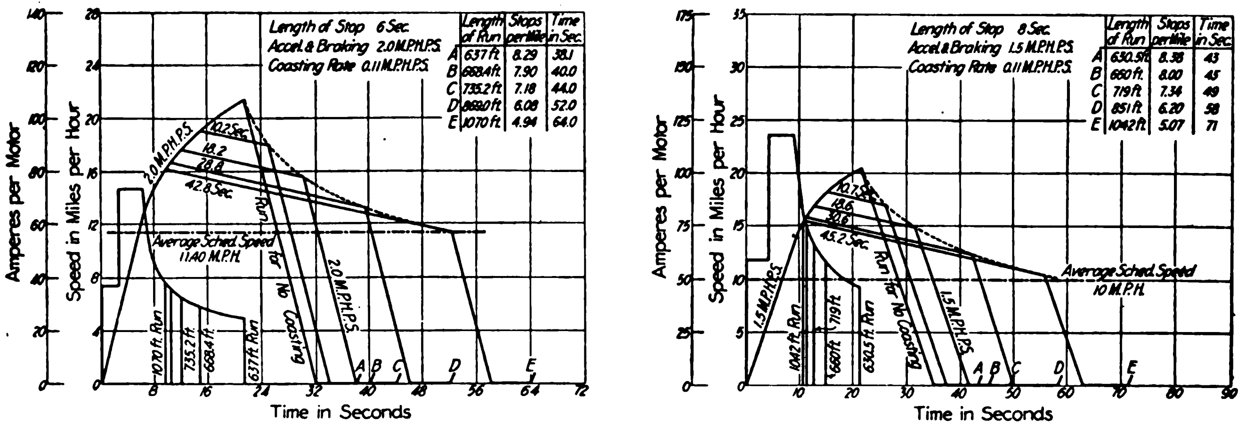
	Per Cent Coasting	KW.-Hrs. Car Mile	KW.-Hrs. Saved	% Power Saved
For 1.8 M.P.H.P.S. Acc. & Braking 6.5 Sec. Stop	28.150	3.085	1.055	25.52
For 2.0 " " " 6.0 " "	40.40	2.712	1.428	34.50
For 2.2 " " " 5.5 " "	48.80	2.490	1.650	39.90

Length of Run 754.3 Feet
Sched. Speed 11.40 M.P.H.
Coasting Rate 0.11 M.P.H.P.S.

	Per Cent Coasting	KW.-Hrs. Car Mile	KW.-Hrs. Saved	% Power Saved
For 1.0 M.P.H.P.S. Acc. & Braking 9.0 Sec. Stop	45.67	1.730	0.942	35.23
For 1.25 " " " 8.5 " "	57.75	1.510	1.162	43.48
For 1.50 " " " 8.0 " "	64.30	1.401	1.271	47.55
For 1.75 " " " 7.5 " "	69.42	1.346	1.326	49.60

Length of Run 1056 Feet
Sched. Speed 10 M.P.H.
Coasting Rate 0.11 M.P.H.P.S.

Fig. 6—Speed-Time and Power-Time Graphs for Several Rates of Acceleration and Braking and Durations of Stop



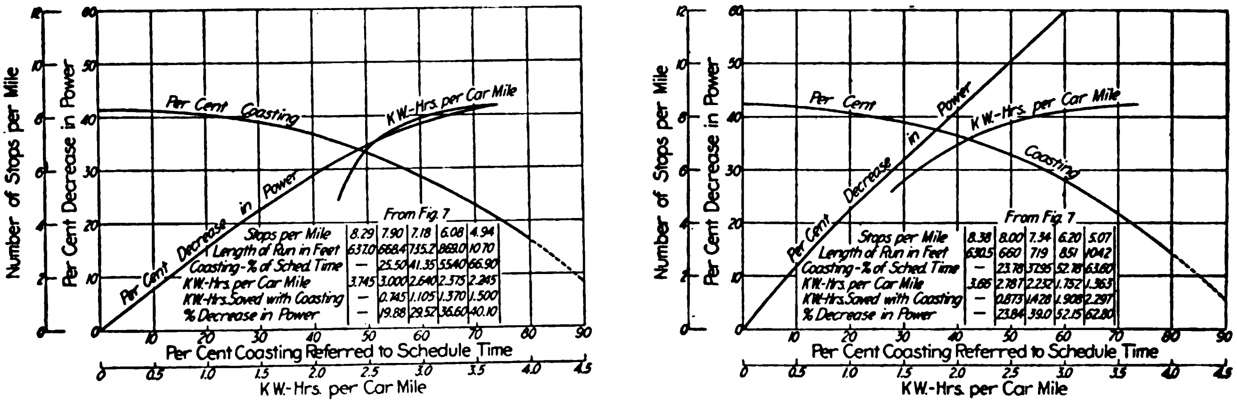
Length of Stop 6 Sec.
Accel. & Braking 2.0 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

	Length of Run	Stops per Mile	Time in Sec.
A	637 ft.	8.29	38.1
B	668.4 ft.	7.90	40.0
C	735.2 ft.	7.18	44.0
D	869.0 ft.	6.08	52.0
E	1070 ft.	4.94	64.0

Length of Stop 8 Sec.
Accel. & Braking 1.5 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

	Length of Run	Stops per Mile	Time in Sec.
A	630.5 ft.	8.38	43
B	660 ft.	8.00	45
C	719 ft.	7.34	49
D	851 ft.	6.20	58
E	1042 ft.	5.07	71

Fig. 7—Speed-Time and Power-Time Graphs for Several Numbers of Stops Per Mile



From Fig. 7

Stops per Mile	8.29	7.90	7.18	6.08	4.94
Length of Run in Feet	637.0	668.4	735.2	869.0	1070
Coasting-% of Sched. Time	—	25.50	41.35	55.40	66.90
KW.-Hrs. per Car Mile	3.745	3.000	2.640	2.375	2.245
KW.-Hrs. Saved with Coasting	—	0.745	1.105	1.370	1.500
% Decrease in Power	—	19.88	29.52	36.60	40.10

From Fig. 7

Stops per Mile	8.38	8.00	7.34	6.20	5.07
Length of Run in Feet	630.5	660	719	851	1042
Coasting-% of Sched. Time	—	23.78	37.95	52.78	63.60
KW.-Hrs. per Car Mile	3.66	2.787	2.232	1.752	1.363
KW.-Hrs. Saved with Coasting	—	0.873	1.428	1.908	2.297
% Decrease in Power	—	23.84	39.0	52.15	62.80

Fig. 8—Curves Showing the Relation of Stops Per Mile to Energy Consumption and Per Cent Coasting, and Per Cent Coasting to Power Saving

ber of stops per mile and a given average trolley voltage is affected solely by the following factors: The duration of acceleration, the duration of braking, and the duration of stops. It will be noted that all of these are time-element factors. The effects of the variations in these elements are illustrated in Figs. 1 to 6, in the Company A and Company B diagrams.

Fig. 1 has already been explained. Fig. 2 shows how coasting can be increased and power saved by increasing the rate and decreasing the duration of acceleration. Fig. 3 shows how similar results can be produced by increasing the rate of braking. Fig. 4 shows how slight decreases in the duration of stop permit increased coasting and decreased power consumption. The results illustrated in the preceding figures are exhibited in Fig. 5 in convenient form for study and show the relation of per cent coasting to per cent energy saving by the three individual methods of saving energy, that is, increasing the rate of acceleration, increasing the rate of braking and decreasing the duration of stops. The average ratio of per cent coasting to per cent energy saving, that is, the saving which could be expected from suitable combinations of these three factors, is also indicated in Fig. 5. This curve might be termed the "coasting characteristic" for this particular case. The results of combining all of the factors which contribute to energy saving are illustrated in Fig. 6.

A study of the diagrams mentioned above demonstrates the following as the effects of variation in these time-element factors of acceleration, braking and duration of stop on the power input:

1. The maximum energy input and maximum speed occur when these factors are such as to permit "no coasting time."

2. The energy input and the maximum speed both decrease as the time of acceleration is decreased, that is, as the rate of acceleration is increased. Obviously the limitation for the rate of acceleration, within limits of motor equipment, are the slipping of the wheels on the one hand and the comfort of the passengers on the other. In practice the discomfort of the passengers results more from irregularity than rapidity of acceleration.

3. The energy input and the maximum speed obtained both decrease as the time of braking is decreased, that is, as the rate of braking is increased. The limitations of braking are the skidding of the wheels and the comfort of the passengers. Here also the discomfort of the passengers results more from irregular than rapid braking.

4. The energy input and maximum speed attained both decrease as the time consumed in the stop is decreased. The practical limitation for energy saving at this point depends upon the facilities for boarding and alighting, the alertness of the conductor as to signals and the alacrity of the motorman in obeying or in even anticipating such signals.

RELATION OF ENERGY INPUT TO COASTING TIME

A most important conclusion from the studies up to this point, deduced from the data shown in Fig. 5, is that as the time-element factors of acceleration, braking and duration of stop are varied, the corresponding energy consumption is in inverse proportion to the coasting time. These time-element factors solely and only can affect the energy input required to operate a given car and its equipment for given conditions of schedule speed, with an average number of stops per mile, etc.

Up to this point the number of stops per mile has been taken as constant. The next step is to consider the practical conditions arising from a change in this quantity. Figs. 7 and 8 of both Company A and Company B diagrams, have been prepared to show these effects. The no-coasting conditions have been changed so as to permit the original schedule speeds to be maintained with somewhat more than eight stops per mile in each case. In the Company A case this proved to be 2 m.p.h.p.s. and in the Company B case 1½ m.p.h.p.s., for acceleration and braking rates. The results are shown in Fig. 8, in the two sets of diagrams.

Analysis of these results shows that by utilizing the time-element factors of acceleration, braking and duration of stop on any selected basis, the maximum number of stops per mile is obtained with the condition of no coasting time, with corresponding maximum power input and maximum speed attained. The energy input and maximum speed attained both decrease, and the coasting time increases, as the number of stops per mile is decreased. Another important deduction is that the increased percentage of coasting is practically proportional to the decrease in energy consumed.

RELATION OF SCHEDULE SPEED TO POWER AND PLATFORM EXPENSE

The next step for consideration is the problem paramount in the minds of executives and transportation managers, namely, that of determining the most efficient schedule speeds. The solution of this problem can be found by the methods previously used. Figs. 9 to 12, in the two series of diagrams, have been prepared to indicate the solution of the problem for the typical cases selected for illustration.

Taking the same no-coasting conditions as in the preceding case but varying the duration of stops so as to give greater values with fewer stops per mile, diagrams have been worked out for typical numbers of stops per mile. The results show that with the time-element factors of acceleration, braking and duration of stop utilized on any selected basis, and a given average number of stops per mile, the maximum schedule speed is obtained with no coasting time, and with corresponding maximum energy input.

The diagrams show further that energy input decreases and coasting time increases as the schedule speed decreases, and that the per cent decrease in energy input is in proportion to the increase in per cent coasting. It should be noted, however, that the curves plotted for per cent decrease in energy input referred to per cent decrease in schedule speeds rise very rapidly, particularly at low values of these quantities. In considering an increase in schedule speeds, therefore, we must balance the increased cost of energy with the decreased cost of platform labor.

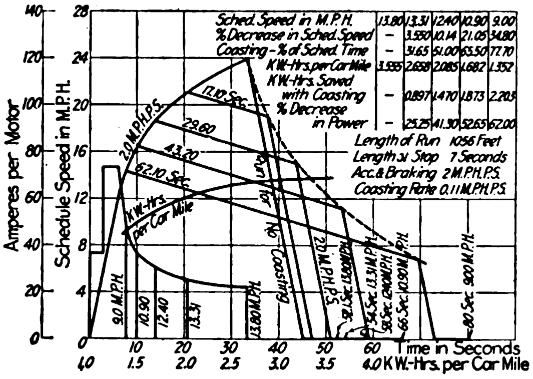
Figs. 13 to 15 in Company A and Company B diagrams have been prepared to show the relation of energy consumption in kilowatt-hours per car-mile to per cent coasting and to schedule speeds; the relation of total energy and platform expense to schedule speeds and the relation of total energy and platform expense to the per cent coasting.

The curves shown in these figures were plotted from data tabulated in the accompanying tables III, IV, V, VI, VII and VIII.

COASTING AS A NECESSARY FACTOR IN ECONOMY

Figs. 13 to 15 summarize all that has gone before on a cost basis. It is obvious that a certain amount of coasting is necessary in any schedule. For any existing or adopted schedule speed, additional coasting can only mean increased efficiency under such schedule. It is apparent, however, that for given car equipment, dependent upon traffic conditions, there is a most economical schedule speed with its corresponding per cent coasting resulting. The method for the solution of this problem is shown clearly in the curves.

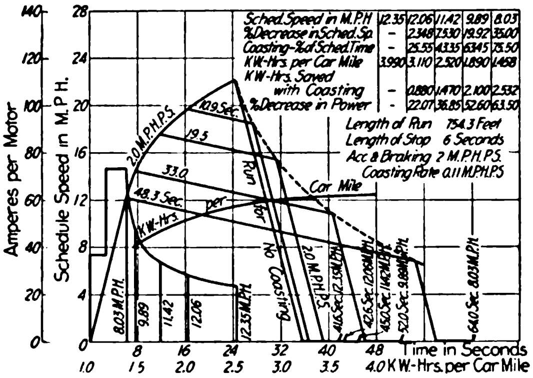
Company A



Sched. Speed in M.P.H.	13.80	13.31	12.40	10.90	9.00
% Decrease in Sched. Speed	—	3.550	10.14	21.05	34.80
Coasting-% of Sched. Time	—	31.65	51.00	65.50	77.70
KW.-Hrs. per Car Mile	3.555	2.658	2.085	1.682	1.352
KW.-Hrs. Saved with Coasting	—	0.897	1.470	1.873	2.203
% Decrease in Power	—	25.25	41.30	52.65	62.00

Length of Run 1056 Feet
Length of Stop 7 Seconds
Acc. & Braking 2 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

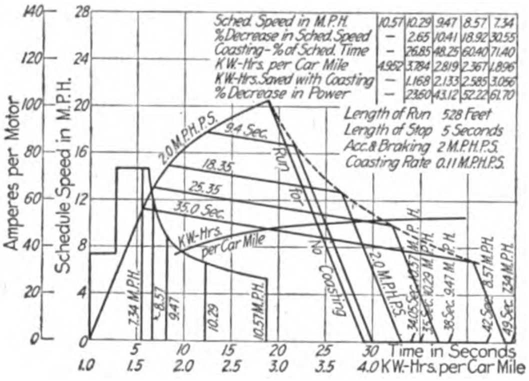
Fig. 9—Diagrams Showing Operating Conditions For Several Schedule Speeds, with Five Stops Per Mile



Sched. Speed in M.P.H.	12.35	12.06	11.42	9.89	8.03
% Decrease in Sched. Sp.	-	2.348	7.530	19.92	35.00
Coasting-% of Sched. Time	-	25.55	43.35	63.45	75.50
KW.-Hrs. per Car Mile	3.990	3.110	2.520	1.890	1.458
KW.-Hrs. Saved with Coasting	-	0.880	1.470	2.100	2.532
% Decrease in Power	-	22.07	36.85	52.60	63.50

Length of Run 754.3 Feet
Length of Stop 6 Seconds
Acc. & Braking 2 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

Fig. 10—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Seven Stops Per Mile



Sched. Speed in M.P.H.	10.57	10.29	9.47	8.57	7.34
% Decrease in Sched. Speed	—	2.65	10.41	18.92	30.55
Coasting-% of Sched. Time	—	26.85	48.25	60.40	71.40
KW.-Hrs. per Car Mile	4.952	3.784	2.819	2.367	1.896
KW.-Hrs. Saved with Coasting	—	1.168	2.133	2.585	3.056
% Decrease in Power	—	23.60	43.12	52.22	61.70

Length of Run 528 Feet
Length of Stop 5 Seconds
Acc. & Braking 2 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

Fig. 11—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Ten Stops Per Mile

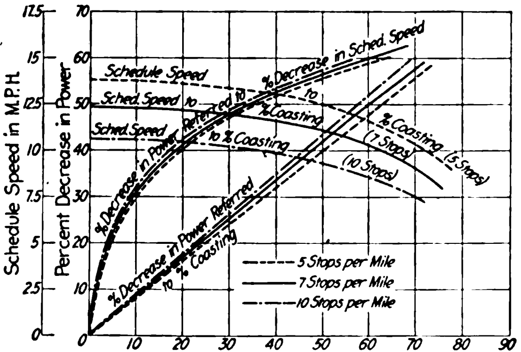
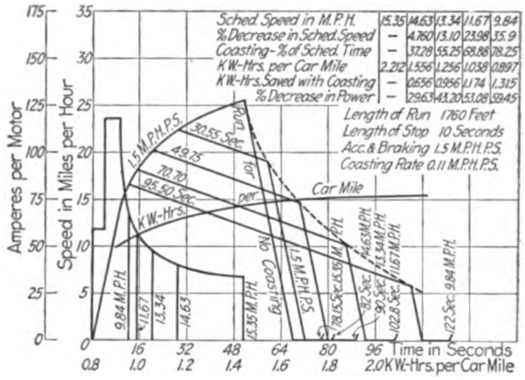


Fig. 12—Curves Showing Operating Conditions Compared with No-Coasting Conditions with Five, Seven and Ten Stops Per Mile

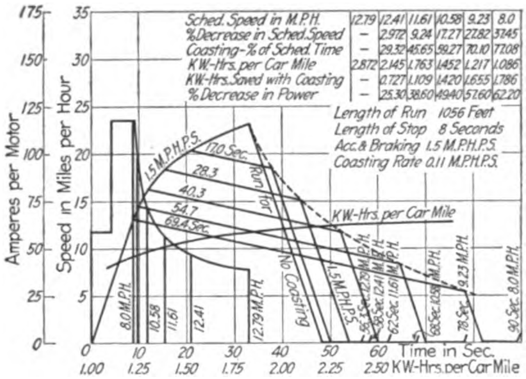
Company B



Sched. Speed in M.P.H.	15.35	14.63	13.34	11.67	9.84
% Decrease in Sched. Speed	—	4.760	13.10	23.98	35.9
Coasting-% of Sched. Time	—	37.28	55.25	68.86	78.25
KW.-Hrs. per Car Mile	2.212	1.556	1.256	1.038	0.897
KW.-Hrs. Saved with Coasting	—	0.656	0.956	1.174	1.315
% Decrease in Power	—	29.63	43.20	53.08	59.45

Length of Run 1760 Feet
Length of Stop 10 Seconds
Acc. & Braking 1.5 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

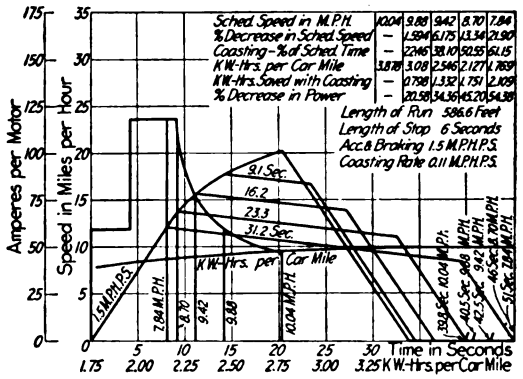
Fig. 9—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Three Stops Per Mile



Sched. Speed in M.P.H.	12.79	12.41	11.61	10.58	9.23	8.0
% Decrease in Sched. Speed	—	2.972	9.24	17.27	27.82	37.45
Coasting-% of Sched. Time	—	29.32	45.65	59.27	70.10	77.08
KW.-Hrs. per Car Mile	2.872	2.145	1.763	1.452	1.217	1.086
KW.-Hrs. Saved with Coasting	—	0.727	1.109	1.420	1.655	1.786
% Decrease in Power	—	25.30	38.60	49.40	57.60	62.20

Length of Run 1056 Feet
Length of Stop 8 Seconds
Acc. & Braking 1.5 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

Fig. 10—Diagrams Showing Operating Conditions For Several Schedule Speeds, with Five Stops Per Mile



Sched. Speed in M.P.H.	10.04	9.88	9.42	8.70	7.84
% Decrease in Sched. Speed	—	1.594	6.175	13.34	21.90
Coasting-% of Sched. Time	—	22.46	38.10	50.55	61.15
KW.-Hrs. per Car Mile	3.878	3.08	2.546	2.127	1.769
KW.-Hrs. Saved with Coasting	—	0.798	1.332	1.751	2.109
% Decrease in Power	—	20.58	34.36	45.20	54.38

Length of Run 586.6 Feet
Length of Stop 6 Seconds
Acc. & Braking 1.5 M.P.H.P.S.
Coasting Rate 0.11 M.P.H.P.S.

Fig. 11—Diagrams Showing Operating Conditions for Several Schedule Speeds, with Nine Stops Per Mile

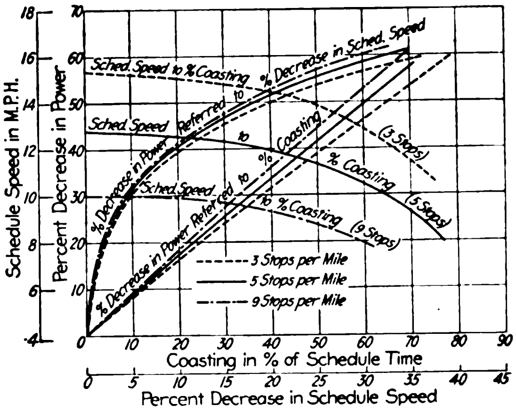


Fig. 12—Curves Showing Operating Conditions Compared with No-Coasting Conditions with Three, Five and Nine Stops Per Mile

Fig. 13 contains curves which form a summary of the data in the preceding four figures in each set of diagrams, and they show definitely the relation of energy consumption to per cent coasting and schedule speed respectively for three numbers of stops per mile. By combining with this information the cost of energy and platform labor for the case in hand it is possible to put the study upon a cost basis.

In Fig. 14 two sets of operating cost curves are plotted, one with costs plotted against schedule speeds and the other with costs plotted against per cent coasting. These are shown on the basis of 0.75 cent per kilowatt-hour energy cost, and 54 cents per hour platform labor cost in one case and 0.7 cent and 60 cents, respectively, in the other. In each curve there is a minimum value which is obviously the best one for the given number of stops per mile. In order to emphasize these minimum cost values, curves are drawn through the minimum values of the two sets of curves respectively.

In Fig. 15 the same data are plotted so that the most economical schedule speed can be read directly for any desired number of stops per mile and the corresponding per cent of coasting, combined power and platform labor cost and energy consumption are shown by curves plotted against number of stops per mile.

Both Fig. 14 and 15 show that when the schedule speeds are determined with relation to economical results, coasting must result and that the amount of coasting which corresponds to the most economical schedule speed is approximately the same in per cent over a wide range in the number of stops per mile.

ENERGY INPUT A MISLEADING MEASURE OF EFFICIENCY

Referring to Fig. 13 of Company A diagrams we note that for 40 per cent coasting with five stops per mile the energy input is 2.4 kw.-hr. per car-mile, with a schedule speed of 13 m.p.h. For 40 per cent coasting with seven stops per mile the energy input is 2.65 kw.-hr. per car-mile with a schedule speed of 11.64 m.p.h. For 40 per cent coasting with ten stops per mile, the energy input is 3.21 kw.-hr. per car-mile with a schedule speed of 9.94 m.p.h. Now the number of stops per mile selected for illustration, with the corresponding schedule speeds, are representative of the range in these quantities actually encountered for varying densities of non-rush-hour and rush-hour conditions. For the above enumerated stops per mile and corresponding schedule speeds, motormen showing coasting records of 40 per cent on that equipment are all operating at equal actual efficiency, even though the conditions of operation vary widely, as enumerated. The coasting record of the motorman, therefore, is the correct relative measure of his actual efficiency for variations in the number of stops per mile or in the schedule speed that must necessarily arise in practical operation.

On the other hand, the measurement of only the energy input of the car is an incorrect and misleading measure of the motorman's actual efficiency where the number and duration of stops or schedule speeds are variable. Efficiency in this connection means nothing unless analyzed in reference to the component time-element factors controlling the energy input, for as we have noted in the above illustrations, this may vary from 2.4 kw.-hr. to 3.21 kw.-hr. per car-mile, although the true efficiency of the motorman is exactly the same.

The incorrectness of conclusions based upon energy measurements where the number and duration of stops are variable is further illustrated by reference to Figs. 4 and 8 of Company B diagrams. In Fig. 4, with 10 m.p.h. schedule speed, five stops per mile of eight seconds' duration each, and acceleration and braking respectively ¾ m.p.h.p.s., the per cent coasting is seen to be 21½ and the energy input 2.1 kw.-hr. per car-mile. In Fig. 8 with the same schedule speed, 7.18 stops per mile of the same duration and twice the rate of acceleration and braking, the per cent coasting is seen to be 42 and the energy input 2.1 kw.-hr. per car-mile.

Based on power input measurement the performance of the motormen is exactly the same in the two cases, yet everyone knows that the additional stops in the second case require additional energy. By the efficient utilization of the time-element factors of acceleration and braking the motorman in the second case used the same energy input as did the one in the first case, but the percentage of coasting resulting was approximately double, even with additional stops. Had the motorman in the first case used 1½ m.p.h.p.s. acceleration and braking, as was done in the second case, the percentage of coasting would have been 64.3 and the energy input 1.4 kw.-hr. per car-mile.

COASTING THE CORRECT RELATIVE MEASURE OF ACTUAL EFFICIENCY

The actual efficiency, based upon the inherent principles involved in operating any given car under given conditions, is dependent upon the effective utilization of the controlling time-element factors.

For further better understanding of the factors affecting the motorman's actual efficiency Fig. 17 has been prepared, showing speed-time and power diagrams, for common variations encountered under the simplest conditions of operations, i.e., a constant schedule speed, with assumed equal duration of stops for the average number of stops per mile. In Fig. 17, seven typical runs, numbered 1 to 7, are shown, the number of stops per mile being either five, six or seven and, as indicated, each stop being of eight seconds' duration.

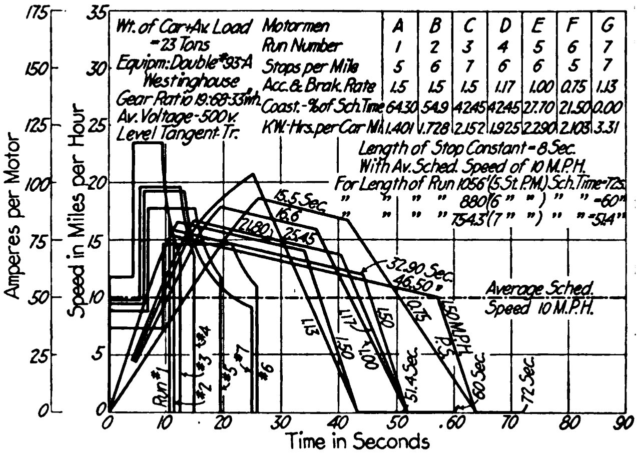


Fig. 17—Speed-Time and Power Graphs for Five, Six and Seven Stops per Mile for Several Rates of Acceleration and Braking at Constant Schedule Speed

It is to be noted from Fig. 17 that, for like number of stops per mile, the per cent coasting increases and the power input decreases, dependent upon the increase in acceleration and braking rates. Now, assume these Runs 1 to 7 are made respectively by motormen A to G. Assume further that, as in the case in practice, nothing is known as to the number of stops per mile, the only known quantity being the schedule speed. Under such conditions suppose the performance of these motormen on their respective runs to be checked, on the one hand, by coasting measurements and, on the other hand, by measurement of the power input. Which method of checking would indicate the correct relative measure of the respective motormen's actual efficiency?

Company A

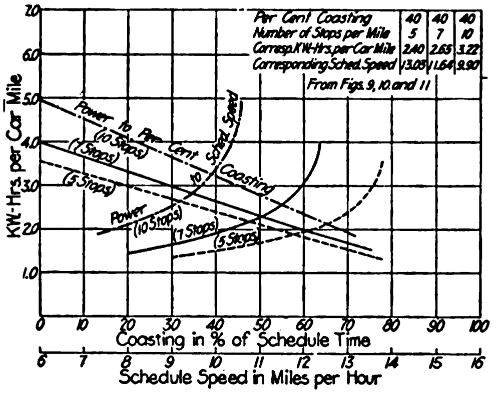


Fig. 13—Curves Showing the Relation of Power to Schedule Speed and Per Cent Coasting for Five, Seven and Ten Stops Per Mile

Company B

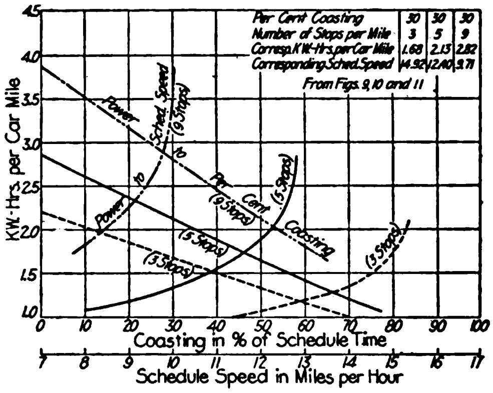


Fig. 13—Curves Showing the Relation of Power to Schedule Speed and Per Cent Coasting for Three, Five and Nine Stops Per Mile

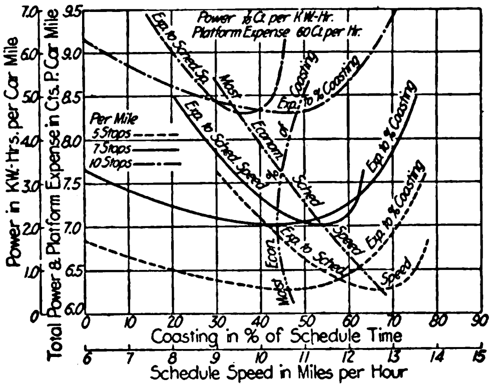


Fig. 14—Curves Showing the Relation of Power and Platform Expense to Per Cent Coasting and Schedule Speed, for Five, Seven and Ten Stops Per Mile

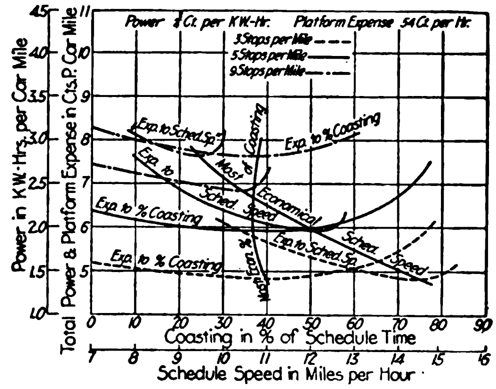


Fig. 14—Curves Showing the Relation of Power and Platform Expense to Per Cent Coasting and Schedule Speed, for Three, Five and Nine Stops Per Mile

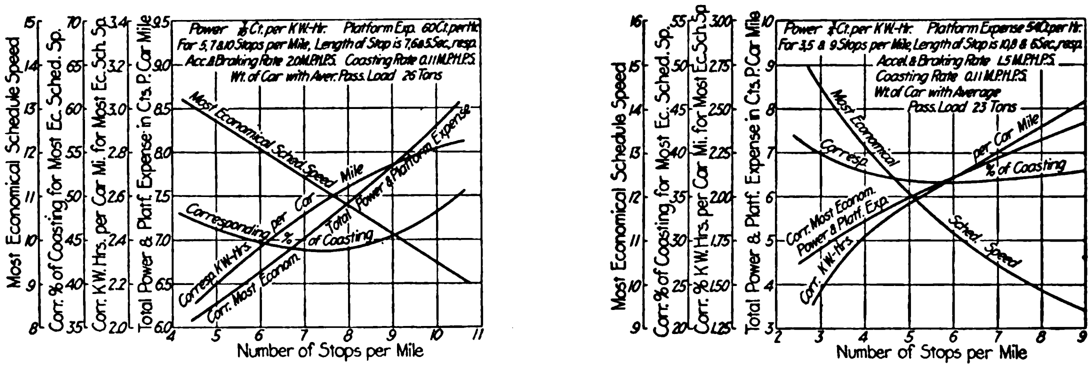


Fig. 15—Curves Showing the Most Economical Schedule Speed and Corresponding Cost and Energy Consumption for Different Numbers of Stops Per Mile

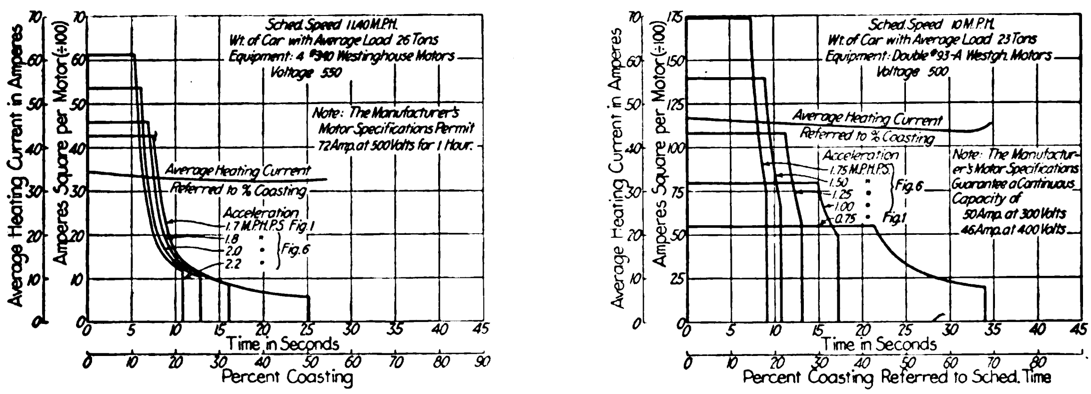


Fig. 16—Diagrams of Heating Currents Corresponding to Different Operating Conditions Shown in Fig. 6

The standing rating of the respective motormen can be stated as follows:

1. Basis of actual efficiency. Since the best efficiency for each respective number of stops per mile occurs with the highest rates of acceleration and braking, all motormen operating with such highest rates can be rated as "Par" and the remaining motormen rated the "Per cent below par," which the power actually used exceeds in per cent the power which would have been used had the highest, or "Par," rates of acceleration and braking been utilized.

2. Basis of per cent coasting determined from the measurement of the coasting time.

3. Basis of power input measured by meter, the motorman using the minimum power input (kw.-hr. per c.m.) being rated as "Par" and the remaining motormen being rated the "Per cent below par" which their respective values of kw.-hr. per c.m. actually used exceeds the minimum or "Par" value of kw.-hr. per c.m.

4. Basis of motorman's index number determined from metered measurements of the power input; each motorman's index number being the ratio of the kw.-hr. per c.m. used by such motorman to the average of the kw.-hr. per c.m. of all the motormen.

Table I shows a tabulation of the rated standings of the several motormen on the respective foregoing basis for ratings.

From Table I it is to be noted the rated standing of the respective motormen, based on the per cent coasting, is relatively correct, compared with the rated standing on the basis of actual efficiency; the discrepancies being that though the actual efficiency of motormen A, B and C is the same, the rated standing on the basis of per cent coasting differentiates as shown.

TABLE I—TABULATION OF RATED STANDING OF MOTORMEN, A TO G, WHOSE OPERATIONS ARE SHOWN BY THE DIARGAMS OF FIG. 17

1. Basis Actual Efficiency	2. Basis Per Cent Coasting	3. Basis Power Input	4. Basis Index Number
A—Par	A—64.3	A—Par	A—1.520
B—Par	B—54.9	B—23.3 per cent below par	B—1.232
C—Par	C—42.45	D—37.4 per cent below par	D—1.106
D—11.4 per cent below par	D—42.45	F—50.1 per cent below par	F—1.012
E—43.5 per cent below par	E—27.7	C—53.6 per cent below par	C—0.989
F—50.1 per cent below par	F—21.5	E—63.4 per cent below par	E—0.930
G—53.8 per cent below par	G—0	G—136.2 per cent below par	G—0.640

This differentiation is desirable, for results in practical operation show that the motorman tends to accelerate and brake at rates proportioned to the traffic requirements, instead of the efficient rates, unless his operations are effectively checked. From Fig. 17 it is to be noted that the stops per mile for A were less than for B, whose stops in turn were less than those of C. The tendency in practice would have been for B to operate less efficiently than C, and A even less than B in reference to the controlling time-element factors. Therefore, the psychological and practical effect is good if A and B are given credit, in their rated standing, as is done by the per cent coasting rating, for their efficient operation under the easier traffic conditions.

ECONOMIC ADVANTAGES OF THE SKIP-STOP PLAN

The enormous advantages to the public and the railway from the utilization of the skip-stop plan are illustrated by data taken from Figs. 13 to 15 of Company A diagrams for seven and ten stops per mile. The following table shows the results of eliminating three stops per mile.

Table II shows that the reduction from ten to seven stops per mile results in making available for the public 20.2 per cent more service, with 20.2 per cent saving in time due to increased rapid transit, at an approximate additional cost of only 1.6 per cent to the railways, on the basis of 4000 car-hours operation per car per year.

A similar study of Company B curves shows that, based on 4000 hours of operation per car per year, a reduction from seven to five stops per mile results in 15.7 per cent more available service for the public with 15.7 per cent saving in time, at only 0.7 per cent additional cost.

In concluding this part of the subject, it should be noted that while the curves in Fig. 15 show the most economical schedule speeds for given numbers of stops per mile, together with the corresponding most economical energy and platform expense, based on given energy and platform labor costs and for a given equipment, similar curves can be determined and constructed for any combination of expense rates. The important, dominating principle demonstrated by the curves is that the determination of conditions yielding best economy carry with them such utilization of the time-element factors that coasting time must result.

TABLE II—SHOWING GAINS BY REDUCTION IN NUMBER OF STOPS

	Ten Stops Per Mile	Seven Stops Per Mile	Per Cent Increase
Most economical schedule speed in. m.p.h.	9.48	11.4	20.2
Corresponding total energy and platform cost per car-mile, cents	8.32	7.03	15.5*
Total car-miles per car per year, based on 4000-hr. operation	37,920	45,600	20.2
Energy and platform labor cost per car per year, basis 4000 hr.	$3,154.92	$3,205.68	1.6

*Decrease.

It would not be right to leave this phase of the subject without considering the effect of variation in the time-element factors upon the heating of the motor equipment. Fig. 16, for Company A and Company B conditions, shows the results of studies made to determine this heating effect. In each case the square of the current, to which the heating is proportional, is plotted against time, and the average heating current is plotted against per cent coasting. The curve between the average heating current and per cent coasting shows that the results already described can be secured without exceeding the equipment limitations.

Questions may also be raised as to the effect of the rheostatic losses on the results and as to the effect of short-period, high-rate acceleration on the power plant. The construction and analysis of speed-time and power diagrams based on the maximum deviation of series operation with maintenance of schedule speeds for any average condition, will dispel any illusion that rheostatic losses may more than offset efficient utilization of the time-element factors hereinbefore discussed.

REDUCTION IN DEMAND ON GENERATING STATION AND DISTRIBUTION SYSTEM

That the adoption of a high rate of acceleration will not increase the demand on the power plant, substation equipment, etc., follows from the fact that the duration of the acceleration current and the required average current both decrease as the rate of acceleration increases. As the current peaks produced by the different cars occur at different times, when the diversity factor of the usual number of cars operated is considered it is apparent that only the sum of the reduced average currents is drawn from the power plant.

As generating and substation equipment ratings are usually based on hourly output, the average current drawn from, or the "demand" upon such equipment, for the usual rating periods of time, will be reduced approximately by the same percentage as the efficiency is increased by the efficient utilization of the controlling time-element factors, herein discussed. It is further

Tables III to VIII—Analysis of Relation of Energy and Platform Expense

Based on variable schedule speed with efficient coasting, determined
from time-speed and energy diagrams. Track level and tangent

COMPANY A—MOTOR CAR WITHOUT TRAILER

Weight with average load, tons	26
Gear ratio	15:57
Line voltage	550
Wheel diameter, inches	26
Rate of acceleration and braking, m.p.h.p.s	2
Energy cost, cent per kilowatt-hour	0.7
Platform labor cost, cents per hour	60

TABLE III

Stops per mile	5
Duration of stop, seconds	7

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
9.00	77.70	1.35	0.95	6.67	7.62
10.90	65.60	1.68	1.18	5.50	6.68
12.40	51.00	2.08	1.46	4.84	6.30
13.31	31.65	2.66	1.86	4.51	6.37
13.80	None	3.53	2.47	4.35	6.82

With 13.80 m.p.h. schedule speed, total energy per car-hour is...48.71 kw.-hr.

With 12.40 m.p.h. schedule speed, total energy per car-hour is...25.79 kw.-hr.

Excess power per car-hour for 13.80 m.p.h. over 12.40 m.p.h. is...22.92 kw.-hr.

Or excess power for 13.80 m.p.h. over energy for 12.40 m.p.h. is...88.8 per cent

But 13.80 m.p.h. schedule speed in excess of 12.40 m.p.h. is......11.3 per cent

Nine cars at 13.80 m.p.h. make 124.20 car-miles, using..438.39 kw.-hr. per hour

Ten cars at 12.40 m.p.h. make 124.00 car-miles, using...257.90 kw.-hr. per hour

Saving in kilowatt-hour output per hour for ten cars at 12.40 m.p.h. over nine cars at 13.80 m.p.h. schedule speed, both making approximately the same car-miles and hence running on the same headway, is..........180.49 kw.-hr. per hour

Or as offset to investment for one additional car there is required an investment for 180 kw. in power plant and distribution system.

TABLE IV

Stops per mile	7
Duration of stop, seconds	6

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
8.03	75.50	1.46	1.02	7.47	8.49
9.89	63.45	1.89	1.32	6.07	7.39
11.42	43.35	2.52	1.76	5.25	7.01
12.06	25.55	3.11	2.18	4.97	7.15
12.35	None	3.99	2.79	4.86	7.65

With 12.35 m.p.h. schedule speed, total power per car-hour is....49.27 kw.-hr.

With 11.42 m.p.h. schedule speed, total power per car-hour is....28.78 kw.-hr.

Excess power per car-hour for 12.35 m.p.h. over 11.42 m.p.h. is...20.49 kw.-hr.

Or excess power for 12.35 m.p.h. over power for 11.42 m.p.h. is...71.2 per cent

But 12.35 m.p.h. schedule speed in excess of 11.42 m.p.h. is........ 8.1 per cent

Ten cars at 12.35 m.p.h. gives 123.5 car-miles using....492.76 kw.-hr. per hour

Eleven cars at 11.42 m.p.h. gives 125.6 car-miles using.316.56 kw.-hr. per hour

Saving in kilowatt-hour output per hour for eleven cars at 11.42 m.p.h. over ten cars at 12.35 m.p.h., schedule speed, both making approximately the same car-miles and hence running on the same headway is....176.20 kw.-hr. per hour

Or as offset to investment for one additional car there is required an investment for 176 kw. in power plant and distribution system.

TABLE V

Stops per mile	10
Duration of stop, seconds	5

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
7.34	71.40	1.90	1.33	8.17	9.50
8.57	60.40	2.37	1.66	7.00	8.66
9.47	48.25	2.82	1.97	6.34	8.31
10.29	26.85	3.78	2.65	5.83	8.48
10.57	None	4.95	3.47	5.68	9.15

With 10.57 m.p.h. schedule speed, total power per car-hour is...52.32 kw.-hr.

With 9.47 m.p.h. schedule speed, total power per car-hour is...26.70 kw.-hr.

Excess power per car-hour for 10.57 m.p.h. over 9.47 m.p.h. is..25.62 kw.-hr.

Or excess power for 10.57 m.p.h. over power for 9.47 m.p.h. is..95.9 per cent

But 10.57 m.p.h. schedule speed in excess of 9.47 m.p.h. is.........11.6 per cent

Nine cars at 10.57 m.p.h. gives 95.13 car-miles using.....470.88 kw.-hr. per hour

Ten cars at 9.47 m.p.h. gives 94.70 car-miles using.......267.10 kw.-hr. per hour

Saving in kilowatt-hours output per hour for ten cars at 9.47 m.p.h. over nine cars at 10.57 m.p.h. schedule speed, both making approximately the same car-miles, and hence running on the same headway is..........203.88 kw.-hr. per hour

Or as offset to investment for one additional car there is required an investment for 203 kw. in power plant and distribution system.

COMPANY B—MOTOR CAR WITHOUT TRAILER

Weight with average load, tons	23
Gear ratio	19:68
Line voltage	500
Wheel diameter, inches	33
Rate of acceleration and braking, m.p.h.p.s	1.5
Energy cost, cent per kilowatt-hour	0.75
Platform labor cost, cents per hour	54

TABLE VI

Stops per mile	3
Duration of stop, seconds	10

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
9.84	78.25	0.90	0.67	5.49	6.16
11.67	68.88	1.04	0.78	4.63	5.41
13.34	55.25	1.26	0.94	4.05	4.99
14.50	39.88	1.46	1.09	3.72	4.81
14.63	37.28	1.56	1.17	3.69	4.86
15.35	None	2.21	1.66	3.52	5.18

With 15.35 m.p.h. schedule speed, total power per car-hour is...33.92 kw.-hr.

With 14.50 m.p.h. schedule speed, total power per car-hour is...21.17 kw.-hr.

Excess power per car-hour for 15.35 m.p.h. over 14.50 m.p.h. is..12.75 kw.-hr.

Or excess power for 15.35 m.p.h. over power for 14.50 m.p.h. is..60.2 per cent

But 15.35 m.p.h. schedule speed in excess of 14.50 m.p.h. is....... 5.9 per cent

Seventeen cars at 15.35 m.p.h. gives 260.95 car-miles using....................576.64 kw.-hr. per hour

Eighteen cars at 14.50 m.p.h. gives 261.00 car-miles using....................381.06 kw.-hr. per hour

Saving in kilowatt-hour output per hour for eighteen cars at 14.50 m.p.h. over seventeen cars at 15.35 m.p.h. schedule speed; both making approximately the same car-miles, and hence running on the same headway, is....................195.58 kw.-hr. per hour

Or as offset to investment for one additional car there is required an investment for 195 kw. in power plant and distribution system.

TABLE VII

Stops per mile	5
Duration of stop, seconds	8

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
8.00	77.08	1.09	0.82	6.75	7.57
9.23	70.10	1.22	0.91	5.85	6.76
10.58	59.27	1.45	1.09	5.10	6.19
11.61	45.65	1.76	1.32	4.65	5.97
12.05	36.80	1.96	1.47	4.48	5.95
12.41	28.32	2.14	1.60	4.35	5.95
12.79	None	2.87	2.15	4.22	6.37

With 12.79 m.p.h. schedule speed, total power per car-hour is...36.71 kw.-hr.

With 12.05 m.p.h. schedule speed, total power per car-hour is...23.62 kw.-hr.

Excess power per car-hour for 12.79 m.p.h. over 12.05 m.p.h. is..13.09 kw.-hr.

Or excess power for 12.79 m.p.h. over power for 12.05 m.p.h. is..55.4 per cent

But 12.79 m.p.h. schedule speed in excess of 12.05 m.p.h. is....... 6.1 per cent

Seventeen cars at 12.79 m.p.h. gives 217.43 car-miles using....................624.07 kw.-hr. per hour

Eighteen cars at 12.05 m.p.h. gives 216.90 car-miles using....................425.16 kw.-hr. per hour

Saving in kilowatt-hour output per hour for eighteen cars at 12.05 m.p.h. over seventeen cars at 12.79 m.p.h. schedule speed; both making approximately the same car-miles, and hence running on the same headway, is....................198.91 kw.-hr. per hour

Or as offset to investment for one additional car there is required an investment for 198 kw. in power plant and distribution system.

TABLE VIII

Stops per mile	9
Duration of stop, seconds	6

Schedule Speed, Miles per Hour	Per Cent of Coasting Possible	Kilowatt-Hours per Car-Mile	Cost of Power per Car-Mile, Cents	Platform Expense per Car-Mile, Cents	Combined Power and Platform Expense per Car-Mile, Cents
7.84	61.15	1.77	1.33	6.89	8.22
8.70	50.55	2.13	1.60	6.21	7.81
9.42	37.90	2.55	1.91	5.73	7.64
9.88	22.46	3.08	2.31	5.46	7.77
10.04	None	3.88	2.91	5.38	8.29

With 10.04 m.p.h. schedule speed, total power per car-hour is...38.96 kw.-hr.

With 9.42 m.p.h. schedule speed, total power per car-hour is...24.02 kw.-hr.

Excess power per car-hour for 10.04 m.p.h. over 9.42 m.p.h. is...14.94 kw.-hr.

Or excess power for 10.04 m.p.h. over power for 9.42 m.p.h. is...62.2 per cent

But 10.04 m.p.h. schedule speed in excess of 9.42 m.p.h. is....... 6.6 per cent

Fifteen cars at 10.04 m.p.h. gives 150.60 car-miles using....................584.40 kw.-hr. per hour

Sixteen cars at 9.42 m.p.h. gives 150.72 car-miles using.384.32 kw.-hr. per hour

Saving in kilowatt-hour output per hour for sixteen cars at 9.42 m.p.h over fifteen cars at 10.04 m.p.h. schedule speed; both making approximately the same car-miles, and hence running on the same headway, is..200.08 kw.-hr. per hour

Or as offset to investment for one additional car there is required an investment for 200 kw. in power plant and distribution system.

apparent from a study of the several speed-time and power diagrams that the investment for an efficiency checking system will be offset many fold by the value of the generating station, distribution system, and substation capacity, unrequired or available for other purposes, due to the reduction of the demand thereon.

SUMMARY AND CONCLUSIONS

By way of summarizing and emphasizing the results of the foregoing analysis of efficiency of car operation the following may be of interest:

1. The power input necessary to operate a given car and equipment at a given average schedule speed and with a given number of stops per mile is solely dependent upon the efficient utilization of the time-element factors; acceleration braking and duration of stop.

2. The effect on the power input of variation in these time-element factors is in proportion to the coasting time, and the increase in per cent coasting is in proportion to decrease in per cent energy consumption.

3. Since efficient utilization of power for given conditions is solely determined by these time-element factors, the correct method of checking the motorman's efficiency in the use of power is by a system giving him a positive, authentic record of his efficient utilization of these factors, which as explained above, is measured by the coasting time and the per cent coasting.

4. Equipped with such a correct method of checking efficiency, the motorman has only to handle his equipment and to take advantage of physical conditions encountered in operation so as to obtain the greatest possible coasting time, with maintenance of schedule time, on each trip of his run. The coasting time can be increased only by the motorman's efficient utilization of the time-element factors of acceleration, braking and duration of stop, these being the only factors under his control that can affect power input.

5. The economical schedule speed for given conditions is also dependent upon the efficient utilization of the time-element factors, and to be economical the schedule must be such as to permit of coasting.

6. The average number of stops per mile, considered in connection with the efficient utilization of the time-element factors, determines the limitations of possible schedule speeds with a given equipment. It is therefore necessary in determining the economical schedule speed to secure definite data in practical operation of the average number of stops per mile and the average duration thereof.

7. The per cent coasting is the measure of the correctness of the relation of the controlling time-element factors for any given number of stops per mile and schedule speed, and of the motorman's efficiency without regard to the variation in number of stops per mile and schedule speed encountered in practice.

As was stated earlier in this paper, there is no question as to the necessity for efficiency in operating an electric railway property. Gross earnings can hardly be increased under existing conditions, and, therefore, net earnings can be increased only by the reduction of operating expenses, which is a condition and not a theory that confronts us. In the solution of the problem of securing greater efficiency, practical and technical analysis must be applied to the only factors that control and determine results. As demonstrated hereinbefore, the laws governing these factors are based on known principles, and deductions based on the applications of these principles are correct to the certainty of the proverbial "death and taxes."

No railway executive or engineering staff questions the reasonable certainty of obtaining calculated efficiencies and results from the large investment involved in a new power generating station, yet the factors affecting the results obtained from that power station contain many more variables than the time-element factors which control car operation efficiency, and the correct method for checking such efficiency.

Doubtless many operating companies have already secured, or are securing, large economies from increased schedule speeds, from adopting the skip-stop and fixed-stop plans, from the use of coasting signboards, and from education of employees, as a group and by personal instruction, along the line of economies obtainable by proper handling of equipment. All of these activities tend to more efficient utilization of the controlling time-element factors of operation.

The writer realizes the possibilities of such methods, but when the enormous effect of variations of the controlling time-element factors encountered in practical operation is considered, the impossibility of approaching obtainable efficiency without a constant, individual checking record must be apparent.

A check made by means of stop watch readings of running schedule time, coasting time, average duration of stop and number of stops per mile, will demonstrate the variability in the way in which various motormen utilize the controlling time-element factors under the same conditions, to say nothing of the variations from obtainable possible results, and will prove convincing as to the need for a correct efficiency checking system.

To expect the best obtainable results without such a system is as inconsistent, when the facts involved are considered, as would be the checking of conductors in matters of fares, etc., by the average results per car on the system, instead of using some fare-registering checking system.

The fact that increased economies are accomplished by means of the more or less indirect methods mentioned points unmistakably to the economies which may be obtained when the efficiency problem is approached with the correct tool and accurate yard stick for measuring the efficient utilization of the controlling time-element factors.

It is well recognized that changing the gear ratio or utilizing the principle of field control for motors, will affect material economies under conditions that may be encountered in practical operation. However, it is apparent that such changes will not eliminate the importance the efficient utilization of the controlling time-element factors herein considered.

It should always be borne in mind that the coasting which has been referred to in this article is that coasting which forms an inherent part of the cycle of operations involved in moving the car efficiently under the practical conditions of traffic operation. Coasting is a function of such a cycle just as is acceleration, braking or duration and number of stops, but, as demonstrated, it is also the measure of the efficient utilization of these factors.

The efficiency checking system based on measurement of coasting comprehends the attainment and measurement of only such coasting as exists as a function of this cycle. It does not involve, as some seem to think, the slowing of schedules, the running by of stopping points, the operation on down grade, etc.

In conclusion the writer believes that executives and transportation managers will agree that the application of practical and technical principles to ordinary, everyday operation is the means for accomplishing efficiency in car operation. When the time-element factors are considered there will be no difference of opinion as to the correct method of checking efficiency, or as to the justification of the necessary investment in the checking system.

COMMUNICATIONS

Causes of Rail Corrugation

NEW YORK, Jan. 13, 1915.

To the Editors:

In Mr. Cram's article on curved rail heads in your issue of Dec. 25, 1915, we seem to be at least approaching the cause of rail corrugation, and the cause once found, the remedy will undoubtedly be found also. In an article in your columns several years ago the reasonableness of excessive wheel pressures being a contributing cause was set forth, but it does not seem to me that this is the sole cause. If it had been we would have found it out long ago. More probably, like tender derailments on steam railways, corrugation is the result of a combination of conditions rather than of any one condition alone, and this it is that constitutes the difficulty of solution.

Corrugated rails appear under such widely different conditions and the experience of different roads varies so greatly that it is quite impossible if not absurd to attribute the phenomenon to any one cause or possibly to any one set of causes. We find it on curves and tangents where brakes are applied and where never applied; on grades and levels, on girder and T rails, and under all manner of congruous and incongruous conditions, all of which tend to complicate the problem and add to the difficulties of its solution.

Reverting to Mr. Cram's investigations they seem to have come nearer the solution than any that have preceded, but he would probably be the first to acknowledge that he has not yet arrived, in spite of the fact that the curved headed rail has relieved some of his troubles. But rails with curved heads do corrugate, as witness those in the New York subway. Excessive wheel pressures alone cannot be responsible, else corrugation would be rampant on steam railways where individual wheel loads are far in excess of anything known in street railway work. Mr. Cram gives no figures as to the actual concentrated pressures under his wheels, but my own investigations would lead me to place it at about 70,000 lb. per square inch under eight-wheeled cars weighing 70,000 lb. when fully loaded, but this would probably be well below the load actually imposed on the rail when the car is in motion.

Some years ago I found that the vertical load between the truck and body bolsters of a car was increased by about 30 per cent with the car running at a speed of 25 m.p.h. on a smooth track. What the increase is between the wheel and the rail I do not know, but it is probably quite as much.

Again, I have found evidence that track conditions are probably responsible for much that occurs. In some investigations as to the lateral thrust of the wheel on the rail, on a tangent track, I found that if a heavy blow were delivered at a certain point, that point always received a heavy blow regardless of the type of locomotive or the speed at which it was running, and this was so although the speeds ranged from 30 m.p.h. to 60 m.p.h.

If this holds true for the lateral thrust, is it not reasonable to assume that it will be true for the vertical thrusts also? And if it is, then it is the combination of track and truck that makes for the determination of the actual instantaneous wheel loads. Incidentally it may be added that probably the more flexible the track the higher will be the gross wheel loads, while the loads imposed per square inch of area of contact will probably increase with the rigidity of the track.

I am not aware that any investigations have been made as to the microstructure of the steel at corrugations for the purpose of determining its condition and the difference between the cold rolling effect at the crests and hollows of the corrugations. As far as I could determine on a corrugated rail that was sent me for examination a few years ago, there was no difference in the hardness, but the investigation was not carried far enough to make this as a positive assertion.

Whether or not excessive wheel pressure is solely responsible it is evidently a contributing cause, and Mr. Cram has started along a line of investigation that, if followed, cannot fail to produce results of even greater value than those already obtained by him. His conclusion that the plain head is wrong and that the curved head is proper is based upon such definite data as to be incontrovertible.

It is therefore suggested that, as we know so little of the instantaneous effect of wheel and rail interactions, it would be a profitable line of investigation for an electric railway company to determine the actual vertical loads imposed by cars running on the rails, the movement of the head of the rail under traffic and the structure of the steel of the rail at the crests and hollows of the corrugations. With these data in hand, we would be better able to assign to truck and track each its own measure of responsibility for that expensive development of street railways, the corrugated rail.

GEORGE L. FOWLER.

Curved Heads for Girder Rails

ATLANTIC WELDING CORPORATION
30 CHURCH STREET
NEW YORK, Jan. 10, 1916.

To the Editors:

The article appearing in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 25, entitled "Curved Heads for Girder Rails in Brooklyn," written by R. C. Cram, assistant engineer of ways and structure, Brooklyn Rapid Transit System, and your editorial on page 1245 of the same issue, are of particular interest to way engineers, and should receive very careful consideration by all interested in this matter.

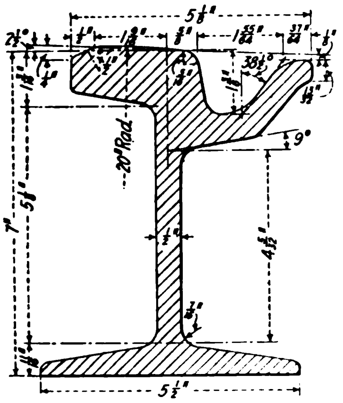
The ideas brought forward are further proof that such a step in the design of girder rail needs is unquestionably along proper lines and bear out my own personal observations. Rail corrugation is of such importance in my estimation that I am prompted to write these lines in further confirmation of the theory advanced by Mr. Cram. My own experience in the case is that the conclusions drawn are undoubtedly a predominant factor in the elimination of corrugation.

This particular subject was very forcibly brought to my attention several years ago, while connected with the Connecticut Company at Hartford, Conn., due to the fact that corrugations were developing in new rail much faster than usual. As no changes in the wheel treads had been made, the result indicated that some change in the rail necessarily caused the rapid development of corrugation.

Several observations showed that the contact between the wheel tread and the head of the rail was very unusual and undoubtedly the cause of the corrugations, and in order to confirm this theory a practical test was instituted by constructing a stretch of track in which the rails were set in a position that would bring the head surface of the rails in contact with the wheel tread throughout its entire width.

After several months of close observation the trial showed that no corrugations had developed. That the demonstration was entirely successful was further proved by the fact that after five years of service no signs of corrugation, or similar effects, were to be observed; while on identically the same general type of construction, where the rails were set in the usual manner, it was found that corrugations appeared within a few days after the rail had been put into service.

The foregoing example of corrugation elimination is further confirmed by my recent experience in Baltimore. During the time I was connected with the United Railways & Electric Company of that city a large portion of its track system was reconstructed. For some time previous to 1915 a flat-headed 7-in. girder section was used exclusively, and this always developed corrugation within a very short period after being subjected to traffic. In many cases the effects were noticeable even after but twenty-four hours of service.



BALTIMORE RAIL WITH CURVED HEAD

A study of the situation again quickly developed the fact that the amount of rail head under action was exceedingly small and was being subjected to such an overload that the metal was being cold-rolled or peened. In a few days some well-developed corrugations were noticeable.

In order to overcome this action a new section of rail was designed with a sloping head to meet as nearly as practicable the average wheel-tread contour, and the company had a large order of rail rolled as quickly as possible. This new section of rail was laid during the early part of 1915. It was P. S.-405, which is a modification of P. S.-287. Up to the time I left Baltimore no signs of corrugation were noticeable on any of these new rail, except in such instances where its presence could be attributed to some ulterior condition. In many cases we discovered that the contact between the wheel treads and the head of the rail was taking place only at the gage line and back of the head, but not for a small width on the center of the head. The new rail section eliminated the corrugation, but showed that a curved head rail was necessary in order to meet the true contour of the wheel tread.

In order to produce a complete and uniform contact between the wheel tread and the head of the rail another slight change in the design of the rail section was made. Rails of this type will shortly be laid. In my opinion this new section will be an ideal one, and besides materially helping to reduce corrugation troubles to a minimum will give the desired contact between wheel and rail.

Practical illustrations were obtained from several streets where both tracks were reconstructed in the same manner and subjected to practically the same service except that the rails used on one track were of the new design and those of the other of the flat-head type. After a few hours' time it was found that corrugation had developed in the track with flat-head rails, while no noticeable action of this nature had developed in the track with the new section.

My experiences, as set forth in the foregoing lines, has proved to me beyond doubt that the conclusions drawn in Mr. Cram's article and the statement made in the first sentence of your editorial are correct, and that the installation of curved-head girder rail will, to a great extent, eliminate corrugation and prolong life of rail and wheels.

I believe the matter to be of such importance that the subject should be given attention by the committee on way matters of the American Electric Railway Engineering Association and brought up for discussion at an early meeting. C. F. GAILOR, Engineer.

General Business Conditions

The Entire Country Is Responding to a Feeling of Optimism for 1916—Forecast for Ensuing Year as Compared with 1915

THE outlook for business for the first four months of 1916, as determined by the standing committee on statistics and standards of the Chamber of Commerce of the United States, is in striking contrast to that prevailing at this time last year. A chart published in the ELECTRIC RAILWAY JOURNAL of Jan. 9, 1915, showed poor conditions in the New England section, the Southern States (except Florida), and parts of Tennessee, Kentucky, Illinois, Missouri, Kansas, Colorado, Wyoming, the Dakotas and Michigan. The only "good" section was in the contiguous corners of Iowa, Minnesota and South Dakota. The accompanying chart, of a similar character, tells its own story for this year. It will be seen that there are spots where much caution and conservatism still remain, and the influence of high prices for the future accentuates this caution because dealers feel that high prices will curtail buying by the consumer. In a general way, however, it may be said that the spirit of optimism and hopefulness prevails to a degree that has not been apparent for nearly a decade, and the general belief and expectation is said to be for such prosperity during 1916 as will recompense the people for all past misfortunes.

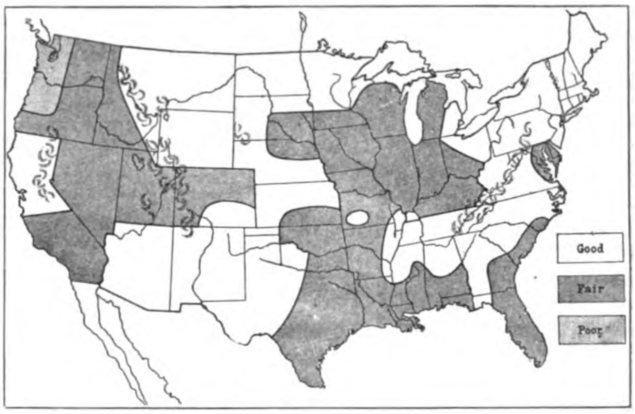


CHART SHOWING BUSINESS CONDITIONS IN THE UNITED STATES FOR FIRST FOUR MONTHS OF 1916

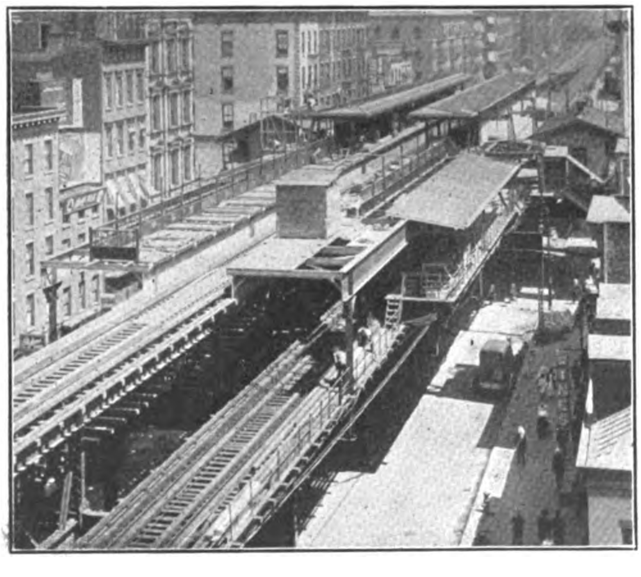
The adverse effect of the conflict in Europe still prevails in some sections, though to much less extent than at this time last year. There are still scattered fears of the possibility of this country being involved, but the large portion of the people are paying less attention to the war and concentrating on domestic matters. Beyond this is the striking fact that the influence of the war at present as a whole is more favorable than adverse, because of the tremendous impetus it has given to certain lines of manufacturing, especially east of the Alleghenies, and likewise to many agricultural products. This influence is a material factor in the present high prices of sheep, cattle, wool, grain, and of the products of leather, steel, iron, copper, brass, lead and zinc or spelter.

Third Tracking Complete on the New York Elevated

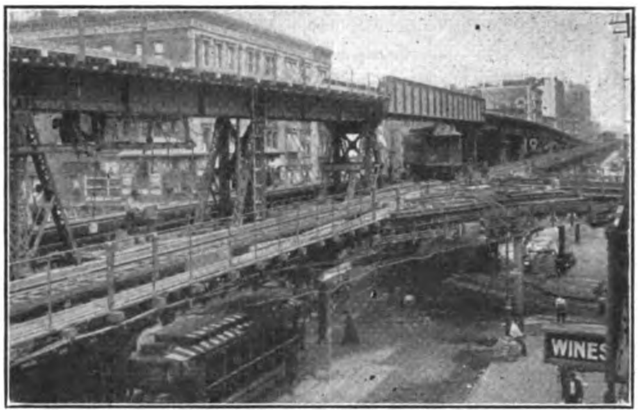
Express Service Will Be Inaugurated on Jan. 17 During the Morning and Evening Rush Hours, Increasing the Passenger-Carrying Capacity 20 Per Cent

THE third tracking of the Manhattan Elevated Railway in New York City has now been completed and express service on these lines will be begun on Jan. 17, the express trains running south during the morning rush and north during the evening rush over the center track. It is estimated by officials of the Interborough Rapid Transit Company, which operates the elevated roads, that the introduction of this service will increase their capacity by about 20 per cent, the limiting feature being the ability of the local track that is opposed to the prevailing direction of traffic to supply cars at the terminal from which the express trains start. Practically no storage can be provided at the downtown end of the lines. However, traffic will be diverted to some extent from the overcrowded subways, as the third tracking of the Second Avenue elevated line, which has heretofore been used for a comparatively small local traffic, has now been arranged to give express service to the upper part of the city and the borough of the Bronx. In fact, the Second Avenue line is to be the fastest route uptown, as it is planned that the run from the City Hall to 125th Street, a distance of about 7 miles, is to be made in twenty minutes, including only four intermediate stops, as opposed to twenty-three minutes required by the subway express trains and saving about ten minutes over the local schedule on the elevated lines. The Second Avenue trains will be run across a new double-deck bridge over the Harlem River to serve the elevated lines in the Bronx which heretofore were utilized only for Third Avenue trains.

The work, which was undertaken just two years ago, has added about 15 miles of new track to the elevated railway system, and about 9 miles of the old track have been rebuilt. A number of engineering problems of unusual difficulty have been solved in the construction, a double-deck terminal station with four tracks having been provided at the City Hall, and a two-level station with seven tracks having been constructed at Chatham Square, the point where the City Hall and South Ferry trains separate for the southbound traffic and where northbound Second Avenue and Third Avenue trains diverge.



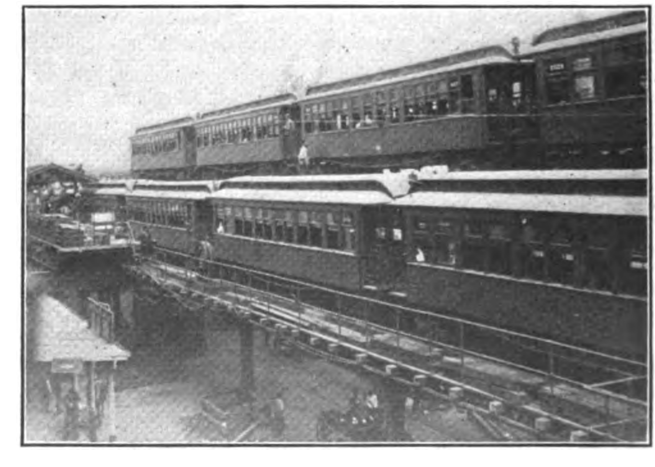
MANHATTAN ELEVATED THIRD TRACKING—TYPICAL EXPRESS STATION ON HUMP, LOCAL STATION BELOW



MANHATTAN ELEVATED THIRD TRACKING—HUMP IN EXPRESS TRACK TO CLEAR CROSS-OVER AT JUNCTION OF LOCAL TRACKS

In general, the third track has been inserted between the two original tracks, and an unusual feature of this arrangement has been the use of double-deck stations for the express tracks, which have made possible the establishment of express stations without widening the original elevated structure. At these express stations the express platforms are located at a higher level than the rest of the line, and as the third track approaches one of them it begins to ascend until the platforms that serve it are high enough above the local tracks to clear the cars which run upon them. The platforms for the express stations are thus built directly over the local tracks and stairways to the new platforms are provided from the original station platforms. In this manner the obstruction of light and air to the street has been reduced to a minimum.

These "humps" in the third-track construction have been introduced also to avoid grade crossings, such, for instance, as occurs where the Sixth Avenue line at Fifty-third Street joins the Ninth Avenue line. In consequence, the Ninth Avenue express trains will have a clear run without risk of running into Sixth Avenue trains which turn onto the Ninth Avenue line and without chance of being held up while one of these local trains is slowly passing. An especially interesting feature of the work of construction was the raising of the Second Avenue tracks for four blocks at 125th Street without interfering with traffic. This was done by jacking up the whole structure from false-work erected below it. Also on the double-track Third Avenue line in the Bronx, room for the express station at 133d Street was made by sliding one of the existing local tracks complete with ties and stringers sidewise upon the new supporting structure built below it.



MANHATTAN ELEVATED THIRD TRACKING—RAISED THIRD TRACK PRIOR TO ERECTION OF EXPRESS STATION

MIDYEAR MEETING
CHICAGO
FEBRUARY 4, 1916

ASSOCIATION NEWS

MIDYEAR MEETING
CHICAGO
FEBRUARY 4, 1916

Committee Lists of the Various Affiliated Associations Are Practically Completed and Are Published Below—New England Delegation Is Making Arrangements to Attend Mid-Year Meeting—A Conference on the Electrical Safety Code Was Held in New York City

Committee Appointments for 1915-1916

With a few exceptions, the following is a complete list of committees for the year 1915-1916 of the various associations except the Accountants.

AMERICAN ASSOCIATION

Aera advisory—H. C. Donecker, chairman, Newark, N. J.; T. P. Kilfoyle, Cleveland, Ohio; John Lindall, Boston, Mass.; George Carson, Seattle, Wash.; H. A. Nicholl, Anderson, Ind.; Thomas Finigan, San Francisco, Cal.; C. C. Peirce, Boston, Mass.

Anthony N. Brady medal—Arthur W. Brady, chairman, Anderson, Ind.; W. C. Fisk, New York City; C. S. Sergeant, Boston, Mass.

Award of bronze medal for best paper presented before a company section—H. R. Fehr, chairman, Allentown, Pa.; P. S. Arkwright, Atlanta, Ga.; J. H. McGraw, New York City.

Company membership—George W. Knox, chairman. Oklahoma City, Okla.; A. M. Patten, Topeka, Kan.; J. H. DeGrange, New Orleans, La.; W. J. Jones, Austin, Tex.; W. B. Rockwell, Pottsville, Pa.; E. C. Foster, Manchester, N. H.; B. M. Warner, San Diego, Cal.

Company sections and individual membership—Martin Schreiber, chairman, Newark, N. J.; F. W. Bacon, Lexington, Ky.; J. E. Gibson, Kansas City, Mo.; George G. Whitney, Washington, D. C.; E. J. Blair, Chicago, Ill.; Prof. H. H. Norris, New York City.

Compensation for carrying United States mail—George H. Harries, chairman, Omaha, Neb.; Henry S. Lyons, Boston, Mass.; A. R. Piper, Brooklyn, N. Y.; R. S. Goff, Boston, Mass.; S. W. Ladd, Detroit, Mich.

Constitution and by-laws—George H. Harries, chairman, Omaha, Neb.; R. I. Todd, Indianapolis, Ind.; E. B. Burritt, New York City.

Education—Prof. H. H. Norris, chairman, New York City; H. A. Bullock, Brooklyn, N. Y.; Martin Schreiber, Newark, N. J.; Prof. W. L. Robb, Troy, N. Y.; Prof. A. M. Buck, Urbana, Ill.; Prof. V. Karapetoff, Ithaca, N. Y.

Electrolysis—Calvert Townley, chairman, New York City; R. P. Stevens, Youngstown, Ohio; L. D. H. Gilmour, Newark, N. J.; J. E. Woodbridge, San Francisco, Cal.

Federal relations—Arthur W. Brady, chairman, Anderson, Ind.; E. G. Connette, Buffalo, N. Y.; George H. Harries, Omaha, Neb.; E. C. Foster, Manchester, N. H.; L. S. Storrs, New Haven, Conn.; F. W. Brooks, Detroit, Mich.; H. H. Crowell, Grand Rapids, Mich.; Frank R. Ford, New York City; L. S. Cass, Waterloo, Iowa; F. T. Griffith, Portland, Ore.; H. E. Chubbuck, Peoria, Ill.

Insurance—A. H. Ford, chairman, Portland, Me.; H. J. Davies, Cleveland, Ohio.; F. J. Spaulding, Brooklyn, N. Y.; F. A. Healy, Cincinnati, Ohio.

Mid-year dinner—B. I. Budd, chairman, Chicago, Ill.; Henry A Blair, Chicago, Ill.; Leonard A. Busby, Chicago, Ill.; Charles C. Peirce, Boston, Mass.; L. E. Gould, Chicago, Ill.; E. F. Wickwire, Mansfield, Ohio; M. B. Lambert, Pittsburgh, Pa.

Public relations—C. Loomis Allen, chairman, Syracuse, N. Y.; T. S. Williams, Brooklyn, N. Y.; J. D. Mortimer, New York City; J. H. McGraw, New York City; Guy E. Tripp, New York City; S. M. Curwen, Philadelphia, Pa.; E. W. Rice, Jr., Schenectady, N. Y.; J. K. Choate, New York City; Frank Hedley, New York City; Charles N. Black, San Francisco, Cal.; T. S. Wheelwright, Richmond, Va.; Henry A. Blair, Chicago, Ill.; Arthur W. Brady, Anderson, Ind.; E. G. Connette, Buffalo, N. Y.; George E. Hamilton, Washington, D. C.; H. G. Bradlee, Boston, Mass.; H. H. Vreeland, New York City; C. C. Peirce, Boston, Mass.; P. F. Sullivan, Boston, Mass.

Recommendations in president's address—Arthur W. Brady, chairman, Anderson, Ind.; Thomas N. McCarter, Newark, N. J.; George H. Harries, Omaha, Neb.; Guy E. Tripp, New York City; E. W. Rice, Jr., Schenectady, N. Y.

Representing association at good roads congress—Gordon Campbell, chairman, York, Pa.; W. B. Rockwell, Pottsville, Pa.

Standards for car loading—S. W. Huff, chairman, Brooklyn, N. Y.; E. J. Dickson, Buffalo, N. Y.; E. J. Cook, Rochester, N. Y.; W. F. Ham, Washington, D. C.

Subjects—L. S. Storrs, chairman, New Haven, Conn.; Jesse W. Lilienthal, San Francisco, Cal.; Harlow C. Clark, New York City; John Lindall, Boston, Mass.; T. P. Kilfoyle, Cleveland, Ohio; George Carson, Seattle, Wash.; H. A. Nicholl, Anderson, Ind.

Valuation—J. N. Shannahan, chairman, Hampton, Va.; P. J. Kealy, Kansas City, Mo.; H. H. Crowell, Grand Rapids, Mich.; B. E. Tilton, Syracuse, N. Y.; C. S. Sergeant, Boston, Mass.; W. H. Sawyer, Columbus, Ohio; C. G. Young, New York City; Martin Schreiber, Newark, N. J.

Operation of motor vehicles—Britton I. Budd, chairman, Chicago, Ill.; William A. House, Baltimore, Md.; Henry G. Bradlee, Boston, Mass.; C. L. S. Tingley, Philadelphia, Pa.; Frank Silliman, Philadelphia, Pa.

1916 *transportation committee*—W. O. Wood, master of transportation, Long Island City, N. Y.; H. G. McConnaughy, master of transportation, New York City; *New England*—R. M. Sparks, chairman, Boston, Mass.; C. V. Wood, Springfield, Mass.; A. H. Ford, Portland, Me.; J. K. Punderford, New Haven, Conn.; A. E. Potter, Providence, R. I.; *New York State (exclusive of New York City)*—W. H. Collins, chairman, Gloversville, N. Y.; B. E. Tilton, Syracuse, N. Y.; J. F. Hamilton, Schenectady, N. Y.; F. H. Hill, Elmira, N. Y.; R. M. Searle, Rochester, N. Y.; *New York City*—J. P. Kineon, chairman, Far Rockaway, N. Y.; J. S. Doyle, New York City; George Keegan, New York City; J. J. Dempsey, Brooklyn, N. Y.; H. A. Bullock, Brooklyn, N. Y.; *New Jersey, Pennsylvania, Delaware and Maryland*—W. B. Rockwell, chairman, Pottsville, Pa.; J. W. Brown, Newark, N. J.; T. W. Wilson, Wilmington, Del.; William H. Hitchcock, Keyport, N. J.; Rankin Johnson, Trenton, N. J.; T. C. Cherry, Annapolis, Md.; S. S. Crane, Altoona, Pa.; *District of Columbia, Kentucky, Virginia and West Virginia*—J. N. Shannahan, chairman, Hampton, Va.; C. B. Buchanan, Richmond, Va.; J. H. Hanna, Washington, D. C.; F. W. Bacon, Lexington, Ky.; W. A. McCorkle, Charleston, W. Va.; *Indiana, Ohio and Michigan*—R. P. Stevens, chairman, Youngstown, Ohio; A. D. B. Van Zandt, Detroit, Mich.; J. F. Collins, Jackson, Mich.; G. K. Jeffries, Indianapolis, Ind.; F. W. Coen, Sandusky, Ohio; R. A. Crume, Dayton, Ohio;

North and South Carolina, Georgia and Florida—W. H. Glenn, chairman, Atlanta, Ga.; R. W. Spofford, Augusta, Ga.; Hardy Croom, Jacksonville, Fla.; J. H. Sottile, Charleston, S. C.; H. W. Plummer, Asheville, N. C.; *Tennessee, Mississippi and Alabama*—F. W. Hoover, chairman, Chattanooga, Tenn.; R. H. Smith, Jackson, Miss.; C. J. Zell, Gadsden, Ala.; *Texas, Oklahoma Arkansas and Louisiana*—L. C. Bradley, chairman, Houston, Tex.; C. J. Griffith, Little Rock, Ark.; M. S. Sloan, New Orleans, La.; R. D. Long, Muskogee, Okla; *Colorado, Utah, Arizona and New Mexico*—F. W. Hild, chairman, Denver, Col.; H. L. Beach, Salt Lake City, Utah; F. E. Russell, Tucson, Ariz.; W. S. Townsend, Las Vegas, N. M.; *Illinois and Wisconsin*—G. T. Seeley, chairman, Chicago, Ill.; J. V. Sullivan, Chicago, Ill.; E. E. Soules, Peoria, Ill.; R. B. Stearns, Milwaukee, Wis.; C. R. Phenicie, Green Bay, Wis.; *Minnesota, North and South Dakota, Iowa, and Manitoba, Canada*—J. J. Caufield, chairman, Minneapolis, Minn.; F. M. Mills, Sioux Falls, S. D.; E. L. Kirk, Sioux City, Ia.; Thomas Roycroft, Grand Forks, N. D.; L. S. Cass, Waterloo, Ia.; Wilford Phillips, Winnipeg, Man.; *Missouri, Kansas and Nebraska*—J. R. Harrigan, chairman, Kansas City, Mo.; Bruce Cameron, St. Louis, Mo.; R. A. Leussler, Omaha, Neb.; A. M. Patten, Topeka, Kan.; *Montana, Idaho, Oregon and Washington, and British Columbia, Canada*—F. I. Fuller, chairman, Portland, Ore.; W. C. Callaghan, Helena, Mont.; H. F. Dicke, Boise, Idaho; George Carson, Seattle, Wash.; W. G. Murrin, Vancouver, B. C.; *California*—G. H. Harris, Oakland, Cal.; H. T. Jones, San Francisco, Cal.; B. M. Warner, San Diego, Cal.; *Eastern Canada (Ontario, Quebec and Nova Scotia)*—Patrick Dubee, chairman, Montreal, Que.; H. G. Mathews, Quebec; E. L. Milliken, Sydney, N. S.; J. D. Fraser, Ottawa, Ont.

Street traffic—J. K. Punderford, chairman, New Haven, Conn.; John Lindall, Boston, Mass.; George Carson, Seattle, Wash.; H. A. Nicholl, Anderson, Ind.

ENGINEERING ASSOCIATION

Buildings and structures—C. F. Bedwell, chairman, Newark, N. J.; R. C. Bird, New York City; C. S. Kimball, Washington, D. C.; H. G. Throop, Syracuse, N. Y.; William Roberts, Akron, Ohio; H. G. Salisbury, Toronto, Ont.; James Link, Knoxville, Tenn.; H. E. Funk, Brooklyn, N. Y.; F. F. Low, Boston, Mass.

Electrolysis—A. S. Richey, chairman, Worcester, Mass.; G. W. Palmer, Jr., Boston, Mass.; E. B. Katte, New York City; E. J. Blair, Chicago, Ill.

Equipment—W. G. Gove, chairman, Brooklyn, N. Y.; H. A. Johnson, Chicago, Ill.; W. E. Johnson, Brooklyn, N. Y.; H. C. Prather, Syracuse, N. Y.; W. W. Brown, Brooklyn, N. Y.; R. H. Dalgleish, Washington, D. C.; L. M. Clark, Indianapolis, Ind.; J. S. McWhirter, New York City; E. W. Holst, Boston, Mass.

Heavy electric traction—E. R. Hill, chairman, New York City; E. B. Katte, New York City; W. S. Murray, New Haven, Conn.; Hugh Hazelton, New York City; C. H. Quinn, Roanoke, Va.; J. H. Davis, Baltimore, Md.

Nominations—Paul Winsor, chairman, Boston, Mass.; E. O. Ackerman, Columbus, Ohio; W. S. Twining, New York City; A. T. Clark, Baltimore, Md.; S. L. Foster, San Francisco, Cal.

Power distribution—C. L. Cadle, chairman, Rochester, N. Y.; Ralph H. Rice, Chicago, Ill.; E. J. Blair, Chicago, Ill.; M. J. Kehoe, Springfield, Ohio; C. F. Woods, Boston, Mass.; E. J. Burdick, Detroit, Mich.; C. R. Phenicie, Green Bay, Wis.; E. S. Gillette, Wheaton, Ill.; C. R. Harte, New Haven, Conn.

Power generation—J. W. Welsh, chairman, Pittsburgh, Pa.; H. G. Stott, New York City; G. H. Kelsay, Anderson, Ind.; F. S. Freeman, Boston, Mass.; A. B. Stitzer, New York City; G. T. Bromley, Allentown, Pa.; W. E. Rolston, Michigan City, Ind.; L. E. Sinclair, Washington, D. C.; J. G. Swain, Akron, Ohio.

Representing association at good roads congress—J. M. Larned, Pittsburgh, Pa.

Standards—H. H. Adams, chairman, Chicago, Ill.; E. R. Hill, New York City; E. B. Katte, New York City; W. G. Gove, Brooklyn, N. Y.; J. S. McWhirter, New York City; C. F. Bedwell, Newark, N. J.; Martin Schreiber, Newark, N. J.; J. W. Welsh, Pittsburgh, Pa.; J. H. Hanna, Washington, D. C.; C. H. Clark, Cleveland, Ohio; R. C. Cram, Brooklyn, N. Y.; C. L. Cadle, Rochester, N. Y.; C. R. Harte, New Haven, Conn.

Subjects—F. R. Phillips, chairman, Pittsburgh, Pa.; J. H. Hanna, Washington, D. C.; Martin Schreiber, Newark, N. J.

Use of association standards—H. H. Adams, chairman, Chicago, Ill.; W. G. Gove, Brooklyn, N. Y.; J. H. Hanna, Washington, D. C.

Way matters—C. H. Clark, chairman, Cleveland, Ohio; R. C. Cram, Brooklyn, N. Y.; L. A. Mitchell, Anderson, Ind.; E. M. T. Ryder, New York City; W. F. Graves, Montreal, Que.; A. E. Harvey, Kansas City, Mo.; B. J. Fallon, Chicago, Ill.; E. M. Haas, Chicago, Ill.; H. M. Steward, Boston, Mass.

CLAIMS ASSOCIATION

Employment—B. B. Davis, chairman, Columbus, Ohio; A. D. Brown, Syracuse, N. Y.; C. J. McAleer, Schenectady, N. Y.

Subjects—H. G. Windsor, chairman, Tacoma, Wash.; W. F. Weh, Cleveland, Ohio; H. V. Drown, Newark, N. J.; James R. Pratt, Baltimore, Md.

Ways and means—J. S. Kubu, chairman, Utica, N. Y.; J. S. Harrison, Jacksonville, Fla.; W. H. Renaud, Jr., New Orleans, La.

TRANSPORTATION & TRAFFIC ASSOCIATION

Construction of schedules and time-tables—Edward Dana, chairman, Boston, Mass.; Howard F. Fritch, Boston, Mass.; Fred Cooper, Portland, Ore.; J. P. Kineon, Far Rockaway, N. Y.; Herman E. Hicks, Rochester, N. Y.

Express and freight traffic—F. D. Norviel, chairman, Anderson, Ind.; H. J. Clark, Syracuse, N. Y.; W. S. Whitney, Springfield, Ohio; A. R. Piper, Brooklyn, N. Y.; C. J. Munton, Kendallville, Ind.; W. J. Whiteside, Buffalo, N. Y.

Fares and transfers—C. S. Ching, Boston, Mass.; B. C. Edgar, Nashville, Tenn.; George L. Radcliffe, Cleveland, Ohio; Bruce Cameron, St. Louis, Mo.; J. T. Moffett, Washington, D. C.; G. S. Brush, Portland, Me.

Passenger traffic—J. K. Punderford, chairman, New Haven, Conn.; P. P. Crafts, Parkersburg, W. Va.; B. E. Wilson, Rochester, N. Y.; Charles Currie, Akron, Ohio; E. M. Walker, Dubuque, Iowa; J. F. Keys, Detroit, Mich.

Rules—C. E. Morgan, chairman, Jackson, Mich.; S. W. Greenland, Fort Wayne, Ind.; F. H. Hill, Elmira, N. Y.; U. W. Berry, Fort Worth, Tex.; M. S. Sloan, New Orleans, La.; J. E. Duffy, Rochester, N. Y.; Samuel Riddle, Louisville, Ky.

Special committee on cost of rush-hour service—J. V. Sullivan, chairman, Chicago, Ill.; H. B. Potter, Boston, Mass.; A. T. Warner, Newark, N. J.

Standards—L. H. Palmer, chairman, Baltimore, Md.; J. N. Shannahan, Hampton, Va.; A. H. Ford, Portland, Me.; C. H. Harvey, Knoxville, Tenn.; C. V. Wood, Springfield, Mass.; H. C. Donecker, Newark, N. J.; C. E. Morgan, Jackson, Mich.; F. D. Norviel, Anderson, Ind.; Edward Dana, Boston, Mass.; N. W. Bolen, Newark, N. J.; J. K. Punderford, New Haven, Conn.

Subjects—M. C. Brush, chairman, Boston, Mass.; L. H. Palmer, Baltimore, Md.; J. K. Choate, New York City; H. C. Donecker, Newark, N. J.

Training of transportation employees—N. W. Bolen, chairman, Newark, N. J.; C. B. Buchanan, Richmond, Va.; M. J. Feron, Chicago, Ill.; J. T. Conway, Boston, Mass.; W. C. Sparks, Rockford, Ill.

Uniform definitions—J. V. Sullivan, chairman, Chicago, Ill.; Frederic Nicholas, New York City; William C. Greenough, Worcester, Mass.

JOINT COMMITTEES ACCOUNTANTS AND ENGINEERING ASSOCIATIONS

Engineering-Accounting—Accountants, not yet appointed; Engineering, L. P. Crecelius, co-chairman, Cleveland, Ohio; J. P. Ripley, New York City; Harold Bates, New Haven, Conn.; Norman Litchfield, New York City; E. P. Roundey, Syracuse, N. Y.

Life of railway physical property—Accountants, not yet appointed; Engineering, Martin Schreiber, co-chairman, Newark, N. J.; J. H. Hanna, Washington, D. C.; C. F. Bancroft, Boston, Mass.

ACCOUNTANTS AND TRANSPORTATION & TRAFFIC ASSOCIATIONS

Transportation-Accounting—Accountants, not yet appointed; Transportation and Traffic, E. B. Peck, co-chairman, Indianapolis, Ind.; A. Swartz, Sylvania, Ohio; E. C. Faber, Aurora, Ill.

ENGINEERING AND TRANSPORTATION & TRAFFIC ASSOCIATIONS

Block signals for electric railways—Engineers, J. M. Waldron, chairman, New York City; J. Leisenring, Peoria, Ill.; G. N. Brown, Syracuse, N. Y.; J. B. Stewart, Jr., Youngstown, Ohio; Transportation & Traffic, J. W. Brown, vice-chairman, Newark, N. J.; J. J. Doyle, Baltimore, Md.; F. W. Coen, Sandusky, Ohio; G. K. Jeffries, Indianapolis, Ind.

Transportation-Engineering—Engineers, Paul Winsor, co-chairman, Boston, Mass.; F. R. Phillips, Pittsburgh, Pa.; W. J. Harvie, Syracuse, N. Y.; Transportation & Traffic, W. A. Carson, co-chairman, Evansville, Ind.; P. N. Jones, Pittsburgh, Pa.; C. F. Hewitt, Albany, N. Y.

New England Delegation to Mid-Year Meeting

Transportation arrangements are being made for the New England delegation to the mid-year meeting of the Railway and Manufacturers' associations in Chicago on Feb. 4. The trains are as follows: "Wolverine," leaving Boston on Feb. 2 at 2 p. m.; the "B. & A. 41," leaving on Feb. 3 at 10 a. m., and the "Twentieth Century," leaving Feb. 3 at 12.30 p. m. The railroad fare each way between Boston and Chicago, exclusive of Pullman charges, is $23.10, with $8 excess fare on the "Twentieth Century." The committee in charge is: C. V. Wood, Springfield, Mass.; A. E. Potter, Providence, R. I.; J. K. Punderford, New Haven, Conn.; A. H. Ford, Portland, Me., and Ralph M. Sparks, chairman, 15 Milk Street, Boston.

Electrical Safety Code Conference in New York

On Jan. 6 and 7 at the association's headquarters, a conference of railway men was held for the purpose of considering suggestions regarding the proposed Bureau of Standards' national electrical safety code in response to a letter recently sent out by President C. L. Henry. Those in attendance included the following: Representing the American Electric Railway Association, W. J. Harvie, Syracuse, N. Y.; A. S. Richey, Worcester, Mass., and T. L. Cadle, Rochester, N. Y.; representing the power distribution committee of the Engineering Association, E. J. Blair, Chicago, Ill., and R. H. Rice, Chicago, Ill.; representing the Central Electric Railway Association, Adolph Schlesinger, Indianapolis, Ind., and G. H. Kelsay, Anderson, Ind.; representing the Pennsylvania Street Railway Association, A. P. Way, Philadelphia, Pa. Representatives of the Illinois Electric Railways Association and the New York Electric Railway Association were also invited but were unable to appear.

The conference took up point by point a number of detailed suggestions which had come in from member companies, and where practicable, these were put into form for suggestion to the Bureau of Standards.

Slight Increase in Mail Pay

Report of Second Assistant Postmaster-General Shows Slight Increase for Year Ending June 30, 1915, but Smaller Estimate of Cost for This Year

THE report of the second assistant postmaster-general for the year ended June 30, 1915, has just been made public. The portion of the report relating to electric and cable-car service follows:

TABLE SHOWING ELECTRIC AND CABLE MAIL ROUTES, YEAR ENDED JUNE 30, 1915

		Increase	
		Amount	Per Cent
Number of routes	569	10	1.788
Length of routes, miles	8,182.68	250.40	3.156
Annual travel, miles	13,947,850.96	795,907.40	6.051
Annual rate of expenditure	$819,452.41	$57,247.02	7.517
Average rate of cost per mile of length	$100.14	$4.06	4.225
Average rate of cost per mile traveled, cents	5.87	0.09	1.554
Average number of trips per week	16.39	0.45	2.823

The appropriation for the fiscal year 1915 provided by the act of March 9, 1914, was $784,000. The deficiency appropriation provided by the act of March 4, 1915, was $15,888, making the total appropriation for the fiscal year $799,888.

The amount expended, as reported by the auditor, to Sept. 30, 1915, was $797,800.82, leaving an unexpended balance of $2,087.18, out of which unsettled accounts must be paid.

The amount available for the fiscal year 1916 is $784,000. The post-office appropriation bill for 1916 carried $845,000 for this purpose but failed of passage, and the joint resolution hereinbefore mentioned made the amount of appropriation for the fiscal year 1915 available for the fiscal year 1916.

The annual rate of expenditure was:

July 1, 1915	$818,857.57
Sept. 30, 1915	788,944.95

The sum estimated as necessary for the fiscal year ending June 30, 1917, is $660,000, being $124,000, or 15.81 per cent, less than the appropriation for 1916.

The annual rate of expenditure for electric and cable-car service authorized at the various rates provided by law was, on June 30, 1915, as follows:

At 3 cents a mile	$196,991.85
At 4 cents a mile	75,504.89
Under special provision	6,707.20
At railroad rates	81,137.79
At schedule rates other than 3 and 4 cents a mile	38,750.34
At department and independent car regular rates	45,126.03
At apartment and independent car maximum rates	370,219.93
At special agreement rates less than regular rates	5,014.38
	$819,452.41

The estimates for the next fiscal year include the existing provisions regarding rates that may be paid.

Demands were made upon the department during the fiscal year by a number of electric car companies for increased compensation, and increases were allowed within the limitations prescribed by law where conditions warranted. In certain cases, notably Boston, Mass., it was found to be to the department's advantage to discontinue the electric car service and provide a substitute service.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electrical Railroading

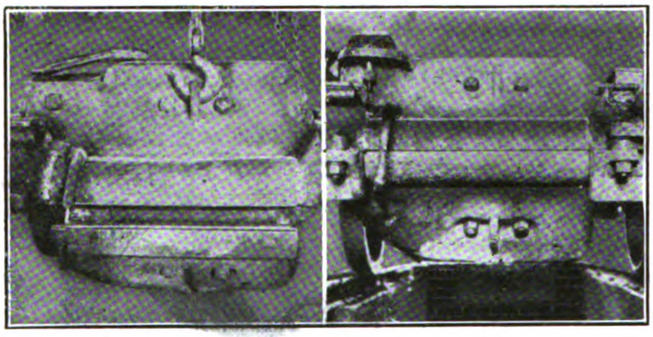
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Reclaiming GE-57 Motors

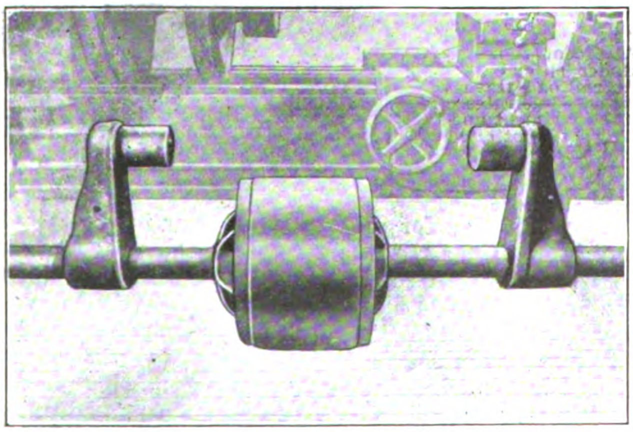
BY R. W. PALMER
Manager Cleveland & Erie Railway, Girard, Pa.

The armature and axle bearings on GE-57 railway motors, like those of most split-frame railway motors, are held in position by clamping the bearing shells in place by means of the lower bearing or other housing cap. The regular service wear causes these bearing seats to wear to such an extent as to interfere with proper alignment of the armature, pinion, gear and axle, causing undue wear of gear and pinion, as well as inequality in the air gap between armature and pole pieces. These faults not only interfere with the efficiency of the motor but increase the cost of maintenance.

To correct the defects and re-establish the centers it is necessary to rebore the motor frames, which work is done in the shops of the Cleveland & Erie Railway on a standard 36-in. lathe. In boring the frames for the armature bearings the field coils and pole pieces are removed and a cast-iron spool 20⅜-in. in diameter, shown in the illustration immediately following, is placed between the upper and lower frames, resting on the four finished surfaces where the pole pieces are attached. The frame bolts are then replaced and the upper and lower halves are bolted together, clamping the spool, which acts as a guide for the boring bar, firmly in place.



RECLAIMING GE-57'S—CAST-STEEL SHIELD OVER AXLE



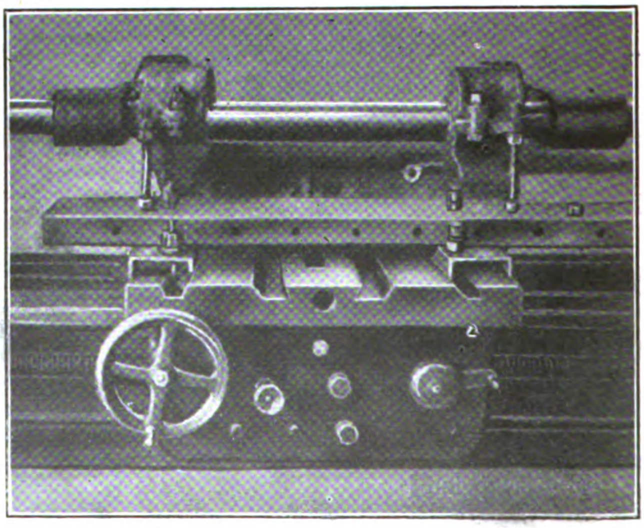
RECLAIMING GE-57'S—SPOOL GUIDE FOR BORING BAR

After removing the cross-feed carriage the frame is placed in the lathe, with the boring bar between the centers. It is then lined up and clamped to the carriage and the armature bearing seats are bored to a standard diameter of 5 in.

After the boring of the armature seats, and while the spool is still clamped in position, a ⅞-in. hole is drilled parallel to, and 7 5/16 in. from, the axis of the armature bearings on both commutator and pinion ends, on the side opposite the axle. These ⅞-in. holes are drilled so that one-half of each is in the upper and the other half in the lower frame. When the motors are finally reassembled, a ⅞-in. pin, made from cold-rolled steel with cotters at each end, is placed in the holes. This pin acts as a dowel and prevents the lower frame from shifting when it strikes any obstruction in the track, such as high bricks in pavement or hard, frozen snow.

In reboring the axle-bearing seats the spool and boring bar are removed, and the finished ends of the arms shown in the previous halftone are clamped in the armature-bearing seats. After the frame has been properly centered and clamped to the carriage, the axle-bearing seats are rebored to a uniform standard of 5 in., new armature and axle bearings being made to fit the rebored frames. The following illustration shows this operation.

On the GE-57, and other older types of motors, the axle bearings as well as the axles were subjected to unnecessary wear on account of dust and grit. In connection with the reclaiming of GE-57's, the axles have been inclosed with a cast-steel shield made in two halves, one section being electrically welded to the top and the other to the bottom half of the motor frame, the joint between the two halves being machined with an offset so as to make it dust tight. This arrangement as well as the practice of reboring the frames has given very satisfactory results and has been the means of considerably reducing the cost of maintenance. The shield is shown in the two small illustrations in the first column.



RECLAIMING GE-57'S—REBORING THE AXLE BEARINGS

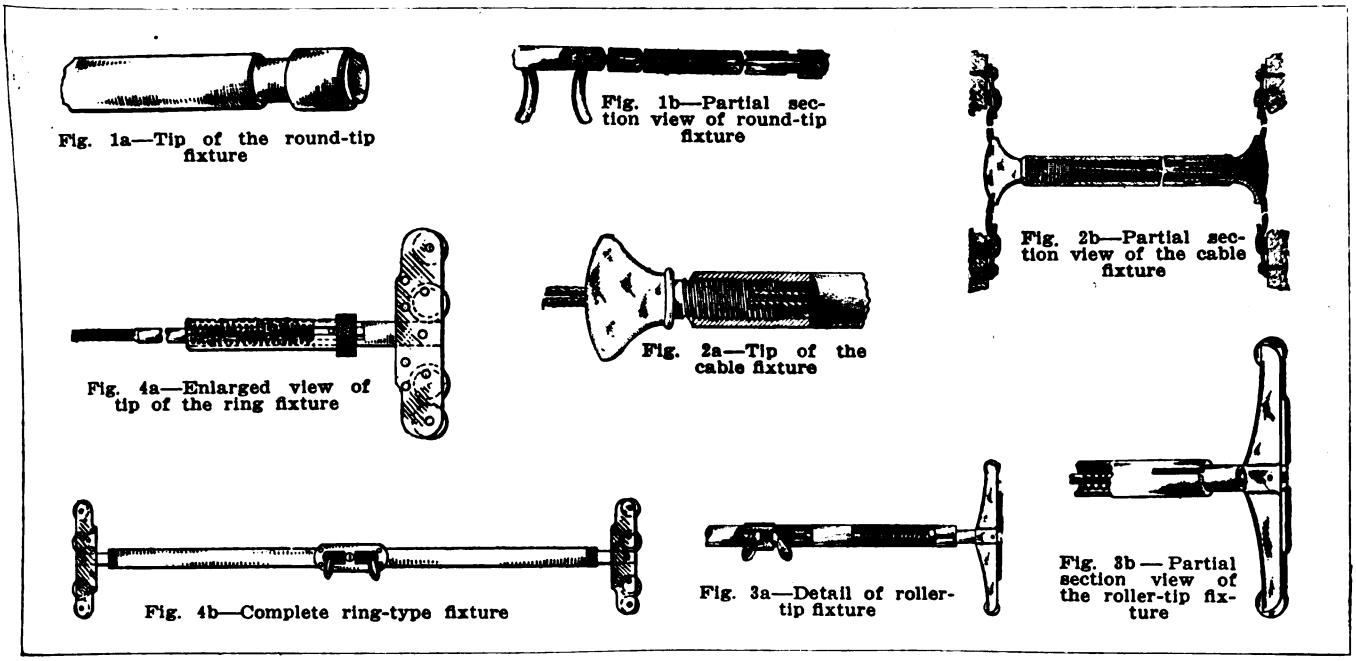


Fig. 1a—Tip of the round-tip fixture

Fig. 1b—Partial section view of round-tip fixture

Fig. 2b—Partial section view of the cable fixture

Fig. 4a—Enlarged view of tip of the ring fixture

Fig. 2a—Tip of the cable fixture

Fig. 4b—Complete ring-type fixture

Fig. 3a—Detail of roller-tip fixture

Fig. 3b — Partial section view of the roller-tip fixture

DETAIL SKETCHES SHOWING FOUR STAGES IN THE DEVELOPMENT OF THE MODERN CURTAIN FIXTURE

The Development of the Automatic Car Curtain

BY W. H. FORSYTH

Second Vice-President Curtain Supply Company, Chicago, Ill.

The first concern to offer to the trade a practical and suitable curtain device was the E. T. Burrowes Company of Portland, Me., which, about the year 1892, purchased from the inventors and owners the original pinch-handle curtain fixture. This consisted of a tube at the bottom of the curtain containing two reciprocating rods, to the inner ends of which pendants or handles were attached. The rods carried at their outer ends pieces of rubber which were thrust against the bottoms of the grooves in the window frame by springs.

Prior to the introduction of this style of curtain, wooden blinds had been generally used, but had proved costly to the railroad and inconvenient to the passengers. In order to keep the wooden blinds in proper condition, they had to be removed from the car, scraped and revarnished at intervals. One or two of such treatments loosened the wooden slats in their sockets, requiring early replacement of the blinds. The hardware attached to the wooden blind was also a source of expense. As a result of the high first cost and maintenance cost of the wooden blind the railroads welcomed the curtain. The passengers also, who found the wooden blinds difficult to move due to swelling, appreciated the change.

The use of the pinch-handle curtain with the rubber tip grew rapidly, but as it grew certain defects became apparent. Many passengers, through ignorance, failed to pinch the handles but instead grasped the bottom of the curtain, often drawing them into oblique or canted positions. Sometimes the curtains would be pulled entirely out of the curtain grooves.

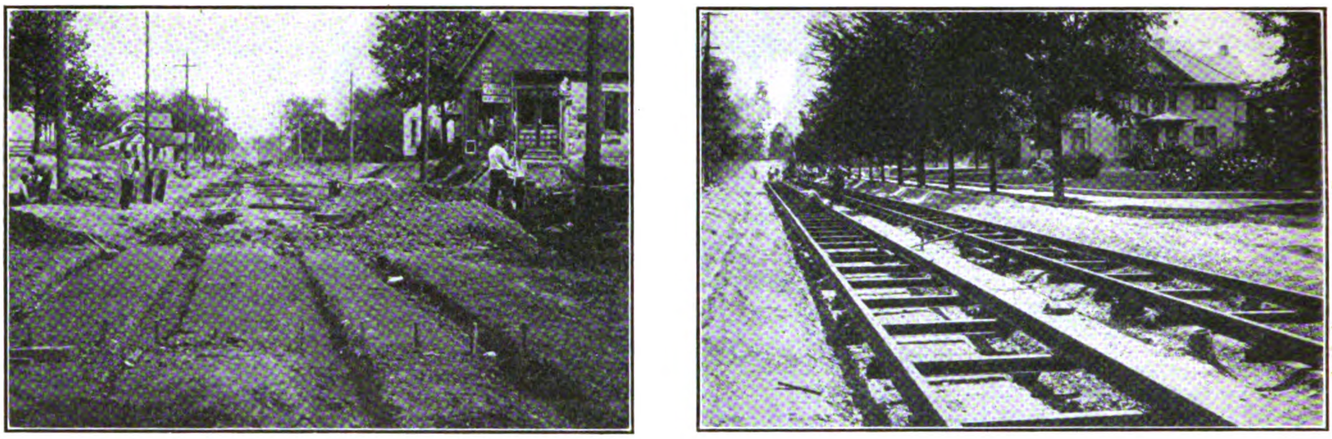
About this time the Adams & Westlake Company put on the market the "Acme" cable fixture, which was so constructed that the fixture could not get into a canted position, nor could it be pushed out of the grooves, through the application of the "squaring band" principle used on large drawing boards. Two cables which crossed each other inside the tube at the bottom of the curtain were used. This device held the curtain rod in the grooves, but another difficulty was encountered, namely, the wearing of the cables due to the constant friction. Furthermore, the cable fixtures could not be removed from the groove at the top of the window openings to permit the car cleaners to clean the windows without soiling the curtains. The curtains thus became soiled during the cleaning operation.

About 1892, Forsyth Brothers Company put on the market the roller-tip type of fixture. In this the tips were elongated and in the tip ends were placed anti-friction rollers. A friction pad was placed between the rollers, extending out beyond a line tangent to their surfaces. Thus when the curtain was tilted the friction pads were withdrawn or rocked away from the bottom of the grooves, and the anti-friction wheels on the ends of the tips came in contact with the bottom of the grooves. As these had no holding power, the upward pull of the spring roller immediately drew the curtain into a level position, and the curtain righted itself without leaving the grooves. This type of fixture almost immediately became popular.

In 1899 the Curtain Supply Company was formed, having come into possession of all the patents owned by the other companies mentioned. The new company immediately began to develop the art still further. It was seen that, in order to work efficiently, a curtain fixture should hold the curtain at any point in the window without creeping, and it should be capable of operation either by using the pinch handles or by grasping the curtain anywhere along the bottom, remaining at the same time level and in the grooves.

While the roller-tip device held the curtain without allowing creeping, it lacked the ability automatically to release its hold upon the window frame when the attempt was made to draw the curtain down. This latter operation was the immediate cause of the canting of the curtain or of its being pulled entirely out of the grooves. When the passenger pulled the curtain down at one end, he drew the holding means on one side away from the bottom of the groove, but he did not release the holding means which was still holding the curtain on the other side. Therefore, the curtain was readily drawn from a horizontal position out of the window opening.

To obviate the above difficulty the ring fixture was designed. This not only holds the curtain without



TRACK REHABILITATION IN SPRINGFIELD—PREPARATION OF FOUNDATION TRENCHES, AND TRACK READY FOR GROUTING

creeping, resisting the upward pull on the roller, but in addition automatically releases its hold of the window frame when the curtain is drawn down.

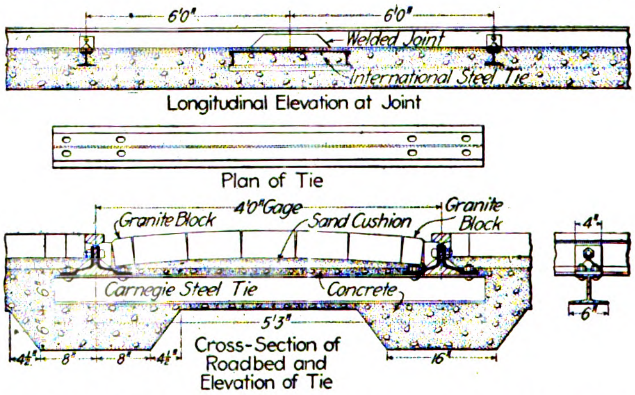
Experience developed that for some cases a special construction of the tip was desirable in order that the fixtures could not be removed from the grooves. For this purpose flanges were provided on the tips of the ring fixture and a confining strip of metal was mounted to project part way over the groove, the inside of the flange coming in contact with the inside of the confining strip. This is called the closed type of fixture, which is much more generally used on electric cars in the country than on steam cars.

Track Rehabilitation in Springfield, Ohio

BY C. G. KEEN
Engineer of Way and Structures American Railways, Philadelphia, Pa.

The Springfield (Ohio) Railway, a subsidiary of The American Railways, Philadelphia, Pa., has recently completed about 12 miles of track construction and reconstruction which presents many interesting features. With the exception of about 2½ miles of open track the entire construction is of 100-lb. A. R. A. Series A rail on steel ties and concrete ballast. The paving is of brick with granite stretcher blocks, except in the central portion of the city, where wood block was laid to conform with the paving program of the city. Paving was done by the same contractor who had the city contracts for paving the balance of street, and the contracts included the entire concrete substructure. The granite stretchers were furnished by the company.

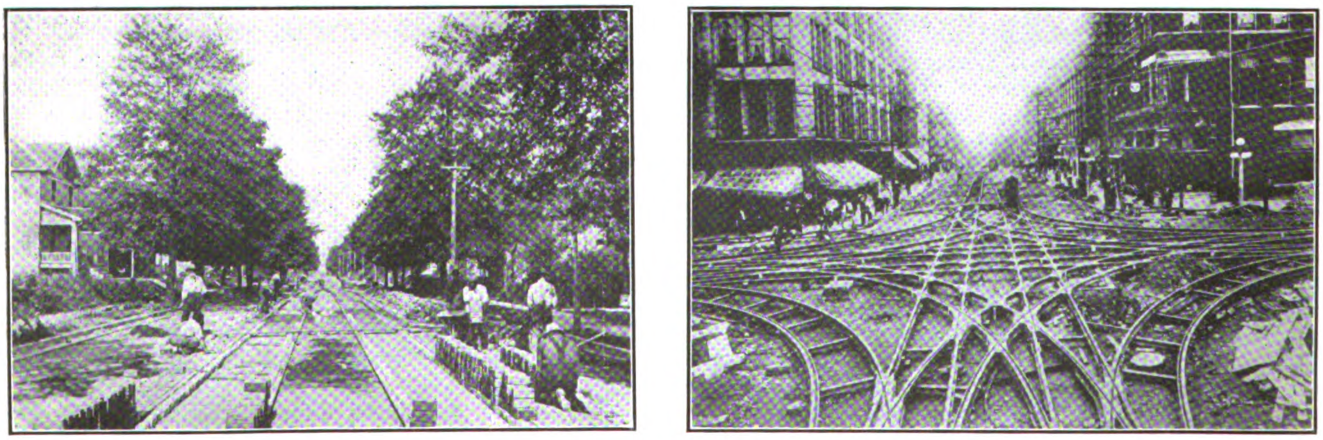
The company was fortunate in being able entirely to suspend operation on the streets on which work was being done and thus was enabled to give the concrete substructure and the paving grout ample time to set. The old tracks were generally in dirt ballast and were removed to the original sub-grade at a cost of from 13 cents to 16 cents per foot. The additional excavation to conform with the cross-section shown in the accompanying illustration averaged 5 cents per foot. The concrete was mixed in a batch mixer and was spouted into the trench by the paving contractor and was included in the square-yard price for paving.



TRACK REHABILITATION IN SPRINGFIELD—DETAILS OF STANDARD TRACK CONSTRUCTION

Carnegie rolled steel ties section 25-M were used with 5-ft. spacing. A special clip was bolted through the web of the rail as shown on the drawing, except at joints where the International twin-steel tie was used.

In paved construction the track was electrically welded



TRACK REHABILITATION IN SPRINGFIELD—PAVING TRACK IN WEST PLEASANT STREET, SPECIAL-WORK LAYOUT WITH STEEL TIES at the joints, and the base of the rail was welded to the plates of the twin-steel ties. Joints were placed opposite, making but one twin tie every 60 ft. Both resistance-type and motor-generator machines were used in the welding. The electrical resistance of 3 ft. of rail at the joints was equivalent to an average of less than 3 ft. of unbroken rail, owing to the use of the cross-section of the joint plates and the International steel tie plate for conductivity. Flat joint plates, furnished by the Indianapolis Switch & Frog Company, and plain angle bars with the lower leg planed to give welding space were used on different parts of the work. No cross-bonding was necessary as the rails are welded to the steel ties at joints.

From a summary of a few jobs on which costs are completed the following statement of the average cost per foot has been prepared:

Engineering and superintendence	$0.05
Grading (extra depth below original sub-grade)	.05
Ballast (concrete 1:3:5)	.54
Ties (one twin steel tie at joints, Carnegie ties on 5-ft. centers between)	.31
Rail and rail fastenings (including clips for Carnegie ties)	1.16
Special work:	
Track labor (including welding costs)	.30
Paving (brick with granite stretchers, cement grout)	1.50
Removing old track to original sub-grade	.15
Total	$4.06

Special work was also built of 100-lb. A. R. A. Series A rail with bolted, rolled guard. Iron-bound construction comprised frogs and mates and solid manganese tadpole-type switches. Cast-iron heel blocks were placed at all acute angles and drain boxes in the switch pieces.

The track work described above is the remaining part of the rehabilitation scheme, of which the carhouse and shop buildings were described in the issue of the ELECTRIC RAILWAY JOURNAL for March 20, 1915, page 556, and the power house in the issue of Oct. 30, 1915.

The rehabilitation work has been in charge of George C. Towle, general manager, Andrew Schmittauer, superintendent of construction Springfield Railway, H. J. Crowley, general manager American Railways, and the writer.

Converter Trouble Cured by Brush Treatment

At the Virden substation of the Illinois Traction System, a 300-kw. rotary converter operating at 500 r.p.m. on 25-cycle current with 600 volts on the d.c. side, originally gave considerable trouble partly because of the extreme irregularity of the loads placed upon it. A standard make of carbon brush having sufficient hardness to keep down the mica between commutator bars was used at the time, but by undercutting the commutator and substituting softer brushes for the hard ones, all of the original difficulties were overcome.

The rotary has six poles with seven brushes to the pole, the size of brush being 1¼ in. x ⅝ in. The full load is 500 amp., giving about 30 amp. per square inch of brush contact, a pressure of ½ lb. per brush being maintained. The accompanying chart, taken with a graphic meter during the time when the excessive trouble with the converter was being experienced, indicates the variable character of the load. However, the average output of the substation is only about 1800 kw.-hr. per day, making it evident that the trouble was not due to constant overloading of the converter. The d.c. circuit breaker, it may be said, is set to open between 800 amp. and 850 amp. of load.

The following record shows the frequency of the trouble that was experienced up to the time that the change was made.

Jan. 16, 1913, armature burned out. Replaced thirteen coils.

Jan. 21, 1913, armature burned out. Replaced twenty-one coils.

March 22, 1913, flash across a.c. collector rings. Rings burned badly. Collector brushes annealed.

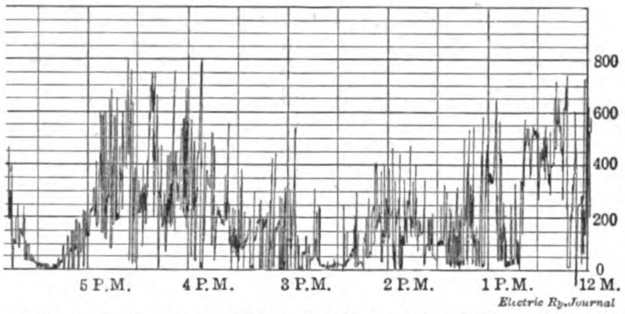
July 21, 1913, shunt field winding punctured.

Aug. 4, 1913, armature burned out. New armature installed because commutator was badly burned.

Aug. 19, 1913, shunt field punctured.

Aug. 28, 1913, commutator badly burned. New set of brushes installed after commutator had been ground down.

Sept. 30, 1913, armature burned out. New armature installed because commutator was badly burned.



SECTION OF CHART SHOWING LOAD ON FRACTIOUS CONVERTER

Feb. 7, 1914, armature changed because commutator was badly burned. Grinding gave only temporary relief.

March 13, 1914, shunt field punctured.

March 30, 1914, commutator ground down because it was burned.

May 14, 1914, commutator turned down, ground smooth, undercut, and a set of Le Carbone grade G carbon brushes installed.

Since the date of the last entry in the above record no lubricant whatsoever has been used. The brush wear, up to the present time, is about 3/16 in., and the change has eliminated all of the previous trouble with the rotary. The brush that is installed at present is of a much less abrasive grade than the one previously used, this being made possible by the undercutting of the commutator, which has now acquired the desired finish. It may be said that the present peak load on the machine is higher than it was when the chart that is reproduced in the accompanying illustration was taken.

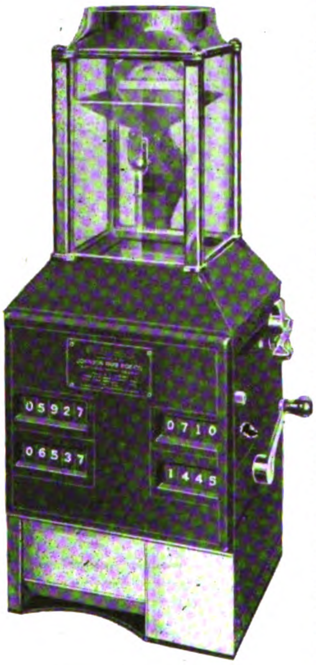
Electric Locomotives Ordered and Track Electrified by the St. Paul

The Chicago, Milwaukee & St. Paul Railway was noted in the regular annual rolling-stock statistical tables of the ELECTRIC RAILWAY JOURNAL of Jan. 1, 1916, as having ordered during 1915 nine 260-ton electric locomotives. This figure should have been thirty, which includes nine locomotives for the Three Forks-Deer Lodge division, and twenty-one locomotives for the Deer Lodge-Avery division, all of which are under construction at the present time. While these machines were originally designed for 260 tons, certain modifications made by the manufacturer and the customer increased the weight to 282 tons.

In the statistical tables on new electric railway track built, published in the same issue, the new mileage of approximately 7 miles electrified and placed in operation at 1500 volts by the Great Falls, Mont., terminal of the Chicago, Milwaukee & St. Paul Railway should have been included in the list.

Counts Five Kinds of Fares

Another development in the refining of the registering fare box to meet the various demands of street railway service has just been put on the market by the Johnson Fare Box Company, Chicago and New York. To the standard registering fare box has been added a registering mechanism which automatically counts two different denominations of metal tickets, as well as nickels, dimes and pennies on separate cyclometers. The metal tickets, which are made in two sizes to serve for lines where two classes of ticket fares are in use, are counted and indicated on two different dials, while the cash fares, including nickels, dimes and pennies are totalized and shown on another indicator. The fourth indicator totalizes all fares collected and the three other indicators show the total passenger load divided into the three classes of fares collected. The counting mechanism for the four dials is so interlocked that it is impossible for any class of fare to be registered on the wrong dial. The addition of the new features has involved no change in the size of the regular Johnson fare box nor in the design of the hopper. All fares are deposited into one hopper and the counting mechanisms select the different classes of fares and indicate them on the dials.



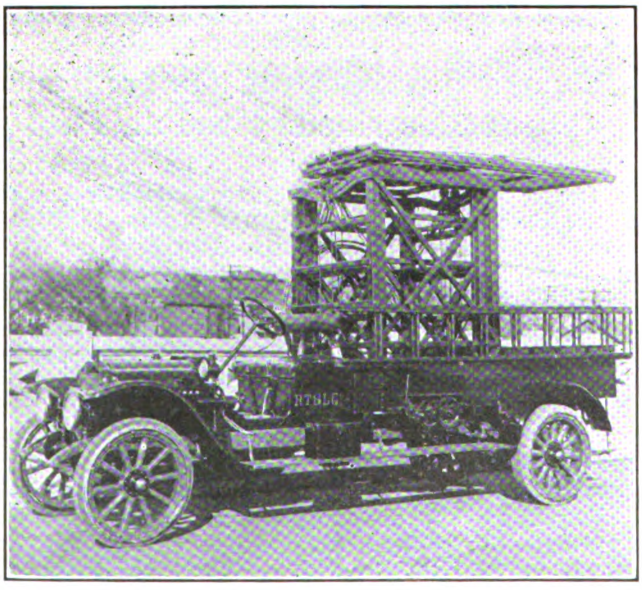
FOUR-DIAL FARE BOX

Distinctive tokens, which may be furnished by the fare box company or purchased in the open market, have been designed especially for use with this box. They consist of coins, one between the penny and the nickel in size and the other between the American dime and the Canadian 5-cent piece. Both of these metal tokens are made with a bronze rim and a German silver center swedged securely in place. This combination, together with the printed matter impressed on this coin with the dies, making it very difficult to counterfeit, and the hardness of the metal employed insures a long wear life. Considerable attention was given to the design of the coin and the selection of the metal to overcome the usual objections to a metal ticket. This fact and the provision of four cyclometer dials and the transfer register mechanism on the fare box, are distinctive features which make possible the use of the registering machine in cities where complicated fare classifications have limited their use heretofore.

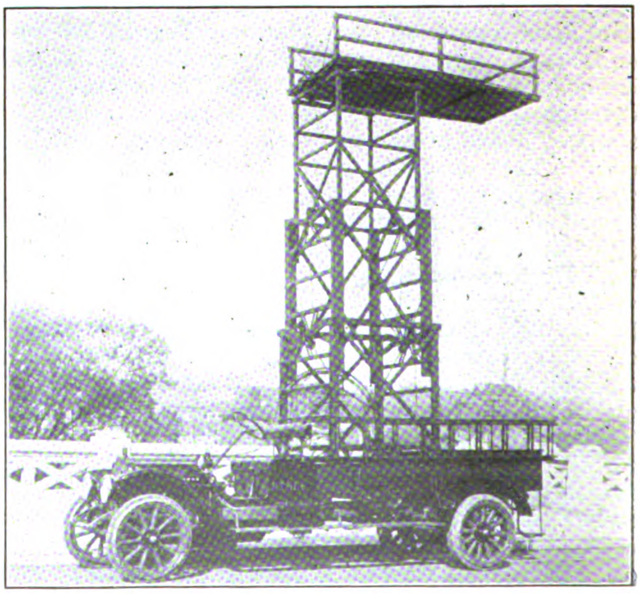
Three-Section Tower Wagon

Since the adoption of the automobile type of tower wagon by many electric railway companies, the need has been felt for a tower in which the weight is placed lower when the tower is closed than on the commonly-used two-section tower, thus eliminating top-heaviness as far as possible. To meet this demand, J. R. McCardell & Company, Trenton, N. J., have recently brought out the three-section design which is shown in the accompanying illustrations, these cuts being made from photographs of a machine in use by the Reading Transit & Light Company, Reading, Pa. This type of tower, when lowered, has between 20 per cent and 25 per cent less height than a two-section tower designed to attain a height equal to that attained by the three-section design. It can be operated easily by one man, the same type of revolving platform and hoisting engine being used in both the three-section and two-section designs. In fact, only such parts have been introduced in the three-section tower as were necessary to adapt the company's well-known two-section tower to the new conditions involved by the growing use of the automobile.

The three-section design measures, horizontally, 4 ft. 7 in. long by 4 ft. 3½ in. wide, and it can be used on any vehicle or car on which a two-section section tower can be used. The body measures 4 ft. 5 in. wide outside of panels, and the length of the body is governed by the length of the chassis frame in back of the driver's seat. Two large lockers, one on each side with a passage way between, extend from the rear of the tower to the rear end of the body, these being provided with lids, hasps and staples, and a complete equipment of hand rails, back rails, steps, etc., is provided. The height of the tower when lowered, measured from the bottom of sill to the



THREE-SECTION TOWER IN LOWERED POSITION



THREE-SECTION TOWER IN RAISED POSITION

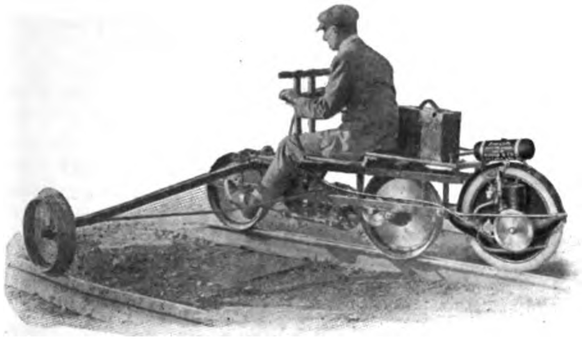
floor of platform, is 7 ft. 1 in. When the platform is elevated the height between the same points is 16 ft. 5 in., but these dimensions can be varied within certain limits, every inch added to the height when lowered adding 3 in. to the height when raised. The net weight of the three-section tower, complete, is approximately 1750 lb.

Motor Wheel for Railway Hand Speeders

A convenient application of the motor wheel to the railroad hand speeder or velocipede, shown in the accompanying illustration, has been worked out by Mudge & Company, Chicago, Ill., together with the A. O. Smith Manufacturing Company of Milwaukee, who have for the past two years been manufacturing a motor wheel for application to bicycles.

The motor wheel is attached behind the velocipede and employed as a pusher. Special appliances for attaching may be furnished. The engine is of the four-cycle, air-cooled type, 2⅜-in. bore by 2½-in. stroke, and develops 1½ hp. It is magneto equipped and is throttle governed by means of a flexible tubing control fastened to handlebars or conveniently on seatboard. Any speed from 4 to 25 m.p.h. can be set and maintained.

Some idea of the capacity of this motor wheel can be gained from the fact that for a test two of them applied to the rear of a seven-passenger Franklin automobile easily propelled it on a run of several miles. The wheel complete weighs but 50 lb. and with its heavy rubber tire gives ample tractive power to carry one and, under favorable conditions, two men on a speeder. It is quickly attached and detached and can be taken off at night and locked up if it is desired to leave the speeder out of doors. When not in operation it is hooked up to the frame of the speeder about an inch over the rail so that the handlebars can be used.



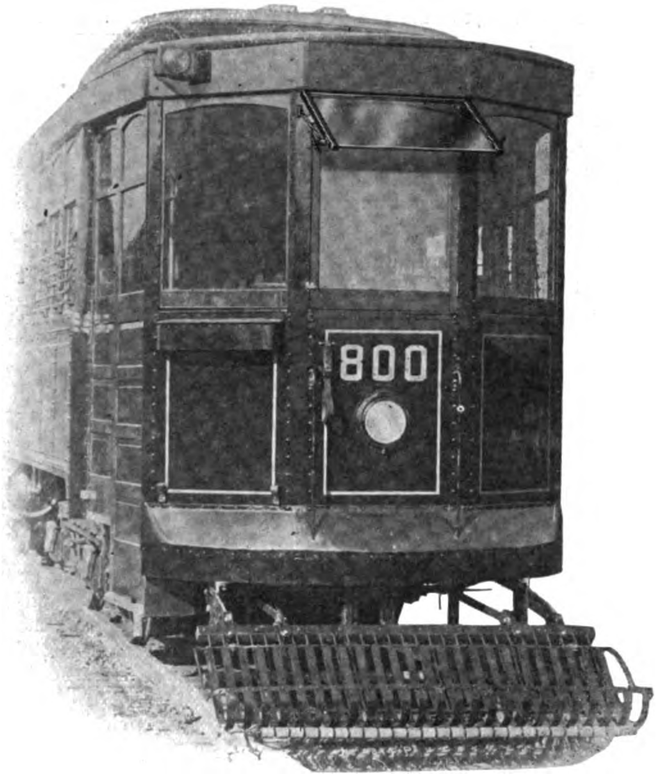
MOTOR WHEELS FOR RAILWAY HAND SPEEDERS

Italian State Railway Electrification Projects

Representations have been made to the Italian State Railway Administration urging the completion and extension of electrification of the Piedmontese Railway network, and in particular the early completion of the electrification and double-tracking of the line from Turin to Bussoleno; also for the supply of electric current for the operation of the completed section to Modane of the Mount Cenis Railway, and the discontinuance of steam operation on the Bardonecchia-Modane section. The absence of the engineers of the Paris, Lyons & Mediterranean Railway is recognized, but it is urged that the Italian Railway Administration should proceed with or without their co-operation, in the interest of the future trade prospects of these regions. The association also urges action with regard to the electrification of the Turin-Pinerolo-Torre Pellioe line, which is of a mountainous character.

Clear Vision Shield

An independent adjustable glass panel or shield for preserving a clear line of vision through the motorman's window during bad weather has been developed by the Clear Vision Shield Company, Pittsburgh, Pa. The shield, shown in the accompanying illustration, is hinged at its upper edge and mounted independently in front of the motorman's window. When in an inclined position it prevents the driving of snow and rain against the motorman's window and may be so adjusted so that the line of vision of the motorman, while below its lower edge, is within the zone protected by the inclined shield from both snow and rain. If ventilation is desired the motorman's window may be dropped slightly without any exposure. When the shield is in a vertical position there is created a "dead air space" between the rain panel and the motorman's window which tends to prevent the formation of frost on the front window and thus in very cold weather gives the motorman a clear view ahead.



STORM SHIELD FOR MOTORMAN'S WINDOW

The shield is a handsomely-finished black enameled steel channel frame; the glass is ¼-in. plate, set in rubber or steel liner. All parts are made extra strong to withstand hard service. The adjustments are furnished in either rod or friction hinge styles.

The Colwyn Bay (England) Council is vigorously opposing a change proposed by the officials of the tramways running between Colwyn Bay and Llandudno, to increase the service by putting on a number of double-deck cars. The opponents of the change object to the double-deck cars on account of the steep hills, and also contend that such cars would not be in keeping with the character of the district.

NEWS OF ELECTRIC RAILWAYS

NEW YORK COMMISSION REPORTS TO LEGISLATURE

Commission for the Second District Reduces Its Operating Cost Despite Increase in Activities

The ninth annual report of the Public Service Commission for the Second District of New York, submitted to the Legislature on Jan. 10, shows one of the most important years in the commission's existence. In addition to handling large current business, the commission has disposed of all of the old cases which have been pending for a long time, has released nearly $500,000 tied up in a dispute with the New York Central over the payments for the elimination of the Yonkers grade crossings and has entered upon the administration of the so-called Thompson jitney bus law which brought all the vehicles of this character under the jurisdiction of the commission as common carriers.

In taking up the work of the jitney bus, two cases were brought to the courts, one of which was carried to the Appellate Division. These cases, recently decided, have laid down clearly the classes of vehicles which come under the law, embracing practically all vehicle lines, operating wholly or partly within a city, and in competition with other common carriers. The district attorneys and city officials throughout the State were notified of the scope of these decisions, and so far as the commission has learned all operation of jitneys in contravention to the statute has been stopped. Many applications are now pending before the commission for certificates of convenience and necessity under the law.

The total number of applications and complaints to the commission for the year has been 1997; 2184 cases of all sorts have been disposed of, showing a reduction of the commission's calendars for the year by 187 cases. To accomplish this result the commission held 578 hearings on 352 days, 256 hearings in Albany, eighty-four in New York City, fifteen in Buffalo, and eighty-six in various other places in the State.

The expenses of the commission during the first year were $438,000. For the current fiscal year (ended Sept. 30, 1916), the appropriation is $394,000, and for the next fiscal year the commission has requested only $392,000, showing a consistent decrease in cost despite enlarging duties.

There are now 928 public utility enterprises under the jurisdiction of the commission, including steam and street railway corporations, express, sleeping car, baggage and baggage transfer, stage coach and stock yard companies, electrical, gas, and steam corporations, including municipalities and unincorporated individuals, and telephone and telegraph companies.

RECOMMENDATIONS CONTAINED IN NEW JERSEY COMMISSION'S REPORT

The Board of Public Utility Commissioners of New Jersey is still of the opinion that the legislation suggested by it to the Legislature but not adopted last year would add desirably to the laws providing for regulation of public utilities. The commission now suggests in its annual report to the Governor further consideration of the following:

1. An act specifically empowering the commission to require proof when its approval of proposed security issues is asked that there has been an adequate attempt on the part of the petitioners to ascertain and to obtain the highest price at which such securites may be sold, and in default of satisfactory proof thereof to impose as a condition of granting such approval the advertising for sealed competitive bids for such securities accompanied by certified checks guaranteeing the responsibility of the bidders.

2. An act making void all security issued by public utilities, whether put out by way of sale or by way of pledge or hypothecation, and making such unauthorized issue a misdemeanor, unless the prior approval of the board thereof has been granted.

3. An amendment of the general railroad act, and in particular Sec. 70 thereof, whereby the limitations to be imposed upon the bonded debt that may be incurred by a railroad company incorporated in New Jersey by a foreign corporation as regards its property situate in this State may be made uniform, whether said company is operated independently or under lease, or by virtue of merger or consolidation with another railroad company.

4. Legislation prescribing more precisely the terms under which railroad companies or other public utilities may lease or be leased to railroads or other public utilities, such legislation to fix the maximum term of the lease and to make mandatory the requirement that the property of the lessor company shall be at all times capable of identification either physically or by fixing the value thereof upon the books of said lessor company and lessee company respectively.

MASSACHUSETTS COMMISSION STUDYING BAY STATE VALUATION

Following an appropriation of $10,000 from the executive council for expert services in the pending fare case of the Bay State Street Railway, the Massachusetts Public Service Commission has begun an investigation of the valuation submitted by the company at the recent hearings and prepared by Sloan, Huddle, Feustel & Freeman, Madison, Wis. At present the board is utilizing the services of seven members of its engineering and inspection departments in the analysis of investment cost on about 40 miles of road between Medford and Lowell, Boston and Lynn. The checking is being done independently of the Feustel report and takes into account the cost of track, conduit and overhead lines. Various records of the company are being examined by the accounting department of the commission under J. W. Lester, chief accountant, and the engineering studies are being made under H. W. Hayes. The checking at present being carried out by the board is in the nature of a cross-section of the company's valuation. The extent of later work has not yet been determined. Hearings will be resumed at Boston on Feb. 1 by the commission. At that time Mr. Feustel will be cross-examined relative to the valuation submitted by the company. This valuation is stated to have cost about $60,000.

FURTHER APPROVAL OF HYDRO-RADIALS

The construction of a public-owned radial system in western Ontario was approved on Jan. 3 by eighteen municipalities. Only four went against it—the Townships of Waterloo, Blanchard, North Easthope and East Zorra. Of the four defeats for the by-law, two at least, those in Blanchard and Waterloo, were due to the fact that the by-laws were submitted for the whole township instead of for the section immediately interested. The result was that the portions of the townships which would not derive a direct benefit from the radial line voted down the other part. These are contiguous to the line, and under a clause in the act their consent is not necessary for the construction of the radials. New petitions will be circulated asking for a by-law covering only the sections of the townships benefited.

Counting the six municipalities that voted on Jan. 1 for the scheme, twenty-four places have not voted. In five municipalities by-laws will be voted upon later. Regarding the negotiations with Sir William Mackenzie in connection with the purchase of Mackenzie and Mann radials, Sir Adam Beck said that the offer of cost plus 10 per cent only referred to two lines now in the conception stage, and possibly one or two under construction. This offer had nothing to do with the Metropolitan or other radials now running out of Toronto. He thought a fixed price would have to be agreed to before title to the radials could be acquired, but the conferences have not reached that stage.

It is not unlikely that another attempt will be made in the courts to upset the by-law in Toronto. This was intimated when the application to restrain the Council from submitting it was thrown out by the High Court. If this is attempted it will probably be on similar grounds, viz., including in the by-law the clause relating to townships setting forth the district to be assessed for the line.

MASSACHUSETTS COMMISSION PRESENTS REPORT

The third annual report of the Massachusetts Public Service Commission was submitted to the Legislature on Jan. 10. It covers the year ended June 30, 1915.

An appropriation of $10,000 has been received to enable the board to call upon outside experts in studying the pending Bay State Street Railway fare case, which the commission considers in many respects the most important fare case of the kind ever tried in the State. The report states that in the pending cases depreciation will demand close attention leading to the establishment of a single standard of figuring this expense. A special report will be submitted relative to conditions at the Dudley Street station, Boston.

During the year 3613 car inspections were made and no serious defects were found. The number of cars found defective with reference to wheels, brakes, lighting, car-seat frames or through untidy conditions was 732. The number of accidents due to broken or loose wheels, broken journals and axles reported was sixty-seven; miscellaneous accidents investigated, such as collisions, personal injuries, and faulty operation, 455; accidents caused by defective track, 447. The number of fatal accidents to individuals investigated was ninety-six. Accidents caused by persons coming in contact with either fenders or wheel guards, or both, were: fatal, fifteen; serious, sixteen; not fatal or serious, 252. Lifting jacks were used eight times to extricate persons from underneath cars. In five instances the time consumed was five minutes each, in one instance twelve minutes and in two others nine and eight minutes. The total number of persons injured was 8488, of which eighty-five were fatal. The number of passengers injured was 6229. Of these twenty-two were fatal. Last year 8282 persons were injured and 117 were killed.

THE TRUTH ABOUT CALGARY

F. G. R. Gordon, writing in *Concerning Municipal Ownership* for January, 1916, under "The Truth About Calgary," referred to the municipal street railway there as follows:

"A further claim has been made by public ownership advocates that the operation of the street railway system has resulted in a big profit, and one writer adds that this miracle has been accomplished on a fare of 2½ cents. This is far from the truth. The fare of 2½ cents is only for school children, that is to say, ten tickets are sold for 25 cents. Workingmen's tickets are sold during certain hours of the day at a rate of eight for 25 cents. Ordinary tickets are sold at twenty-five for $1 in book form. Civic employees receive thirty tickets for $1. In 1914 the actual revenue was $702,531. The expenses amounted to $698,698, leaving a surplus of $3,831.

"The funded debt of the Calgary street railway is $2,280,210, upon which there is an annual interest charge of $106,359. The operating expenses for last year totalled $428,797, of which $277,894 went for wages and salaries. The ratio of operating expenses to gross earnings approximated 70.08 per cent. The system cost $31,331 per mile. The depreciation charges for 1914 were $29,299, or less than 1½ per cent. Here we find the 'nigger in the (municipalized) wood-pile.' Five per cent for depreciation is a sufficiently low figure in the United States and it is doubtful if 6 per cent would be too high for Calgary, when the climate is considered. If Calgary had allowed even 4 per cent for depreciation in 1914, the city would have lost $58,000 net on her street railway system.

"The taxes paid by the system amount to a total of $3,373, of which $863 was on land. As the tax rate in Calgary is $20.75 per $1,000 of valuation, we see that the city discriminates in favor of its street railway system."

ANOTHER 200 CARS ORDERED BY NEW YORK MUNICIPAL RAILWAY

The New York Municipal Railway Corporation, Brooklyn, N. Y., has just placed an order with the American Car & Foundry Company for 200 all-steel side-door car bodies and trucks for same. This order supplements earlier orders for 300 car-body and truck equipments previously placed with the same builder. The bodies and trucks will differ only in a few minor details from the original designs which were described in the ELECTRIC RAILWAY JOURNAL for June 6, June 13 and Dec. 26, 1914; March 13, March 27 and May 8, 1915. This order is subject to the approval of the Public Service Commission, First District of New York, in accordance with regular procedure. News of this order was received too late to be included in the department headed "Rolling Stock," which had already gone to press.

DUTY TO KEEP STREETS IN REPAIR IN NEW JERSEY A CONTINUOUS ONE

The Board of Public Utility Commissioners of New Jersey has disposed of the complaint of the Borough of Red Bank against the Monmouth County Electric Company by ordering the company to make certain improvements to its roadbed, tracks and ties requisite to furnishing safe, adequate and proper service. Complaint was made by the borough that the company did not furnish proper service and it was particularly charged that it did not properly maintain its property in Monmouth Street, Front Street, Broad Street, West Street, Wharf Avenue and Shrewsbury Avenue. The company denied the streets were in bad condition due to its negligence, and alleged the borough required the company to permit the Jersey Central Traction Company to operate cars over its rails in certain streets. It was charged that any impairment of the rails and streets was due to the size and weight of the cars of the Central Traction Company. The company also set up that the jitney service between Red Bank and Long Branch had greatly diminished the revenues of the company and that the service, facilities and appliances furnished by the company were all that could fairly and justly be required under the circumstances. After reviewing the testimony, the board concluded the company did not keep certain portions of its property in proper condition and stated that repairs could be made for $847. Continuing, the board said:

"No matter if this unsafe condition of the company's property is partly due to the operation of the cars of the Jersey Central Traction Company over said tracks by the terms of the original franchise ordinance, under which the respondent is operating its system in the borough, it is in no wise relieved thereby from its duty to the public. It is well to note, however, that the Jersey Central Traction Company pays to the Monmouth County Electric Company a regular rental mutually agreed upon between them, for the operation over its tracks."

The statutes of New Jersey, the board says, impose on every street railway company the duty to keep in repair, to the satisfaction of local authorities, the paving or surface material of the portions of the streets occupied by its tracks. The board said:

"This statutory obligation cannot be waived or modified by any ordinance of the borough. The supplemental ordinance known by the number 68 is improvident and disadvantageous to the borough of Red Bank. The paltry consideration of the payment of $200 per annum only aggravates the injustice perpetrated on the public if we accepted the company's view of its intent. We conclude that the statutory duty was not and could not be changed by any action of the Borough Council. The duty of the company to keep portions of the streets in proper repair is a continuing one, and if these repairs were satisfactory to the local authorities in the year 1910, they certainly have not been for the two years last past. They have continually complained of their unsatisfactory condition."

Toledo Appraisal by July 1.—The Ohio Public Utilities Commission has extended until July 1, 1916, the time of the Toledo Railways & Light Company, Toledo, Ohio, for filing its inventory and appraisal. The city officials desire the data from the appraisal for use in negotiating with the company for a new franchise. The city will probably appoint engineers to check the inventory and report in its behalf.

President Wilson to Address Railway Business Association.—President Woodrow Wilson has authorized announcement that he will speak at the dinner of the Railway Business Association on Jan. 27 at the Waldorf-Astoria Hotel, New York. His subject has not yet been given out. In his annual message in December the President recommended an inquiry into the whole question of railway regulation. The suggestion is embodied in a resolution, now pending, introduced by Senator Newlands, chairman of the committee on interstate commerce, and calling for a joint committee of five Senators and five Representatives to report next December.

San Francisco Purchase Offer Referred Back.—The ordinance authorizing the submission of an offer by the city to the United Railroads, San Francisco, Cal., for its lines on Junipero, Serra and Sloat boulevards and Twentieth Avenue has been referred back to the public utilities committee by the Board of Supervisors. Supervisor Vogelsang said the decision on this proposition should be left to the new board. City Engineer O'Shaughnessy stated from $3,000,000 to $4,000,000 would be required for the Municipal Railway extensions which should be constructed now, and he regarded a bond issue as desirable.

Six Ex-Directors of New Haven Acquitted.—Six of the eleven ex-directors of the New York, New Haven & Hartford Railroad were acquitted on Jan. 9, in the Federal District Court, of having conspired to break the Sherman law. Concerning the other five, the jury, after having been out fifty hours, disagreed. The five whose innocence was not established were: William Rockefeller, Lewis Cass Ledyard, Charles F. Brooker, Charles M. Pratt, Edward D. Robbins. The six who were acquitted were: Frederick F. Brewster, D. Newton Barney, Robert W. Taft, James S. Hemingway, A. Heaton Robertson, Henry K. McHarg.

Small Gathering Greets Milroy Committee at Toledo.—Only thirty persons were present at the first meeting for the year of the Milroy street railway committee at Toledo, Ohio, held on Jan. 4, and only two members of the committee appeared. Out of the total number, nineteen voted in favor of municipal ownership regardless of how it is to be attained. Most of those present favored the transportation of freight over the local line at hours to be designated by the city. Frank Hillenkamp made the principal address. He argued that the present indebtedness of the city was not so serious as to preclude municipal ownership.

Tenders Wanted for Spanish Railway.—Tenders will be received at the Direccion General de Obras Publicas, Ministerio de Fomento, Madrid, Spain, until Jan. 28, 1916, for the construction and working, for a period of sixty years, of an electric tramway in Madrid (Monte del Pardo district). The minimum rolling stock required to commence the working of the line is three motor cars and three trailers. Construction work must be commenced within three months and completed within a year from the date of the award of the concession. The Bureau of Foreign and Domestic Commerce, Department of Commerce, reports that it has no further information relative to this opportunity.

Ordinances Before Pittsburgh Council. — Councilman Robert Garland has introduced into the Council a resolution authorizing that body, as the committee on public service and surveys, to enter at once upon a study of all phases of the underground system which, it is believed, will afford the only permanent relief from traffic congestion in the downtown section. Mr. Garland has also presented the ordinance granting a franchise to the Pittsburgh District Railroad, a proposed underground system to extend across the city. This measure was considered by the Council before, but never acted upon definitely. A. E. Anderson is president of this company. The proposed ordinances of the Pittsburgh Railways looking toward the relief of traffic did not come before Council on Jan. 10.

Columbus Purchasing Agents Organize.—The Columbus Purchasing Agents' Association was organized at the Virginia Hotel, Columbus, Ohio, on Dec. 13, 1915. The following officers were elected for the coming year: N. O. Abey, president; W. T. Sheldon, vice-president; H. J. Kaufman, secretary; W. V. C. Bulkeley, treasurer. The board of directors will consist of these four officers and C. H. Rogers, H. C. Hoeflich and J. D. Pinney. The charter members include the following purchasing agents in Columbus: N. O. Abey and J. W. Davidson, Jeffrey Manufacturing Company; W. V. C. Bulkeley and E. C. Johnston, Columbus Railway, Power & Light Company; J. E. Finneran, Buckeye Steel Castings Company; H. C. Hoeflich, Case Crane & Engineering Company; C. H. Rogers, Scioto Valley Supply Company; R. M. Royer, Ohio State Telephone Company; W. T. Sheldon and W. A. Tully, Ralston Steel Car Company. The association will become a branch of the National Association of Purchasing Agents.

East Boston Tunnel Tolls Agitation.—Since the beginning of the year the Boston (Mass.) Elevated Railway has met with considerable difficulty in the collection of 1-cent tolls in the East Boston tunnel, in addition to the regular 5-cent fare. The Legislature of 1915 passed a law opening a way for the elimination of the 1-cent toll charge collected from each passenger through the tunnel. The law provided that the taking of tolls might cease on Jan. 1, 1916, if the Mayor and the City Council of Boston should appropriate a sum from the tax levy sufficient to make up the difference between the sinking fund requirements and the amount of rentals paid by the company for the use of the tunnel, such suspension of tolls to last for one year. Owing to the failure of the city authorities to take proper action, the company found itself obliged by law to continue the collection of tolls after Dec. 31, 1915, and scenes of disorder accompanied the refusal of passengers to pay the toll charge. In a statement issued on Jan. 6, William A. Bancroft, president of the company, explained the terms of the company's lease of the tunnel and showed that it has no alternative to toll collection pending suitable action by the city. The company is now collecting substantially all the tolls with police co-operation. It is expected that appropriate action will soon be taken by the city to enable the tolls to be abolished for the current year.

Brooklyn Elevated Third-Tracking Controversy.—The Public Service Commission for the First District of New York took action on the third tracking of the Fulton Street elevated railroad in Brooklyn, on Jan. 6, by adopting a resolution authorizing the New York Municipal Railway Corporation, upon filing a certain stipulation, to close a contract for the supply of steel required for the third tracking from Nostrand Avenue to Adams Street on condition "that the plans or drawings for the portion of such work between Cumberland Street and Adams Street, if constructed, shall be so modified as to provide for lattice instead of plate girders, and as so modified shall be subject to the approval of the chief engineer of the commission and of the commission." The stipulation referred to is a statement made at the last public hearing in regard to the third tracking by Timothy S. Williams, president of the Municipal Corporation, to the effect that if the city will provide as a substitute for the three tracks in Fulton Street between Cumberland Street and Brooklyn Bridge equal facilities in a subway running generally parallel to Fulton Street, to be held by the company during the same tenure as the surrendered facilities and to be furnished free of cost, the company will accept such substitute facilities and surrender the elevated structure in the business district of Fulton Street between Cumberland Street and the Brooklyn Bridge.

PROGRAMS OF ASSOCIATION MEETINGS

New York Electric Railway Association

The twenty-first quarterly meeting of the New York Electric Railway Association will be held at the Ten Eyck Hotel, Albany, N. Y., on Feb. 24 and 25.

Illinois Electric Railways Association

The annual meeting of the Illinois Electric Railways Association will be held at the Hotel LaSalle, Chicago, Ill., on Jan. 21. The business program will include the reports of various committees and election of officers. A sub-committee of the engineering committee will report on trolley and transmission lines and their supports. A. J. Bates of the Bates Expanded Steel Truss Company, Chicago, will deliver an address on expended steel poles for overhead lines .

Financial and Corporate

ANNUAL REPORT

Boston & Worcester Street Railway

The statement of income, profit and loss of the Boston & Worcester Street Railway, Boston, Mass., for the years ended June 30, 1914 and 1915, follows:

	1915	1914
Revenue from transportation	$724,429	*$686,025
Miscellaneous revenue	14,366	6,451
Total revenue	$738,796	*$692,477
Conducting transportation	$228,846	$233,821
Maintenance	120,425	128,458
General expenses	81,854	78,338
Total expenses of operation	$431,126	*$440,618
Operating income	$307,670	$251,859
Interest on funded and floating debt	$120,723	$120,693
Taxes	49,301	46,668
Net income for year	$137,645	$84,496
Dividends on preferred stock	$23,832	$23,832
Dividends on common stock	55,687	55,687
Surplus for year after dividends	$58,126	$4,977

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*As adjusted by reason of revised method of accounting in freight department, which excludes freight earnings and expenses on tracks of other companies.

Both the passenger and the freight earnings of the company are said to have showed a substantial increase during the year in spite of the unfavorable business conditions in the early part. The total revenue showed an increase of $38,404 or 5.6 per cent, while the operating expenses decreased $9,492 or 2.1 per cent. This decrease resulted from a decrease of $4,975 in conducting transportation, a decrease of $8,033 in maintenance and an increase of $3,516 in general expenses. The operating income increased $55,811 or 22.1 per cent. Fixed charges showed a slight increase, so that the net income for the year increased $53,149 or more than 60 per cent. It is said that a reserve for depreciation of equipment and for damages was set aside during the year, which will be increased from time to time for the upkeep and protection of the property.

DIVIDEND REDUCTION IN CHICAGO

Chicago City & Connecting Railways Collateral Trust Finds Earnings Insufficient to Pay Full Preferred Dividend

The owners of participation shares of the Chicago City & Connecting Railways, which was formed in 1910 to hold securities of the Chicago City Railway and connecting railways serving outlying districts in the southern part of Chicago and extending into Indiana, have suffered a dividend reduction. The committee of nine has advised the shareholders that the earnings of the various street railway lines, the stock and the bonds of which are held in trust, have been insufficient to pay in full the cumulative annual dividend of $4.50 per share on the 250,000 preferred participation shares.

The following facts are said to have considerable bearing upon the situation: (1) A large reduction in gross receipts owing to the general depression of business, which condition is improving very decidedly with the oncoming of better times. (2) The heavy increase in operating expenses due largely to the unprecedented increase in wages as the result of an arbitration presided over by Mayor Thompson. (3) Compulsory extensions of street railway lines into unsettled territory, where the operating income is only a small fraction of operating expense and yields no return on capital invested. (4) The operations of various regulatory boards and commissions whose activities have added heavy additional expenses with no corresponding benefit either to the public or to the company.

Harrison B. Riley, chairman of the committee, states that the problems which are continually confronting the officers and directors of the various companies are indicated in some measure by these facts. It is hoped that an increase in gross receipts, which may be fairly anticipated for the coming year, will ameliorate conditions for the stockholders. At the annual meeting the common shares will have no voting power in view of the default on the preferred.

A semi-annual dividend of 75 cents was declared on the preferred participation certificates, payable on Jan. 1. The total payment was $2.50 for 1915, previous to which $4.50 was the yearly rate. No distribution has been made on the common certificates since July, 1912.

LATEST RETURNS FOR MASSACHUSETTS LINES

Public Service Commission Reports Summary of Financial and Operating Statistics for Year Ended June 30, 1915—Effects of Jitney Competition

The report of the Massachusetts Public Service Commission for the year ended June 30, 1915, just submitted to the Legislature, covers the returns of fifty-three electric railways in the State. The total main track operated was 2952.5 miles, a gain of 24.9 miles over 1914. The gross assets as of June 30, 1915, were $221,543,802; the gross liabilities, $221,418,356, and the surplus (with change in classification of accounts), $125,446, or an amount representing 0.12 per cent of the capitalization. The aggregate capital stock was $99,031,275, an increase of $836,500. The total amount of dividends declared was $4,612,019, or 4.66 per cent of the capital stock, as compared to 5.2 per cent in 1914. The net divisible income was less than the dividends declared by nearly $50,000. The net debt was $104,375,077, as compared to $100,590,688 in 1914.. The total cost per mile of main track was $70,904, as compared to $70,646 in 1914, and the capital investment per mile was $66,980 and $64,534 in the two years, respectively. Of the present investment per mile, $39,895 represents construction cost, $13,370 equipment, and $17,639 other permanent property, mainly lands, buildings, parks and power plants.

The total operating revenue for the year ended June 30, 1915, was $39,537,442 and the total income $42,230,884, the latter representing an increase of $604,980 over 1914. The total expenditures were $42,278,562, an increase of $751,697 over last year. Operating expenses, $27,194,899, gained $529,678, while taxes increased $2,467,773. The companies carried 760,464,372 passengers, a decrease of 6,164,163, and the total car mileage was 132,187,596, a decrease of 168,229. The average number of passengers carried per mile of main track was 257,558, as compared to 261,853 a year ago. The percentage of operating expenses to gross earnings increased during the year from 67.16 to 68.78. A brief summary of various unit figures follows:

	1915	1914
Gross earnings per mile of main track	$13,839.00	$14,017.00
Operating expenses per mile of main track	9,519.00	9,414.00
Net earnings per mile of main track	4,320.00	4,603.00
Gross earnings per car-mile (in cents)	29.91	29.99
Operating expenses per car-mile (in cents)	20.57	20.14
Net earnings per car-mile (in cents)	9.34	9.85
Gross earnings per passenger (in cents)	5.20	5.18
Operating expenses per passenger (in cents)	3.58	3.48
Net earnings per passenger (in cents)	1.62	1.70

The operating revenue per car-hour for 1915 was $2.97 and the operating expenses per car-hour were $2.04, leaving a net of $0.93 per car-hour. The companies had 23,842 employees in 1915, as compared to 23,412 in 1914, and they owned 8296 passenger cars, as compared to 8364 last year, and 20,688 electric motors, as compared to 20,636 last year.

Two comprehensive appendices accompany the other data submitted by the commission in its report, one being a study of the cost of power by Prof. L. E. Moore of the engineering department on the twenty-five principal electric railways of the State, and the other a report on the jitney bus, by Charles E. Mann, executive secretary of the commission. The latter includes brief histories of the growth of the jitney movement in the various Massachusetts counties, an account of its effect on earnings of the local railway companies, and notes on a number of ordinances regulating jitney traffic in various parts of the country.

In regard to the effect on electric railway earnings, it is said that according to company statements the jitney competition in Massachusetts has been felt severely in some cases, and in others very slightly. The Rhode Island Company estimated its total loss on account of jitneys at $362,000 from March to August, inclusive. Early last December 160 jitneys were operating in the Providence section. The Bay State Street Railway early in December estimated its daily loss on the entire system at $700, and said that the loss had been on about this ratio since early in the summer. For the three months ended Sept. 30, 1915, the estimated loss of the Massachusetts Northeastern Street Railway was at the rate of $100 a day. Upon the Middlesex & Boston Street Railway the June, July, August and September receipts were cut at least $10,000 by the jitneys. The Union Street Railway estimated its loss during the summer months at about $200 per day, but early in December the loss was roughly set at about $100 a day, with the number of jitneys gradually decreasing. The loss of the Springfield Street Railway from April 1 to Dec. 15, 1915, was approximately $67,402. Other losses from jitney competition for the same period were approximately $28,309 for the Worcester Consolidated Street Railway, $1,924 for the Milford, Attleboro & Woonsocket Street Railway, and $14,026 for the Interstate Consolidated Street Railway.

NEW YORK COMMISSIONS REPORT

Traffic Decrease in New York City Said to Be Almost Negligible—Up-State Lines Show Declining Tendency, But Maintenance Is Kept Up

For the first time in the eight years' life of the Public Service Commission for the First District of New York, according to the report just submitted to the Legislature, the total of street railway traffic and the total revenue from passenger fares in New York City showed a decrease instead of an increase. The report states that this condition was also recorded in most other parts of the country, and was generally attributed to the effect of the European war. The decrease was so small in New York City, however, as to be almost negligible. The total number of passenger fares for the fiscal year ended June 30, 1915, was 1,807,632,726, as compared to 1,813,204,356 for 1914, a decrease of 5,571,630. Yet the real decrease was about 3,000,000 in excess of this figure, owing to the traffic over the Manhattan Bridge, which was not included in the 1914 report. The total loss of about 8,500,000 was less than the traffic of two normal days. The companies' receipts from passenger fares amounted to $88,783,012 for 1915, as compared to $89,361,262 for 1914. The thirty-six operating companies showed at the end of the year an accumulated surplus of $18,700,591.

In spite of the traffic decrease, there was an increase in track mileage from 1706 miles in 1914 to 1730 miles in 1915, and also a substantial increase in the passenger car miles operated, indicating that the service was better as compared with the traffic than in the preceding year. The decrease in traffic was confined to the elevated and surface car lines, the traffic in the subway showing a slight increase. The figures for the subway were 345,585,749 passengers, an increase of more than 5,000,000 for the year. The per capita railway rides for the year were about 360. Before the days of the elevated and underground railroads, the per capita rides were between forty and fifty. With the population of the city estimated at 5,400,000, the fare payments for local transportation during the year averaged about $16.49 per capita.

The Public Service Commission for the Second District in its report states that the net income available for dividends in the case of street railways has been and is falling off because of decreased revenues and increased taxes. Dividends for the last few years have been maintained only by drawing on accumulated surplus. In spite of the decreased earnings, however, nearly all lines are said to have kept up their maintenance of way and rolling stock. Electric corporations showed a slight reduction of prosperity and gas corporations a decided falling off, while corporations doing business in both fields showed a gain. There was a slight falling off in the net revenues of telephone corporations on account of increased taxes and expenses.

STATISTICS OF NEW JERSEY COMMISSION

The report of the Board of Public Utility Commissioners of New Jersey for 1915, just submitted to the Governor, contains the following preliminary summary of revenues, operating expenses, etc., for the year ended Dec. 31, 1914:

No.	Class	Operating Revenues	Operating Expenses and Taxes	Per Cent of Operating Revenues	Net Revenues
23	Street railways....	$19,041,299	$12,621,522	66.2	$6,419,777
35	Gas companies	13,065,924	7,683,673	58.8	5,382,251
55	Electric light and power companies	11,404,044	6,002,555	52.6	5,401,489
119	Water companies..	4,844,096	2,364,378	48.8	2,479,718
15	Sewer companies..	267,525	179,515	67.1	88,010
40	Telephone companies	9,001,801	6,488,021	72.1	2,513,779
287		$57,624,689	$35,339,664	61.3	$22,285,024

Steam railroad companies are not included in the above. This is due to the fact that the revenues of these companies are derived from both State and interstate business, much the greater part coming from the latter. Divisions have not been made in reporting returns to an extent sufficient to show the total sums paid for transportation of freight and passengers wholly within the State. Complete statistics from this commission for electric railways for the calendar year 1913 were published in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1915.

As in the past, the largest issues of securities approved by the board during 1915 were for the railroad companies. The law provides that all such issues shall be approved, and this requires at times action by the board on proposed issues of securities supported by property outside the State, or the proceeds of which are to be used by companies whose New Jersey business is but a part of the whole. The following is a general summary of the security applications granted in 1915:

No.	Class	Bonds	Stock	Notes
8	Railroads	$136,182,500	$454,400	......
7	Street railways	7,224,000	1,811,300	......
11	Electric lighting companies...	651,000	3,453,600	......
6	Gas companies	911,562	860,800	......
14	Water companies...............	1,535,500	1,029,100	$20,000
1	Sewer company	70,000	....	......
47		$146,574,562	$7,609,200	$20,000

NEW SECURITIES FOR ELMIRA LINE

Elmira Water, Light & Railroad Company Plans to Issue $425,000 to Cover Outstanding Obligations and Meet Requirements for Next Five Months

Three meetings of stockholders of the Elmira Water, Light & Railroad Company, Elmira, N. Y., have been called for Jan. 18. One meeting is to be held to increase the capital stock $200,000; the second meeting is to classify the increased stock as second preferred stock, and the third meeting is to increase the board of directors, amend the by-laws and authorize the issuance of securities and certain acts necessary to permit the company to acquire the property and franchise of the Elmira & Seneca Lake Traction Company, the entire capital stock and bonds of which are already owned.

It is said that for several months the officers, directors and some of the largest stockholders of the Elmira Water, Light & Railroad Company have been considering the financial condition of the property, the financing of its capital expenditures and its estimated requirements for the coming five months. It has been determined that obligations of this company and the Elmira Transmission Company (which is to be merged with the approval of the Public Service Commission) outstanding on Oct. 31, 1915, and incurred for improvements, betterments and extensions, and the acquisition of property, should not be capitalized or refunded wholly in bonds. Hence it has been deemed best to sell $125,000 of 7 per cent cumulative first preferred stock, $200,000 of 5 per cent cumulative second preferred stock and $100,000 of first consolidated mortgage 5 per cent fifty-year gold bonds. The proceeds derived from the sale of about $60,000 of these bonds will be applied toward future improvements, betterments and extensions to the plant and property of the company, estimated as required during the coming five months, while the proceeds of approximately $40,000 of the bonds and the proceeds of the stocks will be applied, to the extent that they are sufficient, to the payment of obligations outstanding on Oct. 31, 1915.

It is proposed that any balance of expenditures made for capital account, or obligations incurred therefor, prior to Oct. 31, 1915, and not refunded or paid out of the proceeds of the sale of these stocks and bonds, shall not be capitalized by the issuance of any additional securities, and that the accumulated surplus earnings as of Dec. 31, 1915, shall not be used for the declaration of any dividends on the common stock subsequent to this date. With the approval of the commission, it is also proposed that the physical property and the franchises of the Elmira & Seneca Lake Traction Company shall be acquired so that the company will own these directly instead of controlling the company through stock ownership.

Application has been made to the Public Service Commission for the Second District of New York for leave to issue the above-stated securities. Stockholders will have an opportunity to subscribe to the additional $125,000 of first preferred stock and $200,000 of second preferred stock at par. During the year ended Nov. 30, 1915, the gross earnings showed an increase of $66,987 over the gross earnings for the corresponding period of the preceding year.

Belvidere (Ill.) City Railway.—A report circulated some months ago that W. C. Foster had purchased at auction the Belvidere City Railway was misleading, for the property of this company has never been foreclosed upon or sold and a receiver has never been appointed. All that Mr. Foster purchased at auction was a 1914 paving assessment for $275. It seems that the Belvidere City Railway, which is controlled by the Elgin & Belvidere Electric Company, has been operated at a loss for more than eight years, and the controlling company asked for complete release from the operation of local cars on the ground that there was no hope of such operation ever paying. The Mayor and City Council were disposed to give the release asked, but when a town meeting laid the case upon the table, the owners took the matter before the Illinois Public Utilities Commission and received authority to discontinue the operation of local cars and to operate interurban cars into the city without interference from city officials. Then the City Council last September passed an ordinance repealing the original ordinances granted to the Belvidere City Railway and the Elgin & Belvidere Electric Company, and authorized the former company to sell or lease such portions of its tracks as it desired to the latter company, and the latter company to operate its cars over such portions of the city tracks as it wished to and to take up such portions as it did not desire to use. Inasmuch as Mr. Foster's purchased assessment was for paving the tracks which the company proposes to take up, he is said to have a claim against only that portion of the track in front of the property assessed on the particular street in question, and the salvage value of such material is not worth the cost of its removal.

Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.—Counsel for the reorganization committee of the Birmingham, Ensley & Bessemer Railroad state that the sale of this property, as noted in the ELECTRIC RAILWAY JOURNAL of Nov. 13, has been confirmed, but title has not yet passed. The approved reorganization plan, which was described in the issue of Oct. 2, is in alternative form, but it has not yet been decided which alternative will be carried out and no decision will be reached for some time.

Boston Suburban Electric Companies, Newtonville, Mass.—The directors of the Boston Suburban Electric Companies have declared a quarterly dividend of $1 on the preferred stock, payable on Jan 15 to holders of record on Jan. 4. This dividend is the same as that paid during the first two quarters of 1915, the payments for the last two quarters being 50 cents each. It is said that the arrears of dividends on this cumulative stock to date amount to $11.50.

Camaguey (Cuba) Company, Ltd.—A dividend of 1 per cent has been declared on the common stock of the Camaguey Company, payable on Feb. 1 to holders of record on Jan. 15. This is the first dividend since March, 1913.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—The Ohio Electric Railway did not pay its rental on Dec. 24 to the Cincinnati, Dayton & Toledo Traction Company, whose lines it operates under lease, and as a result the lessor failed to pay interest on its bonded indebtedness on Jan. 1. The lessee had twenty days' grace, but it was said that no payment of rental would be made within this time on account of losses under the lease. Plans are being considered in regard to changing the rental and adjusting the bonded indebtedness of the lessor. One proposition was described in the ELECTRIC RAILWAY JOURNAL of Jan. 1. The outstanding bonds on which interest is unpaid consist of $2,700,000 of Cincinnati, Dayton & Toledo Traction Company bonds, $250,000 of Dayton Traction Company first mortgage bonds and $400,000 of Cincinnati & Hamilton Electric Traction Company 6 per cent bonds. Bondholders' protective committees have been formed for the first and last of these issues.

Dayton & Troy Electric Railway, Dayton, Ohio.—The dividend of 1¼ per cent on the common stock of the Dayton & Troy Electric Railway, paid on Dec. 31, 1915, was the first payment on this stock since June 30, 1914. The declaration of this dividend was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8.

Holyoke (Mass.) Street Railway.—Directors of the Holyoke Street Railway have declared a semi-annual dividend of 3 per cent on the company's stock. From 1892 to 1915, inclusive, 8 per cent per annum was paid.

Iowa & Illinois Railway, Clinton, Iowa.—The Iowa & Illinois Railway, with terminals at Davenport and Clinton, has been sold to the Davenport & Muscatine Railway, operating between Davenport and Muscatine. These two properties are controlled by the United Light & Railways Company. The principal office will be at Davenport. John G. Huntoon will serve as general manager of the consolidated lines and Clark Anderson as assistant general manager.

Kansas City Railway & Light Company, Kansas City, Mo.—Judge Hook on Jan. 11 signed the decree for the sale of the properties of the Kansas City Railway & Light Company under the reorganization plan. Many questions as to procedure and conditions came up during the two days prior to the issuance of the decree, but Judge Hook made it plain that, while preserving everybody's rights, he would control the situation until the new company, the Kansas City Railways, actually had charge. J. A. Guthrie was named commissioner to sell the street railway properties, and W. A. Nickels to sell the light company properties. The sale of the personal property of each group will be held on Feb. 4, and the sale of the real estate on Feb. 11. The approval of the franchise for the Kansas City Railways and the reorganization plan by the State commission was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8.

Miami (Fla.) Traction Company.—The stockholders of the Miami Traction Company have authorized an issue of $1,000,000 of bonds, of which $200,000 are to be sold now, the proceeds to be used for the construction of an extension to Miami Beach, West Palm Beach, Florida City and other points. Plans are also being considered to construct extensions to Cape Sable, Lake Okeechobee and Tampa. The company recently placed 3.5 miles of line in operation in Miami.

Northern Electric Railway, Chico, Cal.—Holders of more than 66 per cent of the several outstanding issues of bonds of the Northern Electric Railway and its subsidiary corporations have signed the reorganization agreement and placed their securities at the disposal of the committee. The signatures of 80 per cent of holders of the securities must be obtained before the plan can become operative. This reorganization plan was described in the ELECTRIC RAILWAY JOURNAL of Oct. 23. The earnings of the road are said to have been very satisfactory of late.

Public Service Railway, Newark, N. J.—With the approval of the Board of Public Utility Commissioners of New Jersey, a merger of the Public Service Railway and the Public Service Newark Terminal Railway has been arranged. The latter corporation was formed for the purpose of constructing the large terminal building nearing completion in Newark. Under the terms of the merger, the street railway's authorized capital has been increased from $38,000,000 to $50,000,000, the additional amount representing $9,000,000 of the terminal company's authorized capitalization and $3,000,000 of new stock. As both the railway and the terminal company are owned absolutely by the Public Service Corporation of New Jersey, none of the securities of the underlying company will be put upon the market.

Southeastern Ohio Railway, Zanesville, Ohio.—The Ohio Public Utilities Commission on Jan. 5 authorized the Southeastern Ohio Railway to issue $800,000 of common stock and to sell $50,000 for the highest price obtainable but not less than par. A total of $750,000 in stock and the proceeds of $8,000 of stock are to be delivered in full payment of the purchase price for the property of the Southeastern Ohio Railway, Light & Power Company, recently purchased at receiver's sale. A preliminary notice regarding the incorporation of the successor company was published in the ELECTRIC RAILWAY JOURNAL of Jan. 1. The proceeds of $42,000 of stock are to be used for the construction of additions, extensions and improvements to the company's property. The extension of the line from Crooksville to New Lexington is planned.

United Light & Railways Company, Grand Rapids, Mich.—It is reported that the United Light & Railways Company has decided to issue only limited amounts of first and refunding 5 per cent bonds in future financing, the major part to be accomplished through the issuance of 7 per cent preferred stock.

United Railroads of San Francisco, San Francisco, Cal.—The United Railroads of San Francisco has filed with the California Railroad Commission an application for an order confirming the issue of coupons on 400 bonds of the Ferries & Cliff House Railway remaining unpaid on Dec. 31, 1914. The bonds have a par value of $1,000 each. The Ferries & Cliff House Railway, organized in 1887, issued in 1889 first mortgage 6 per cent bonds of $650,000, maturing on March 1, 1914. In 1893 the company was consolidated into the Market Street Railway and in 1902 was taken over by the United Railroads of San Francisco. Before the bonds became due on Jan. 21, 1914, this company arranged a postponement until Dec. 31, 1914, when 200 of the bonds were cancelled and a further postponement of the 400 remaining bonds were secured until Dec. 31, 1916. As part consideration for the postponement, the company gave four coupons for interest at 6 per cent on each of the 400 unpaid, due semi-annually on June 30 and Dec. 31, 1915 and 1916. For this action it now asks the approval of the commission.

Wausau (Wis.) Street Railroad.—The Wausau Street Railroad has changed its name to the Wisconsin Valley Electric Company, and it has purchased the property of the Merrill Railway & Lighting Company, Merrill, Wis., consisting of a hydraulic and steam power plant, street railway, and electric lighting and power business. The company has also purchased in Merrill all the water power of the Lindauer Pulp & Paper Company, and proposes combining into one hydraulic electric plant the power formerly owned by the above-named companies. Merrill is located 18 miles north of Wausau. The company is now constructing a high-tension line, 23,000 volts, connecting these two cities. It is said that the stockholders have authorized an increase in stock from $400,000 to $800,000, and of the new amount $200,000 will be issued immediately.

Winnipeg (Man.) Electric Railway.—William P. Bonbright & Company, New York, announce that their recent offering of $750,000 of Winnipeg Electric Railway two-year 6 per cent gold notes, mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 8, has been largely over-subscribed. It is reported that the directors of this company have declared a dividend of 2 per cent for the last quarter of 1915, making the total for the year 9½ per cent as compared to 12 per cent for 1914 and the years immediately preceding. The rate was reduced from 3 per cent quarterly to 2½ per cent during the first quarter of 1915.

York (Pa.) Railways.—At the annual meeting of stockholders of the York Railways Charles H. Bean and John E. Zimmerman were added to the board of directors. Mr. Bean is a prominent banker of Philadelphia, while Mr. Zimmerman is a member of the firm of Day & Zimmerman, contractors, of the same city.

DIVIDENDS DECLARED

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 75 cents, preferred.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Winnipeg (Man.) Electric Railway, quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.						
1m., Nov.,	'15	$156,442	$102,201	$54,241	$39,512	$14,729
1 " "	'14	160,928	104,688	56,240	39,950	16,290
5 " "	'15	869,759	549,246	320,513	202,251	118,262
5 " "	'14	944,717	581,813	362,904	199,017	163,887
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.						
1m., Nov.,	'15	$72,856	*$62,253	$10,603	$16,786	†‡$5,956
1 " "	'14	72,066	*64,896	7,170	17,315	†‡10,055
5 " "	'15	425,641	*321,886	103,755	84,526	‡20,059
5 " "	'14	447,386	*339,892	47,494	85,921	†‡37,607
CITIES SERVICE COMPANY, NEW YORK, N. Y.						
1m., Nov.,	'15	$490,623	$15,537	$475,086	$40,833	$434,253
1 " "	'14	371,124	11,927	359,197	40,833	318,364
12 " "	'15	4,352,413	167,112	4,185,301	490,000	3,695,301
12 " "	'14	3,943,507	108,761	3,834,746	408,333	3,426,413
CONNECTICUT COMPANY, NEW HAVEN, CONN.						
1m., Nov.	'15	$679,900	*$487,961	$191,939	$100,575	‡$114,720
1" "	'14	601,801	*474,675	127,126	98,386	‡50,530
5 " "	'15	3,747,870	*2,496,831	1,251,039	493,014	‡874,178
5 " "	'14	3,561,744	*2,650,636	911,108	492,245	‡527,158
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.						
1m., Nov.,	'15	$477,688	*$197,256	$280,432	$212,253	$68,179
1 " "	'14	458,574	*180,146	278,428	209,663	68,765
5 " "	'15	2,246,310	*956,674	1,289,636	1,059,288	230,348
5 " "	'14	2,225,920	*922,989	1,302,931	1,058,220	244,711
NEW YORK (N. Y.) RAILWAYS						
1m., Nov.,	'15	$1,134,595	$698,369	$436,226	$370,534	‡$114,500
1 " "	'14	1,061,863	683,988	377,875	366,451	‡47,347
5 " "	'15	5,795,652	3,555,097	2,240,555	1,853,978	‡613,871
5 " "	'14	5,680,232	3,560,362	2,119,870	1,840,274	‡472,082
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.						
1m., Nov.,	'15	$25,093	*$24,302	$791	$7,998	†‡$7,158
1 " "	'14	23,967	*22,692	1,275	7,876	†‡6,563
5 " "	'15	186,660	*135,331	51,329	40,003	‡11,639
5 " "	'14	190,342	*138,334	52,008	39,379	‡12,883
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.						
1m., Nov.,	'15	$44,265	*$41,804	$2,461	§$5,422	†‡$1,628
1 " "	'14	37,849	*44,602	†6,753	§6,827	†‡12,046
5 " "	'15	214,341	*208,158	6,183	§30,460	†‡16,041
5 " "	'14	187,073	*215,734	†28,661	§30,521	†‡51,194
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO.						
1m., Nov.,	'15	$341,974	$200,063	$141,911	$54,241	$87,670
1 " "	'14	286,732	186,008	100,724	50,261	50,463
11 " "	'15	3,510,934	2,155,045	1,355,889	575,269	780,620
11 " "	'14	3,319,704	2,040,013	1,279,691	556,365	723,326
REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.						
1m., Nov.,	'15	$289,151	*$167,266	$121,885	$58,838	‡$63,547
1 " "	'14	241,625	*153,065	88,560	56,005	‡34,126
11 " "	'15	2,800,428	*1,706,192	1,094,236	635,884	‡460,142
11 " "	'14	2,741,626	*1,703,810	1,037,816	620,510	‡420,855
RHODE ISLAND COMPANY, PROVIDENCE, R. I.						
1m., Nov.,	'15	$417,449	*$332,972	$84,477	$120,461	†‡$34,388
1 " "	'14	397,016	*343,126	53,890	117,300	†‡61,721
5 " "	'15	2,315,599	*1,696,816	618,783	602,136	‡49,925
5 " "	'14	2,376,507	*1,724,294	652,213	591,800	‡96,777
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Nov.,	'15	$793,618	$484,236	$309,382	$166,265	‡$144,773
1 " "	'14	750,592	475,033	275,559	133,415	‡144,024
11 " "	'15	8,596,586	5,504,360	3,092,226	1,520,340	‡1,593,015
11 " "	'14	8,486,162	5,264,675	3,221,487	1,442,725	‡1,791,828
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.						
1m., Nov.,	'15	$19,847	*$21,426	†$1,579	$1,548	†‡$3,271
1 " "	'14	19,752	*21,686	†1,934	1,917	†‡3,231
5 " "	'15	116,228	*109,218	7,010	7,161	†‡956
5 " "	'14	123,385	*116,640	6,745	6,812	‡587

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*Includes taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the N. Y., N. H. & H. R. R. under guarantee, also interest on notes held by the N. Y., N. H. & H. R. R. not credited to income of that company.

Traffic and Transportation

DETROIT UNITED CREATES NEW POSITIONS

Night Superintendent and Inspectors of Service Are Appointed to Effect Improvement in Service

On Jan. 1 the Detroit (Mich.) United Railway made many appointments with a view to the better supervision of the service within the one-fare zone. Among the appointments made are those to fill some newly-created positions, chief of which is one of night superintendent, while the other new positions are inspectors of service. The night superintendent will have charge of the night operation of all the city lines in the absence of the division superintendents of the several lines, while the inspectors of service will be located at the more important turn-outs and junction points for the purpose of regulating the service and re-establishing the schedules whenever, from any cause, there have been delays. The night superintendent is Richard Dawson and the inspectors of service are C. H. Wendt and Marvin Heidt, with jurisdiction over the Woodward, Hamilton and Victor lines; F. A. Vogel, with jurisdiction over the Baker, Sherman, Harper, Springwells and Chene extension lines; Arthur McKeown, with jurisdiction over the Fort, Grand Belt and Third-Larned lines; W. Cannon, with jurisdiction over the Michigan, Mack, Brush and South Chene lines; August Kornrumpf, with jurisdiction over the Jefferson, Myrtle and Trumbull lines; H. E. Baldwin and William Walsh, with jurisdiction over the Fourteenth, Crosstown and West Warren lines.

Other appointments by reason of vacancies caused by promotion, are as follows: C. E. Wilcox, assistant division superintendent of the Woodward, Hamilton and Victor lines; Charles Crowley, assistant division superintendent of the Fourteenth, Crosstown and West Warren lines; George Conkle, carhouse foreman Fourteenth carhouse; W. A. Jenkins, carhouse foreman Clark carhouse; William A. Murphy, carhouse foreman Jefferson carhouse; R. Pinkard, carhouse foreman Field Avenue sub-office.

HANNIBAL SERVICE CASE DECIDED

Summary of Findings of Missouri Commission With Respect to Service in Town of 19,000 Inhabitants

The Public Service Commission of Missouri has denied the motion for a rehearing made in the matter of the complaint of the city of Hannibal against the Hannibal Railway & Electric Company. The commission held in short as follows:

1. Street railway stops at the middle of the blocks in the business district of a city of 19,000 are not considered necessary and are ordered discontinued.

2. The installation of a small automatic signal system or the construction of longer passing tracks by a street railway, not clearly shown to improve the service, is not ordered.

3. The operation of street cars by one man in certain districts should not be condemned where the same tends toward economy without increasing the danger to the traveling public.

4. Delays in street railway service due to the blockading of cars by railroads in violation of municipal ordinances are to be avoided through the enforcement of the ordinance.

5. The names of streets should be called by conductors of street railway cars as the streets are approached.

6. The designation by a street railway of the rear door as an entrance and the front door as an exit is to be made.

7. Additional cars are to be operated by the street railway system to relieve congested traffic during morning and evening rush hours.

8. Where the evidence and an examination of a portion of a street railway show the same to be in bad condition, its reconstruction is ordered; the reconstruction to be effected by applying the annual surplus from the entire system thereto, from time to time, where the company is not financially able to proceed at once.

9. It is recommended that the city co-operate with the street railway in the granting of the necessary permission and the establishment of the grades of streets for the reconstruction of street railway tracks that elimination of objectionable curves might be had and the shifting of the tracks after reconstruction might be avoided.

10. The reconstruction of street railway tracks along a shorter route, serving better territory and eliminating dangerous grades, is suggested.

11. This commission has no power to grant the necessary franchises, or compel a municipality to do so, for an extension of the existing lines of a street railway. However, the commission may direct the street railway company to apply to the appropriate municipal authorities and take the necessary legal steps to secure the required franchise and rights-of-way for a necessary extension of its system.

12. Although slightly longer than other proposed extensions, a route having easy grades, serving the places having the greatest demand for street railway service and the most desirable and available territory for residences, is preferred.

13. Where, upon an analysis of the testimony, it appears that there would not be sufficient traffic on a proposed extension of street railway service to pay operating expenses, the construction of the new lines and the operation thereof at a loss is not ordered—the company being barely able to make operating expenses and not having the necessary funds for the extension or means of raising them.

CONFERENCE TO PROMOTE SAFETY AT GRADE CROSSINGS

Chairman Van Santvoord of the Public Service Commission for the Second District of New York called a meeting for Jan. 14 in the commission's Albany offices, of the executive committee of the conference to promote safety at the grade crossings of electric railways. This conference met in Syracuse last October and was attended by representatives of motorists' organizations and of electric railways, by the State highway officials, the Secretary of State and representatives of the Public Service Commission. A number of sub-committees were appointed to consider the many suggestions then and since offered for making the grade crossings of electric railways safer. The executive committee, which was appointed by the chairman, will consider the many suggestions that have been made and take steps for the further development of the campaign for making the electric railway crossings safe. In addition to Chairman Van Santvoord, and Charles R. Barnes, the electric railway inspector of the Public Service Commission, the members of this committee are: George C. Diehl, Buffalo; John B. McInerney, Rochester; B. E. Tilton, New York State Railways, Utica; Peter G. Ten Eyck, Albany; James P. Barnes, Buffalo, Lockport & Rochester Railway, Rochester; Edwin Duffey, State Commissioner of Highways, and Francis M. Hugo, Secretary of State.

MILWAUKEE LINES BEGIN PACKAGE EXPRESS SERVICE

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., on Dec. 20 inaugurated a package express service on its interurban lines between Milwaukee and East Troy and Burlington, Wis. Two trains daily each way on both lines leave and arrive at the Public Service Building in Milwaukee and make the 36-mile runs on the two lines in approximately four hours. In connection with this service a tariff provides for the addition of 20 per cent to the scheduled rates for all shipments where collection and delivery are made by the company. All shipments have been divided into two classes, one of which includes the collection and delivery service, but does not provide a time limit for collection, transportation and delivery by the company, and constitutes Class A shipments. All shipments forwarded which do not include collection and delivery nor a time limit for collection, transportation and delivery by the company make up Class B shipments. The railway collects and delivers all Class A shipments within the free mail delivery limits of eight cities and villages along its lines.

The lines selected to inaugurate this package express service traverse a territory not served by steam roads, hence it was possible to calculate the rates on a 15-mile zone basis. For instance, shipment of a 1-lb. Class A package, without the 20 per cent added to the rate for collection and delivery service, is made within this first 15-mile zone for 21 cents. The charge for a Class B shipment for the same haul is 20 cents. A 100-lb. Class A shipment carries a rate of 40 cents for the first zone, and a Class B shipment is carried anywhere in the first zone for 25 cents. Shipments to the second zone are made for 21 cents and 20 cents respectively for a 1-lb. package of Class A and Class B, and 45 cents and 28 cents respectively for 100-lb. shipments of the two classes. In addition to the rate schedules on commodity shipments the company has issued a switching tariff on carload freight and a graduated scale of rates on milk and cream in 5, 8 and 10-gal. cans. The rate on milk shipments varies from 7 cents for a 5-gal. can for a 5-mile haul to 11 cents for a 5-gal. can for a 40-mile haul. The rate on a 10-gal. can of milk is 10 cents for the first 5 miles and 19 cents for 40 miles. The charge for cream in the three sizes of cans is slightly in excess of that for milk.

GRAND RAPIDS RAILWAY TO ITS PATRONS

The Grand Rapids (Mich.) Railway published a two-page advertisement in the Grand Rapids *Herald* of Jan. 2 over the signature of Benjamin S. Hanchett, president of the company. The ad was headed "A frank and friendly talk by a friendly company to a friendly people." Underneath this appeared the following statement: "The Grand Rapids Railway has no secrets; its records are open to every eye. An old year-new year review of what a year has brought forth." The ad was divided into paragraphs headed: "The company has no secrets," "Jitney competition and its results," "Economy's urgent demand," "Income and what was done with it," "Number of passengers carried," "Not a passenger killed," "The company's loyal employees," "Parks and pleasure places," "The record of extensions," "The old year and the new." The ad carried a portrait of Mr. Hanchett and a picture of a modern pay-as-you-enter car which the company hopes to adopt for general use. In the upper right hand corner of the ad appeared these thoughts for the new year:

"The good will of the people is the company's greatest and best asset.

"Good understanding is helpful to the maintenance of friendly relations.

"Impairment of the company's earnings impairs its ability to give good service.

"Thirty million passengers handled, not one killed.

"Look out for the aged, take care of the children, be gentle with the infirm, help the women, be courteous with everybody and be eternally and everlastingly vigilant for safety are the rules of conduct for employees.

"Training employees and the public in safety first and all the time.

"A million dollars of income and what was done with it.

"Promised extensions were made in spite of the demands for economy.

"The company's earnest purpose of not merely winning but of deserving the good will of the people, their friendship and their approbation."

Bristol & Norfolk Tariff Suspended.—The Massachusetts Public Service Commission has issued an order suspending the proposed fare increase on the Bristol & Norfolk Street Railway until May 1, 1916, unless otherwise ordered.

Crusade Against Spitting in Washington.—Both the Washington Railway & Electric Company and the Capital Traction Company, Washington, D. C., have anti-spitting notices displayed in all the cars operated by them and both have notified their conductors to direct the attention of passengers to the regulation.

Club for Atlanta Employees.—Announcement of plans for the formation of an association among the forces of the Georgia Railway & Power Company, Atlanta, Ga., has been made by P. S. Arkwright, president of the company. Mr. Arkwright stated that a library and meeting room will be equipped in the company's building, and will be kept open at all times to company workers, officers and men, and that the initial plans of the association will be developed as rapidly as possible.

Hearing on Massachusetts Northeastern Fares.—The Public Service Commission of New Hampshire held a hearing at Concord on Jan. 6 upon the proposed fare increases of the Massachusetts Northeastern Street Railway. Representatives of border towns in southern New Hampshire opposed the increase. The board informed those present that the case will be decided with the aid of joint sessions with the Massachusetts Public Service Commission at Boston, in view of the preponderance of interstate travel on the system.

Traffic Circular of Michigan Railway.—The Michigan Railway, Jackson, Mich., has issued an attractive calendar, 11 in. x 24 in. in size, containing a map of its lines and halftone illustrations showing the character of service, equipment and roadway. Particular emphasis is laid on the modern all-steel equipment of the company for both freight and passenger service, and attention is directed to the places of interest along its lines. The principal points touched by this 550-mile interurban system are indicated on the map and listed on the calendar.

Prize Composition on Electric Roads.—E. F. Schneider, general manager of the Cleveland, Southwestern & Columbus Railway, reports that a school composition on the benefits of electric railways, written by a girl fourteen years old in the Berea High School, first grade, was recently selected to be read before a teachers' institute which was held in Berea. The composition describes the advantages which children living in the country now have in the way of education because they can use the electric lines to go to the high schools in the nearest town.

Supervisors Consent to Car Rerouteing.—The subject of permitting the United Railroads, San Francisco, Cal., to reroute certain of its lines was discussed at the regular meeting of the Board of Supervisors recently. A majority of the committee reported in favor of the scheme proposed by the company being given a thirty days' trial, during which time a study of the traffic conditions as developed thereby would be made and new suggestions considered by the committee at a meeting to be held on Jan. 27. It was also stipulated that the service on the Mission-Richmond line be increased 25 per cent. A minority of the committee recommended a modified plan of rerouteing, which was adopted.

Only Six Jitneys in Fort Worth.—Jitneys in Fort Worth, Tex., have been reduced from about sixty to six on account of the bonding companies raising the cost of the $2,500 indemnity bond required by the ordinance, which, in the opinion of the jitney operators, makes the business unprofitable. The petition of the jitney union to eliminate the bond feature from the ordinance and instead maintain a pool of $5,000 in a bank out of which indemnity would be paid for any injury or damage to persons or property, was refused by the City Commissioners following a ruling from the city attorney to the effect that such a provision would be discrimination against the operators who were not members of the jitney union or group making the pool.

Interurban Edition of "Electric Railway Service."—The publicity department of the Detroit (Mich.) United Railway has inaugurated a new feature in connection with *Electric Railway Service*, the weekly publication of the company. An interurban edition, paying particular attention to matters of interest in the cities and towns served by the Detroit United interurban lines, is now being issued in addition to the regular edition for the consumption of Detroit riders. The interurban edition will be placed in all interurban cars and at many of the important suburban stations. The publicity department does not plan a complete change in the subject matter of the two editions, but proposes to devote two or three pages each week exclusively to interurban news. Many favorable comments upon the new departure have been made by newspapers in the cities and towns along the interurban lines.

Safety Calendars in 9000 Brooklyn Classrooms.—The Brooklyn Institution for Safety and the bureau of public safety of the Brooklyn (N. Y.) Rapid Transit System have issued their safety calendar for the year 1916. This is the third year in which a special safety calendar has been produced for use primarily in the public schools of Brooklyn. An edition of 9000 copies was printed so as to provide one of the calendars for every school classroom in the borough. The safety calendar has proved one of the most effective features of the public safety campaign. This year's calendar consists of twelve sheets produced in poster form by Ernest Hamlin Baker. Each sheet presents a safety picture in colors, and most of the pictures have to do with the dangers to which children subject themselves while playing in the streets. With the pictures there is a safety text calling attention to the particular hazard which the picture presents.

New Cars for Springfield.—The Wason plant of The J. G. Brill Company, at Brightwood, Mass., has received an order for nine more semi-convertible cars from the Springfield (Mass.) Street Railway. The cars are a departure from previous rolling stock used by the road, being of a type recently developed under direction of Clark V. Wood, president of the Springfield company. The cars are rebuilt from nine-bench open equipment and are provided with two steps, the floors being on the same level in both platforms and inside the body. Increased aisle width is a feature and wooden slat seats are used. The doors are provided with glass panels extending to the floor, in order to facilitate safe alighting and boarding. Several of the cars are also being built by the Osgood Bradley Car Works, Worcester, Mass., for the Springfield company. The order for the cars has been referred to previously in the department headed Rolling Stock in the ELECTRIC RAILWAY JOURNAL.

A Good Example to Follow.—*On the Cars*, the publication of the Sioux Falls (S. D.) Traction System, in an item in the issue of Jan. 1 said: "Seven years ago we began to print 'now and then' our little paper *On the Cars*. It had the honor of being the first in the field. We had many inquiries and requests for copies from the managements of street railway companies, which resulted in our example being followed by companies in many parts of the country—some of them like ours, only published occasionally, and some issued regularly every month. The one feature of ours which has not had the attention given to it by others is that we have devoted most of our space to boosting the city. We believe in working for the place we live in. We want it to be the biggest and best and busiest place in the country, knowing, of course, that if Sioux Falls grows we will grow too. Some of the other street railway publications are very elaborate but all devoted almost exclusively to the interest of the company. We believe in publicity so we unbosom ourselves to the public."

Oregon Supreme Court Upholds Jitney Bus Ordinance.—The Oregon State Supreme Court in a recent decision written by Justice Benson declares that the jitney bus ordinance passed last fall by the city of Portland is constitutional. This decision reverses the judgment of Circuit Judge Bagley, who decided in favor of the jitney bus representatives against Mayor Albee of Portland. Justice Benson holds that a municipality has power to enact an emergency ordinance and that "the ordinance in question goes quite fully into matters necessary to entitle an applicant to a license for the operation of a motor bus, and, among other things, requires the procuring of a certain certificate prescribing what it shall contain. This part of the ordinance is to be read in connection with other provisions of the act and an appeal is provided against unjust action upon the part of the commissioner." Among other provisions the ordinance requires that jitney bus drivers shall be more than eighteen years of age; that the route shall be specified in applying for a license and can be changed only with the consent of the commissioner of public utilities; that continuous service shall be furnished between 6 a. m. and 8 a. m. and 4.30 p. m. and 7 p. m.; that the fare shall be 5 cents unless a passenger agrees to a greater fare for diverting from route; that machines shall stop only on or near intersections and within 2 ft. of curb; that only one passenger shall ride in the seat with the driver and no passenger ride on the door or running board; and that all cars shall be lighted inside at night. It also requires the examination of drivers to determine their ability. Inspections are to be made once a month. The city license costs $2 a month for seven-passenger cars and 25 cents a month for each additional seat for larger cars.

CHICAGO BOARD OF ENGINEERS NOMINATED

Messrs. Arnold, Ridgway and Parsons Selected to Pass on Chicago Transportation Problems

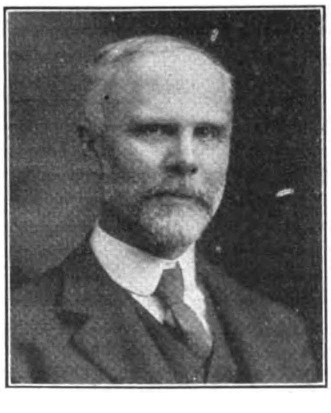
The board of three engineers which is to present a report to the city of Chicago providing for a unified and comprehensive system of transportation, including the present surface and elevated lines and the proposed subway, was completed on Jan. 7 by the selection of Robert Ridgway, New York, as the associate on the board of Bion J. Arnold, Chicago, and William Barclay Parsons, New York, previously selected. All three have accepted appointment. The decision to appoint one man from Chicago and two others familiar with the efforts made to solve the transportation problems of New York, Boston and Philadelphia, shows a broad view of the situation. The choice still has to be confirmed by the Council and the Mayor of the city of Chicago.

B. J. ARNOLD

The selection of Mr. Arnold as the member from Chicago was most logical. He is chairman of the Board of Supervising Engineers Chicago Traction and has been connected with the traction situation there for many years. Mr. Ridgway is not so well known to men engaged in the electric railway industry as is either Mr. Arnold or Mr. Parsons. After a short period spent on railroad construction work he entered the service of the city of New York and has been engaged on engineering work for the city ever since. In 1900 he was appointed senior assistant engineer of the New York Rapid Transit Commission and had charge of much difficult work connected with the rapid transit lines now in operation, including the Brooklyn division with the line under the East River. In 1911 he was appointed engineer of subway construction by the Public Service Commission of the First District of New York, in which capacity he has supervised the work under the $360,000,000 dual system of rapid transit now well along toward completion. Mr. Ridgway's work in Chicago will not affect his connection with the New York commission.

ROBERT RIDGWAY

Mr. Parsons has long been engaged in consulting engineering work, and is best known in traction matters, probably as the chief engineer of the New York Rapid Transit Commission under whose direction the present subway in New York was built. He remained as chief engineer of the Rapid Transit Commission until 1905. He was a member of the Isthmian Canal Commission in 1904; advisory engineer to the royal commission on London traffic in 1904, and member of the board of consulting engineers of the Panama Canal in 1905. He has inquired into and reported on street railway operating problems in San Francisco, Detroit and other cities.


W. B. PARSONS

Personal Mention

Mr. L. W. Gent has been appointed traffic manager of the Arkansas Valley Interurban Railway, Hutchinson, Kan.

Mr. John Gribbel has been elected vice-president of the American Railways, Philadelphia, Pa., to succeed Mr. William H. Shelmerdine.

Mr. A. W. Wilkerson, vice-president of the City National Bank, Bryan, Tex., has been elected treasurer of the Bryan-College Interurban Railway, Bryan, Tex.

Mr. L. M. Levinson, acting manager of the Bryan-College Interurban Railway, Bryan, Tex., has been elected secretary and general manager of the company.

Mr. John H. Hanna, formerly chief engineer of the Capital Traction Company, Washington, D. C., has been elected vice-president in charge of operation of the company.

Mr. William F. Ham, vice-president of the Washington Railway & Electric Company, Washington. D. C., has been elected a director of the Federal National Bank of that city.

Mr. R. L. Cadwell has resigned as superintendent of the Warren-Bisbee Railway, Warren, Ariz., to accept a similar position with the Gila Bend & Ajo Railroad, now nearing completion.

Mr. A. M. Moore, who has been master mechanic of the Georgia Railway & Power Company, Atlanta, Ga., has been appointed to the newly created office of superintendent of equipment of the company.

Mr. J. E. Eaves has been appointed master mechanic of the Georgia Railway & Power Company, Atlanta, Ga., to succeed Mr. A. M. Moore, who has been made superintendent of equipment of the company.

Mr. Arthur Blaser, for the last six years with Wilbur J. Watson & Company, engineers, has been appointed chief engineer in his department by Fielder Sanders, Street Railway Commissioner of Cleveland, Ohio.

Mr. David S. Carll has voluntarily retired from the office of general manager of the Capital Traction Company, Washington, D. C., but retains his position as vice-president and as a member of the board of directors.

Mr. Richard Dawson has been appointed night superintendent of the Detroit (Mich.) United Railway, a new position, in which he will have charge of the night operation of all the city lines in the absence of the division superintendents of the several lines.

Mr. Clarence P. King, president of the Washington Railway & Electric Company, Washington, D. C., and allied interests including the Potomac Electric Power Company. was elected a director of the Chamber of Commerce of Washington at the annual election held on Jan. 11.

Mr. Frank Irvine has resigned as a member of the Public Service Commission of the Second District of New York and will return to his post at Cornell University as dean of the college of law. Mr. Irvine was appointed to the commission in 1914 by Governor Martin H. Glynn.

Mr. A. D. Furlong has resigned as general manager of the Saginaw-Bay City Railway, Saginaw, Mich., with which he has been connected since January, 1914. Mr. Furlong was formerly third vice-president, general manager and purchasing agent of the Springfield (Ill.) Consolidated Railway.

Mr. Frank J. Sprague has sailed with the superdreadnought New York as the guest of Capt. Hugh Rodman. Mr. Sprague, who is a graduate of Annapolis, is a member of the new Naval Consulting Board. He will witness the maneuvers and target practice of the Atlantic fleet, and on his return will embody his observations in a report to the Naval Consulting Board.

Mr. Van Horn Ely, president of the National Properties Company and the Wilmington & Philadelphia Traction Company, has been elected president of the American Railways, Philadelphia, Pa., to succeed Mr. J. J. Sullivan, the National Properties Company and the American Railways having been amalgamated, as noted in the Electric Railway Journal of Nov. 6 and 27.

Mr. C. I. Beamer, special car agent of the Detroit (Mich.) United Lines for the last seven and a half years, has been granted leave of absence, and he plans to spend some time in the West and Southwest to improve his health. Before his departure he was presented with a purse of gold from company officials and fellow employees. Mr. Malcolm McIntyre will act as special car agent during Mr. Beamer's absence.

Mr. Peter Witt, until Jan. 1 Street Railway Commissioner at Cleveland, Ohio, has opened an office in that city, and will probably devote a portion of his time to certain features of electric railway operation, as an expert. He will also give his attention to a car, for which patents have been applied, a number of which are now in operation on the Cleveland Railway. Mr. Witt has been asked by the Massachusetts Commission to represent it in the Bay State Street Railway fare case.

Mr. H. E. Cleland, formerly advertising manager and manager of the copy-service department of the Hill Publishing Company, New York City, has joined the organization of the McGraw Publishing Company, Inc., publisher of the Electric Railway Journal, and, effective on Jan. 10, was appointed business manager of the *Electrical World.* Mr. Cleland has had an exceptionally broad experience in publicity and modern sales methods employed in the distribution of engineering products.

Mr. R. F. Carley, at present chief operating engineer of the Illinois Traction System, Peoria, Ill., has been appointed general superintendent of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill. He succeeds Mr. Foster Hannaford, who has become connected with the Twin City Lines as superintendent of the St. Paul division, as announced in the Electric Railway Journal of Dec. 8. The duties of the office of chief operating engineer will be assumed by the present organization.

Mr. John A. Cleveland, who has been connected with Hodenpyl, Hardy & Company, New York, since December, 1913, has returned to Saginaw, Mich., as general manager of the Saginaw-Bay City Railway, which is controlled by the banking firm previously mentioned. Mr. Cleveland succeeds Mr. A. D. Furlong at Saginaw. Mr. Cleveland was formerly general manager of the Saginaw property. He is thirty-six years old and was graduated from Williams College in 1901 with the degree A.B. and from Cornell University in 1904 with the degree E.E. He was at one time connected with the Rochester Railway & Light Company. In May, 1903, he entered the employ of the Saginaw Power Company as superintendent in charge of new business.

Mr. Fielder Sanders, recently appointed Street Railway Commissioner by Mayor Harry L. Davis of Cleveland, was born in Washington, D. C., on Aug. 24, 1876. Mr. Sanders was graduated from Central High School, Cleveland, in 1893, and from Adelbert College in 1897, with the degree of bachelor of letters. In 1901 he was graduated from the law school of Western Reserve University and within a short time was admitted to the bar. He practised law in Cleveland from 1901 to 1909, when he was made assistant county solicitor. a position which he held until Jan. 1, 1912. He then took his seat as judge of the municipal court and was re-elected to that office in 1913 for a term of four years. He resigned from the municipal court on Dec. 20, 1915, to assume his present position.

Mr. Lewis F. Brown, who for a number of years has been claim agent for the South Covington & Cincinnati Street Railway, Covington, Ky., and the Union Light, Heat & Power Company, has been made chief counsel for both companies, and Mr. E. W. Fitzgerald has been appointed claim agent to succeed Mr. Brown. The legal departments of the companies have been in charge of Mr. R. C. Simmons, Covington, and Mr. Alfred A. Cassatt, Cincinnati. Mr. Brown has been connected with the South Covington & Cincinnati Street Railway for a number of years. He entered the employ of the company as a boy, studied law, and several years ago became a practising attorney at the Kentucky County bar. Both Mr. Brown and Mr. Fitzgerald were claim agents of the company previously.

Mr. William W. Mason has been appointed senior electrical engineer for the Interstate Commerce Commission, Central District, with headquarters at Chicago, Ill., and has severed his connection with the Public Service Commission for the First District of New York, with which he has been associated since 1908. Mr. Mason took the student course with the Thomson-Houston Electric Company in Lynn in 1893. In 1896 he became connected with the Greenfield & Turner Falls Street Railway in charge of the power station and later of all electrical work of the system. In 1899 he entered the employ of the Boston (Mass.) Elevated Railway and took an active part in installing the multiple-unit system on that road. In 1903 Mr. Mason went to the Pacific Coast on construction work for the first third-rail interurban line west of the Mississippi River. After the earthquake in 1906 he returned to the East to enter Westinghouse, Church, Kerr & Company, New York. After the Erie electrification at Rochester Mr. Mason supervised for Westinghouse, Church, Kerr & Company all field parties in the appraisal of rolling stock of the electric properties of the New York, New Haven & Hartford Railroad. The Metropolitan Street Railway, Coney Island & Brooklyn Railroad, Brooklyn Rapid Transit Company, Second Avenue Railroad and the Third Avenue Railroad were all appraised by the Public Service Commission during Mr. Mason's connection with that body.

Mr. W. A. Carson has been elected vice-president of the Evansville (Ind.) Railways in addition to the position as general manager. Mr. Carson has been connected with the Evansville Railways since July, 1908. He was assistant to the general superintendent of the Indianapolis & Cincinnati Traction Company from 1903 to 1906, and was assistant general manager of the Indianapolis, Columbus & Southern Traction Company from 1906 to 1908. Since Mr. Carson's connection with the Evansville Railways the company constructed a line in 1908 from Evansville to Newburgh, and built an extension from Rockport to Grandview in 1910. That same year a syndicate composed of officials of the Evansville Railways, of which Mr. Carson was a member, purchased the city lines in Henderson and Owensboro, Ky., and Mr. Carson was appointed general manager of both companies, which were taken over by the Evansville Railways in 1913. In 1912 a lease was secured on the line of the Illinois Central Railroad between Evansville and Henderson. This property was electrified by the Evansville Railways and a gasoline car ferry was installed to transport the interurban cars across the river. In 1913 the Crescent Navigation Company was incorporated with Mr. Carson as president, to operate a line of fast passenger motor boats on the Ohio River to connect with the company's line at Grandview, operating up the river to Troy, Tell City and Cannelton, Ind., and Hawesville, Ky., also a line of boats connecting with the line of the Evansville Railways at Rockport, and operating down the river to Owensboro, Ky. During Mr. Carson's connection with the company the carload freight business on the eastern division from Evansville to Rockport and Grandview has shown a rapid growth, and exchange of carload business is made with the Illinois Central Railroad at Evansville and the Southern Railway at Rockport under the American Electric Railway Association's rules on per diem and car service.

OBITUARY

Clarence Howard Clark, Jr., president of the Centennial National Bank, Philadelphia, Pa., and a member of the firm of E. W. Clark & Company of that city, bankers, died near Garnett, S. C., on Jan. 9. Mr. Clark was fifty-four years old. He entered the employ of E. W. Clark & Company in 1879, who control many public utility properties, as a clerk and became partner in 1885. For ten years he had served as president of the Centennial National Bank.

Oliver C. Gayley, vice-president of the Pressed Steel Car Company, died on Jan. 8 at his home in New York in his fifty-sixth year. Mr. Gayley was born in West Nottingham, Cecil County, Md., and was formerly for eight years employed in the engineering department of the Pennsylvania Railroad, later becoming a division engineer of the Philadelphia & Reading Railroad. For many years he was connected with the Safety Car Heating & Lighting Company, and was a director at the time of his death.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Tampa, Clearwater & Island City Railroad, Clearwater, Fla.—Incorporated in Florida to construct a railway from Clearwater to Clearwater Key, 2¾ miles. Capital stock, $100,000. Officers: E. W. Parker, Tampa, president; G. R. Smoyer, Clearwater, vice-president; E. T. Roux, Plant City, secretary; H. W. Bivins, Clearwater, treasurer, and M. G. Gibbons, Tampa, counsel. [Dec. 25, '15.]

***Intermountain Traction & Power Company, Tacoma, Wash.**—Incorporated in Washington with a capital stock of $500,000. The main office of the company will be at Tacoma, with branches at Seattle and Valdez, Alaska. Incorporators: I. M. Iles, F. B. Chandler and A. B. Iles.

FRANCHISES

Kingman, Ariz.—Application for a franchise to build and operate a steam and electric railroad from some point on the Santa Fé main line to Oatman has been filed with the Mohave County board of supervisors by Henry Lovin and Horace J. Pullen.

San Diego, Cal.—The San Diego Electric Railway has asked the Council for a franchise to construct an extension of its line on University Avenue from Fairmount Avenue to Euclid Avenue.

Kansas City, Mo.—The Kansas City & Tiffany Springs Railway has received franchises from Clay and Platte Counties for building and operating a line across the county highways. [Dec. 25, '15.]

Buffalo, N. Y.—The Public Service Commission for the Second District of New York has approved the franchise granted the International Railway by the Council in October of last year for a double-track extension of its line with the necessary switches, etc., in Skillen Street from the Military Road to O'Neil Street.

Dallas, Tex.—The Dallas Standard Traction Company has received a twenty-year franchise from the Council to construct an extension to its Mount Auburn line.

TRACK AND ROADWAY

Edmonton (Alta.) Radial Railway.—The City Commissioners have recommended the extension of the Edmonton Radial Railway along Brandon Avenue to connect with the Edmonton Interurban Railway, estimated cost $3,000.

Pacific Electric Railway, Los Angeles, Cal.—A contract has been let to the Union Switch & Signal Company for the installation of block signals on this company's line between Los Angeles and Riverside.

Martinez, Cal.—It is reported that preliminary surveys for the proposed line to connect Concord and Martinez have been completed. The line will follow the main road from Martinez to Pacheco, and from there will take a cut-off through the Oak Knoll property and into Martinez. In conjunction with the building of the line, the Santa Fé Railroad will move its station at Muir to a point about 1½ miles nearer Martinez. Judge Clifford McClellan, San Francisco, and Irving Peterson, Berkeley, are interested. [Jan. 8, '15.]

Municipal Railways, San Francisco, Cal.—The Board of Supervisors has received a petition from the North Beach Promotion Association to extend the Stockton Street line from Stockton and Market Streets along Fourth Street to the Third and Townsend Streets depot, and from Columbus Avenue to the bay.

New Britain, Kensington & Meriden Street Railway, New Britain, Conn.—At a conference recently held by the joint committee of the New Britain and Meriden Chambers of Commerce and representatives from Kensington interested in the proposed line between New Britain and Meriden and

Mr. Brown of the Railway Storage Battery Car Company, the committee went over the matter in detail with him and arranged to have him submit an agreement giving the proposal his company is willing to make in writing. With this as a working basis, the committee will then prepare a report to present to their directors.

Miami (Fla.) Traction Company.—This company has authorized an issue of $1,000,000 of bonds, of which $200,000 are to be sold now, the proceeds to be used for the construction of an extension to Miami Beach, West Palm Beach, Florida City and other points. Plans are also being considered to construct extensions to Cape Sable, Lake Okeechobee and Tampa. It is proposed to begin work on the extension this winter.

Chicago (Ill.) Surface Lines.—Operation has been extended by this company over North Western Avenue to Devon Avenue and over South Ashland Avenue to Eighty-seventh Street. The line which has heretofore been operated between California and Kedzie Avenues via Elston Avenue will be operated via the newly constructed tracks on Milwaukee Avenue. These lines, with those operated on the extensions of Division Street, North Avenue, the north and south ends of Kedzie Avenue and the north end of Crawford Avenue, added approximately 20 miles to the transportation facilities during 1915.

Northwestern Elevated Railroad, Chicago, Ill.—Operation has been begun over the new elevated structure of the Northwestern Elevated Railroad in Chicago between Wilson and Howard Avenues. Permanent platforms have not been laid at the stations, as the men who have been working on the elevation have been needed for structural work. It is the intention of the company to replace these temporary platforms with concrete next spring.

***Mishawaka, Ind.**—Plans are being considered to build an electric line to connect Mishawaka with Indianapolis. The line would form a connecting link with the Grand Trunk System at Mishawaka and extend south through Bremen, Bourbon, Argos, Logansport and other towns and connecting with a steam line into Indianapolis. Among those interested are D. C. Dunlap, Wilmett, Ill.; Degroot Van Backerman, Chicago, Ill., and A. G. Barone, Wellington, Ill.

Iowa City-Muscatine Interurban Railway, Iowa City, Iowa.—According to an announcement made by President A. D. Bowen, the Iowa City-Muscatine Interurban Railway will be in actual operation not later than March 1. Contracts have been signed with the Rock Island Company for the leasing of its 104-mile line from Muscatine to Iowa City, What Cheer and Montezuma. Stock of the railway has been sold to the amount of $110,000 in Muscatine and Iowa City. [Nov. 6, '15.]

Morganfield, Ky.—Construction of an electric, standard gage, trunk railroad between Morganfield and Uniontown is proposed in a petition which has been presented to the Fiscal Court of Union County by S. B. Anderson of Memphis, Tenn., and G. L. Drury of Morganfield. The proposition is conditioned on the granting to the company by the court of a right-of-way along the main thoroughfare which now connects the two towns. They propose to begin construction immediately and state that the line will be in operation within twelve months after the concessions asked for are granted. In return the promoters propose to do what hauling the county requires at special rates. The towns are approximately 12 miles apart.

Worcester (Mass.) Consolidated Street Railway.—Residents of Greenwood Street below Upland Street have petitioned the Worcester Consolidated Street Railway for the extension of the Greenwood Street line from its present terminus on Greenwood Street to the Millbury line.

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—This company will soon go before the utilities commission with a request for permission to issue bonds, probably asking for $35,000 a mile, and for issuance of stock. The company is planning now to build only in Clay and Platte Counties, the main line northward from Kansas City detouring to reach Parkville on the route to Tiffany Springs, a spur extending to Campbellton. The purposes of the spur are to touch the main line of the Quincy, Omaha & Kansas City Railroad at Campbellton. [Dec. 25, '15.]

United Railways, St. Louis, Mo.—Alderman Koenig on Jan. 7 introduced in the Board of Aldermen a resolution that the United Railways be required to extend either the Lee or Natural Bridge car lines to reach the northwestern residence section. On Mr. Koenig's motion, the resolution was referred to the committee on public utilities. The measure asks the United Railways to extend one of the lines from the present terminus to Union and Bernays Avenue, west on Lillian Avenue to Jennings Avenue, and to the western city limits.

International Railway, Buffalo, N. Y.—A report from this company states that it contemplates the construction of 33 miles of new track for its 1916 requirements.

Interborough Rapid Transit Company, New York, N. Y.—Bids were opened on Jan. 10 by the Interborough Rapid Transit Company for new extensions, as follows: For the Webster Avenue extension the two lowest bidders were M. J. Leahy, $831,110.90, and A. L. Guidone & Son, $838,765; for the West Farms extension the two lowest bidders were A. L. Guidone & Son, $105,915, and Conners Brothers, $108,000, and for the Eighth Avenue extension the lowest bidder was Battery Engineering & Contracting Company, $336,000.

Cleveland (Ohio) Railway.—An application will be made by this company to Traction Commissioner Sanders for an appropriation of $934,370 for track renewals and repairs. The request will include applications for funds to relay the Broadway line between Miles Avenue and East Thirty-fourth Street, 6.3 miles, and the East 105th Street line on East Ninety-third Street, between Kinsman and Miles Avenue, 3.5 miles. The application for 1916 is $10,000 higher than the amount Commissioner Witte was asked for in 1915.

***Wilmington, Ohio.**—A committee of four Dayton business men, Messrs. Cooper, Kimmel, Ratcliff and Eichelberger, has arranged for a special meeting with the local Chamber of Commerce, at which time a proposition to construct a line from Wilmington to Xenia, to connect with the Dayton, Springfield & Xenia Southern Railway, will be made. The route has already been surveyed. It is reported that the Dayton Power & Light Company is back of the proposition.

Youngstown & Niles Railway, Youngstown, Ohio.—It is reported that the directors of the Youngstown & Niles Railway, a subsidiary of the Mahoning & Shenango Railway & Light Company, and recently incorporated with a capital stock of $10,000, have filed an application for an extension of its charter. The original charter provided for a line between Youngstown and Niles. The extension now asked for provides for the line extending through Niles to Warren, furnishing a route for a high-speed line almost entirely on private right-of-way. J. P. Wilson, Youngstown, president. [Dec. 11, '15.]

Kansas-Oklahoma Electric Company, Caney, Okla.—It is reported that steps are being taken to finance this company's proposed line from Independence, Kan., to Caney and Dewey, Okla. Plans for the line from Independence to Caney are said to be already perfected. S. M. Porter, Caney, is interested. [Dec. 25, '15.]

London & Port Stanley Railway, London, Ont.—A by-law was carried by the ratepayers of London to spend $101,000 on terminal connections for the newly electrified London & Port Stanley Railway.

Toronto, Ont.—By a vote of nearly four to one the taxpayers of Toronto on Jan. 1 indorsed the agreement under which the city guarantees about $14,000,000 of the bonds of the proposed Toronto-London radial railway, to be constructed and operated by Ontario's Hydro-Electric Power Commission. The line will eventually be extended to Sarnia. A line will also be built northward from Toronto, extending to Collingwood, Barrie and Orillia, and possibly to Owen Sound. An easterly radial will extend along the shore of Lake Ontario through to Montreal.

Southern Oregon Traction Company, Medford, Ore.—Operation has been begun on this company's extension from Medford to Jacksonville.

Willamette Valley Southern Electric Railway, Oregon City, Ore.—Plans are being considered by this company to extend its line from Mount Angel to Salem via Silverton, Macleay and Aumsville.

Perkiomen Traction Company, Collegeville, Pa.—It is reported that contracts have been let by this company for the construction of its line from Collegeville to Schwenkville, and preparations are being made to begin grading and track-laying. James L. Wolcott, Dover, Del., president. [March 6, '15.]

Pottstown & Phœnixville Railway, Pottstown, Pa.—A report from this company states that during 1915 it constructed 3½ miles of new line between Sanatoga Park and Linfield. During the coming year the company expects to construct 2½ miles of line between Linfield and Spring City.

Dallas, Tex.—At a meeting of officials of the city of Dallas, the Union Terminal Company and Dallas Consolidated Electric Street Railway, it was decided that there would be no car tracks laid on Houston Street in front of the Union Terminal, now in course of construction, owing to the narrowness of the street and consequent possibility of congestion. Passengers entering Dallas via steam roads will have to walk a block to Jefferson Street to get a street car.

Houston, Richmond & Western Traction Company, Houston, Tex.—It is reported that bonuses and donations amounting to nearly $600,000 have been secured by this company, which proposes to build a line from Houston to San Antonio. E. Kennedy, president. [Dec. 18, '15.]

Green Bay & Eastern Railway, Manitowoc, Wis.—Surveys have been begun by this company for its proposed line from Green Bay to Sheboygan via Manitowoc. [Dec. 25, '15.]

SHOPS AND BUILDINGS

Bay State Street Railway, Boston, Mass.—The old carhouse of the Bay State Street Railway on Bass Avenue, Gloucester, was totally destroyed by fire on Jan. 4, together with thirteen open cars, other equipment and three horses. The carhouse was a wooden structure and has been used as an auxiliary station to the brick building at the corner of Sayward Street and Bass Avenue. The loss is estimated at $40,000.

Long Island City, N. Y.—The transit committee of the Queens Chamber of Commerce has urged the Public Service Commission for the First District of New York to hasten the station finish work in the Hunters Point Avenue station on the Queensboro subway in Long Island City, in order to provide connections for passengers wishing to transfer from the Long Island Railroad trains at that point. This would enable residents in all parts of the Borough of Queens to transfer to the subway system at this station. Public Service Commissioner George V. S. Williams promised to take up at once the question of having a separate contract prepared for the station finish of the Hunters Point Avenue station.

Texas Traction Company, Dallas, Tex.—It is reported that this company will rebuild its substation near Sherman which was recently destroyed by fire.

POWER HOUSES AND SUBSTATIONS

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Work is progressing rapidly on the addition to the Lowellville power house of this company. The Stone & Webster Engineering Corporation is now engaged on the structural iron work. The reinforced concrete stack has been completed and one boiler has been installed. The addition will increase the horsepower capacity of the plant from 20,000 to 40,000.

Northampton Traction Company, Easton, Pa.—This company, which has taken over the property of the Bangor & Portland Traction Company, contemplates some changes in its power supply and lines. One or more substations, probably of the automatic type, may be erected. Plans are now being prepared by James T. Rood, consulting engineer, Easton, Pa.

Potomac Electric Power Company, Washington, D. C.—The capacity of the Benning steam power plant of the Potomac Electric Power Company, which supplies energy to the Washington, Baltimore & Annapolis Railroad, is to be increased by the installation of an additional 15,000-kw. generator. The building will be enlarged by the construction of necessary extensions to accommodate the new machinery, and a contract for the engineering and construction work has been awarded The J. G. White Engineering Corporation of New York.

Manufactures and Supplies

ROLLING STOCK

Bristol & Plainville Tramways, Bristol, Conn., expects to buy three convertible cars during 1916.

Chicago & Joliet Electric Railway, Joliet, Ill., on Jan. 3 had one of its street cars partially destroyed by fire.

Manhattan & Queens Traction Corporation, New York, N. Y., is considering the purchase of additional passenger cars.

Vicksburg Light & Traction Company, Vicksburg, Miss., may purchase during 1916 two closed city motor passenger cars.

Manhattan City & Interurban Railway, Manhattan City, Kan., expects to purchase during 1916 two single-truck motor cars.

Lehigh Valley Transit Company, Allentown, Pa., has issued specifications for twelve side-entrance cars for city and interurban service.

Union Traction Company of Indiana, Anderson, Ind., has purchased a modern double-track snow sweeper from the McGuire-Cummings Manufacturing Company, at a cost of $3,000.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has just completed at its Huntington shop a single-truck, double-end, broom snow sweeper to replace one destroyed by fire at LaFayette, Ind.

Metropolitan Street Railway, Kansas City, Mo., advises that the report that it was in the market for fifty cars and trucks is in error, but that it was in the market for fifty four-motor electrical and air-brake equipments.

Toronto (Ont.) Civic Railway will shortly purchase thirteen new cars at a cost of about $100,000. These will be used on the new Lansdowne line, the St. Clair Avenue line, and the Danforth line. The money was provided for in the estimates for this year. The Toronto Works Department is now advertising for bids on this equipment, which will be received up to Feb. 1.

East Liverpool Traction & Light Company, East Liverpool, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1915, as having received delivery of fifteen low-level center-entrance Pittsburgh type cars from the G. C. Kuhlman Car Company, specified the following details for these cars:

Seating capacity	51
Weight of car body, incl. elec. eq. attached to body and seats	18,910 lb.
Bolster centers, length,	21 ft. 8 in.
Length of body	31 ft.
Length over all	45 ft.
Width over sills	7 ft. 9½ in.
Height, rail to sills, at bolsters	2 ft. 4 5/16 in.
Height, sill to trolley base,	8 ft. 3 7/16 in.
Body	metal
Interior trim	cherry
Headlining	Agasote
Roof	Monitor Deck
Air brakes	G.E. CP-27
Axles,	spec. heat treated carbon
Bumpers	Ry. Std.
Control	G.E.
Couplers,	Ry. std. shackle bar with drawhead castings
Curtain fixtures	Cur. Sup. Co.
Curtain material	Pantasote
Destination signs	Keystone
Gongs,	New Departure rotary
Handbrakes	Peacock
Heaters	Peter Smith
Headlights	Crouse-Hinds
Journal boxes,	Symington torsion lid
Motors,	4 G.E.-247-A, inside hung
Paint	Sherwin-Williams
Registers,	Int. Reg. Co.'s C-21 combined coin and transfer register
Sash fixtures	O. M. Edwards
Seats	Brill rattan
Step treads	Feralun
Trolley catchers,	Knutson No. 5
Trolley base	G.E.
Trucks	Brill arch-bar type
Varnish,	Sherwin-Williams & Valspar Peerless for platform roof
Ventilators,	Perry for monitor deck
Wheels	rolled steel

TRADE NOTES

Kay & Ess Company, Dayton, Ohio, has appointed H. N. Turner, formerly Eastern representative of this company, as sales manager with headquarters at Dayton. J. W. Wilson has been appointed Eastern railway representative succeeding Mr. Turner.

Curtain Supply Company, Chicago, Ill., has received orders to equip with Ring No. 88 fixtures and Rex rollers the fifteen cars recently ordered by the United Traction Company, Albany, N. Y., and the three cars ordered by the Bristol & Plainville Tramway, Bristol, Conn.

Harrison Safety Boiler Works, Philadelphia, Pa., have received a gold medal award for the exhibit of their combined open-feed water heater and hot water meter, known as the Cochrane Metering Heater, which was exhibited at the Panama-Pacific Exposition.

Bailey Meter Company, Boston, Mass., has been incorporated under the laws of Massachusetts to manufacture and sell a line of recording meters and instruments for power plants and other similar uses. These meters have been developed during the past six years in the mechanical engineering department of the Fuel Testing Company of Boston. E. G. Bailey will devote his entire time to the new company, but the Fuel Testing Company will continue its regular line of work under the personal direction of W. B. Calkins, who has been a partner with Mr. Bailey since its organization in 1909.

ADVERTISING LITERATURE

Berger Manufacturing Company, Canton, Ohio, has issued a folder describing its various types of steel lockers suitable for employees' use in carhouses and shops.

Wright Manufacturing Company, Lisbon, Ohio, has issued a catalog describing and illustrating its various types of chain hoists, steel trolleys and hand cranes.

Ohio Brass Company, Mansfield, Ohio, has issued a folder illustrating the elimination of the danger factor at steam and electric railway crossings through the use of its National trolley guard.

Bowman, Cost & Company, St. Louis, Mo., have begun to issue *Investment Factors*, a new free periodical for investors. The January number contains articles on the bond market outlook for 1916, talks with investors, "What the Public Wants," the time to make purchases of securities, a list of profitable income-producing issues, and it touches on almost every phase of the investment market.

T. J. Cope, Philadephia, Pa., has issued a folder on his underground construction tools and equipment. This material includes cable racks, porcelain insulating saddles, cable tags, conduit-cleaning tools, cable-pulling wire ropes, steel manhole ladders, winches for pulling cables, cable-pulling rigging, cable reel jacks, shoring or trench jacks, bond plates, high-tension terminals, duct protectors, manhole guard rails and turnbuckles.

Western Electric Company, New York, N. Y., has issued the second edition of its year book, known as the "Electrical Supply Year Book for 1916." The current book continues the practice of a simple series of list prices, upon which a basis discount applies, such a discount indicating to the holder of the catalog his approximate price for all the articles listed. The 1916 book is even more complete and comprehensive than the 1915 issue, the number of pages being 1504 as compared with 1296 last year.

Richardson Scale Company, Passaic, N. J., has issued an artistically designed and completely compiled catalog describing its hopper scales for the automatic weighing of coal and water in power plants. The value of these appliances is emphasized in the catalog from the fact that since coal is the largest single element in the cost of power it is important to insure that the quality and quantity of coal paid for is received, and that proper economy in the use of coal bought is obtained. These automatic hopper scales are made on the principle of the equal-arm, single weighing beam, provided with standard Government weights. The hoppers are so arranged that no coal can pass through them unweighed and unrecorded. Three types of these scales find application in power plants: the scale for receiving coal, the scale for weighing fuel to boilers, and the water scale. In essential principles they are alike and differ only in details of construction. With the aid of clearly prepared illustratoins the catalog describes the construction and operation of these scales and gives special attention to the method of their installation. The catalog is designed and written by Ray D. Lillibridge, Inc., New York.

NEW PUBLICATIONS

Maintenance of Way and Structures. By William C. Willard, C.E., M.S. McGraw-Hill Book Company, Inc., New York. 451 pages. Cloth, $4.

This book sets forth the accepted practice in the maintenance of way and structures of steam railroads. The author has arranged the matter and treated it in such a way that it will be of interest both to maintenance of way engineers and to university students pursuing a course in engineering. Fundamental principles and theory are stated and are emphasized in each instance by representative examples of the practice of individual railways. The standard methods and practices recommended by the American Railway Engineering Association serve as a guide and, aside from these, way engineers of electric railways will find much information of value in the matter of way department organization and rules, records and accounts. A large amount of fundamental information concerning roadway, ballast, wooden ties, economics of ties, the preservation of timber and rails has been included. The latest data regarding stresses in the track are treated in one chapter, which is followed by a discussion of railway track design. Accepted standards for signs, fences, highway crossings, bridges, trestles and culverts are also described in detail. In each chapter the practical construction features, as well as theoretical calculations, are given. As a compendium of information concerning modern track and roadway construction this volume will prove invaluable for reference purposes.

Tramway Track Construction and Maintenance. By R. Bickerstaffe Holt. D. Van Nostrand Company, New York. 450 pages. Cloth $4.50.

This book contains a wealth of information concerning construction and maintenance methods employed by English tramway engineers. While English track construction differs materially from the American standards from a design standpoint, the care exercised by English tramway engineers during the construction and maintenance periods will be a revelation to American way engineers. The author is the permanent way engineer of the Leeds Corporation and is responsible for the construction and maintenance of one of the largest tramway systems in England. The exceptional opportunities afforded the author in this capacity have eminently fitted him to present conclusions concerning track materials and processes that will also serve as a guide to American way engineers. The book does not pretend to survey all the methods that have ever been employed on English tramways, but is concerned principally with the materials and methods that have been tested and have given the author confidence in them. In reality this work is a book of instructions on track construction and maintenance, being basicly practical and, doubtless, is the most authoritative contribution on the subject of English tramway tracks that has yet been published. In a foreword the author states that "all is not well with the permanent way" and then proceeds to furnish suggestions to tramway engineers, managers, students and municipal authorities concerning what he deems to be the best practices. In scope the volume treats of concrete foundations and materials and their repairs. The different track designs employed are described and the best practice to follow in rail packing, laying and fastening is presented. The problems incident to joints and joint welding are discussed at length. Rail wear, the composition and manufacture of rails and the effect of the section on rail wear are given thorough consideration. Drainage, rail maintenance, special work, track paving and reconstruction are also treated at length and in a way that they will serve as a guide to English way engineers. An appendix presents the principal methods required in special track work calculations, and the value of the volume is enhanced by over 150 illustrations carefully selected to illustrate the methods and practices described by the author.

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THE MID-WINTER MEETING PROGRAM

The association is to be congratulated on the program which has been prepared for the Chicago meeting. It is simple, but the topics to be discussed are momentous and the speakers selected are especially well qualified to discuss them. It is not to be expected that these topics can be exhausted in a single day, but the occasion is fitting to take account of stock of present knowledge and temper on the subjects "Valuation," "Rate of Return" and "Governmental Regulation," so that the course of the railways may be sailed by chart rather than by instinct. It is inferred that Senator Underwood will take up certain points in the President's message to Congress bearing upon the point covered in the title of his address, and if so he will open the way for an expression of opinion by the electric railway industry. The Chicago meeting bill of fare promises some nutritive food for thought.

A SOUND BASIS FOR FREIGHT RATES

In connection with the problem of freight rates, which is growing increasingly important to electric railways because this traffic offers apparently the livest opportunity for increased revenue at the present time, it is pertinent to call attention to the excellent guide afforded by existing steam railroad practice. High freight rates do not necessarily mean high freight receipts, and, on the other hand, lowered rates do not involve an inevitable increase in business. A proper adjustment of the rates on the various commodities to be handled is of infinitely more importance in securing maximum freight receipts, and this is something that the steam railroads have been working on for the last fifty years. They have, as a matter of fact, so fixed their rates as to give the maximum return in practically every locality, a feature that is well-exemplified by the experience of a large interurban railway, which at the time of inauguration of its freight business set its rates so that they averaged 20 per cent higher than those of competing steam lines. A readjustment was recently made to meet the steam road rates in all cases, and notwithstanding the reduced charges the revenue per 100 lb. of freight handled was 18.2 cents as opposed to a revenue of 18.1 cents when the rates averaged 20 per cent higher. This might look like a miracle if it was not for the fact that the steam roads, through their many years of experience, have succeeded in adjusting their charges to a point such that each commodity carries all that the traffic will bear, and in consequence their example is something that should not fail to be considered by the infant industry of freight on electric railways.

REDUCING DAMAGE TO FREIGHT

Freight loss and damage are not only objectionable to the shipper and the carrier but represent an absolute financial loss to the latter. On the average railway the increase in freight claims paid is in direct proportion to the increase in revenue. On steam roads the loss in damage payments represents approximately 1½ per cent of the gross freight revenue. Whether this is a measure of the amount paid in freight claims on electric interurban lines, we are unable to state. We do know, however, that money paid for this purpose amounts to a considerable sum, and that there is room for the application of the safety-first movement to freight handling on interurban lines. Co-operation between the shipper and the carrier is absolutely necessary to obtain tangible results, but that they will accrue is made manifest by the experience on steam roads. During the past year a number of steam roads have exercised extraordinary diligence to prevent damage to freight, with the result that reductions in the amount paid in claims, up to 50 per cent on some roads, have been made. This saving suggests similar action on the part of the freight departments of interurban roads. Perhaps the uniform instructions for packing and marking recommended by the American Railway Association committee on packing, marking and handling of freight would be a valuable aid in this direction. In the same way, the inauguration of a campaign among employees and shippers to reduce damage to freight is certain to produce results. In any event, the co-operation of both the employees and the shippers should be solicited as well as their suggestions for the prevention of freight damage and loss.

ELECTRIFICATION OF A FREIGHT TERMINAL

The agreement that has been reached by the city of New York and the New York Central Railroad, whereby the latter will have permanent rights to the present tracks on the western shore of Manhattan Island, as outlined on another page, involves the undertaking of an electrification project of very considerable magnitude. The route that is to be reconstructed is only about 12 miles long, but since a large proportion extends through an extraordinarily busy shipping and industrial district and includes several large switching yards, the importance of the plan is by no means measured by the distance that is covered. Electric operation for the entire mileage has been decided on primarily because of the location of part of the line past a residential and park district, from which numerous complaints have arisen through the use of steam locomotives on the present tracks. In addition, much of the reconstructed line is to be in tunnels of sufficient length to necessitate the banishment of the steam locomotive, so that apparently the question of economical operation has been subordinated in the preliminary considerations. However, it is quite conceivable that the economies which will follow electrification may provide a sufficient return to pay interest and depreciation on the investment for the contact system and locomotives, and if this is the case the installation will have an important bearing upon future proposals for the electric operation of freight terminals. In any event, the new electrification is certain to influence the matter of extending the New York Central electric zone, for the large tonnage of freight moving to the west side yards will necessitate elaborate provisions at some point for the change in motive power. If this is made at Harmon, the northern terminus of the present electrified tracks, so that both freight and passenger trains are electrically operated, an early extension of electric operation to Albany seems to be a foregone conclusion.

IMPROVING SHUTTLE SERVICE

Shuttle service on surface lines is a difficult class of traffic to popularize. It is necessary in many cases, however, to the economical feeding of main lines of travel, with the corresponding distribution of passenger flow on the reverse trips. From the passenger's standpoint, a change of cars is usually more or less objectionable, and to minimize this drawback every reasonable effort should be made to provide a quick and comfortable journey over the shuttle line. On account of the low density of traffic, there is a temptation to employ old and often poorly lighted cars in this service, but the latter condition is more often due to oversight than to intention. There is also a tendency to run an infrequent schedule on the theory that even if passengers walk to the main line the company will get their fares, but we see no reason why stimulation of traffic on the shuttle line should not be as beneficial as on other parts of the system. If possible passengers have to walk to the junction they may walk the rest of the way, or the probability that they shall have to walk may deter them from taking the trip. In their knowledge of actual running times rather than of total elapsed times in making trips of various kinds on a system, electric railway men are sometimes prone to overlook the value of close connections to the passenger. Sometimes these connections can be improved on short shuttle lines by the installation of a loop service through a district of comparatively limited area, avoiding layovers at one end of the line and possibly taking advantage of carhouse facilities at the beginning and end of each trip. It goes without saying that cars used in shuttle service should be well cleaned and painted, and provided with comfortable seats and properly maintained trucks and wheels. A low maximum speed is generally feasible, but too much care cannot be taken to see to it that the lighting is good because the ability to read on a shuttle line, even if the running time over it is only ten or fifteen minutes, is an important factor from the public's standpoint.

THE BENEFIT OF THE DOUBT

The subject of public relations cannot be settled by passing resolutions and enunciating principles, important as such exercises may be. Good public relations develop like individual character, each consistent effort exerting its influence toward the desired end. An excellent opportunity to make a good impression is furnished whenever a patron has occasion to bring a complaint to headquarters for adjustment. The following example came to our attention recently.

A woman came into a manager's office and claimed that on the preceding day she handed a conductor two $1 bills, which stuck together so that they looked and felt like one and she received change for only one. She did not discover her error until after she got off the car, when she found that the two bills were missing. She could not remember the badge number of the conductor or the number of the car. This case actually happened within the last few months in the case of a large company.

Later, the incident was discussed by several managers, and three methods of dealing with the case were suggested. The first was to tell the passenger that it was impossible, without the number of the car or of the conductor, to check up the story as no conductor had reported his accounts as being over, and to explain courteously that nothing could be done. The second course suggested was that possibly an exception ought to be made if the complaining passenger was known to be a person of influence in the community. The third plan was to take the passenger's word for the transaction on the theory that she would not have made the visit if she did not believe that the facts were as she had stated, to tell her that the situation was unusual but that the manager's office was the place where unusual matters were straightened out, to thank her for calling and to hand her a $1 bill.

In the case in question the plan followed was that given as the third in the list just mentioned. It may seem quixotic, but by means of a consistent following of a policy of this kind the company in question has built up a very strong feeling in the community that it is always ready to meet the public more than half way. There is, of course, some danger that unscrupulous persons will impose upon it, but experience has shown that this danger is more imaginary than real. The cases which call for a refund are necessarily rare, but where they are made the refund is accompanied by a railway ticket to cover the cost of sending the letter to the company. A lookout has to be kept, of course, for repeaters, but they can nearly always be detected, and the amount lost through fraud is trifling, not only in comparison to the cases of real injustice corrected but also actually in amount.

Of all the public utilities the urban railway is undoubtedly the one with which a broad and liberal policy of public relations is most important. The service which it gives is more personal in character than that of either a lighting or water company, and it carries the members of the community which it serves more often than do the steam railroad companies. Moreover, it is in more constant evidence than any one of the other utilities mentioned as it uses the public streets. In settling disputes, therefore, it is especially important that the patron be given the benefit of the doubt whenever the matter in controversy deals with the accuracy of fundamental data rather than the infraction of reasonable and well-understood rules.

In one of the New York dailies several columns are being given each week to correspondence with readers regarding their experiences with merchants. The impression given by all of this is that the modern merchant aims to satisfy his patrons even if it is necessary sometimes to grant unreasonable demands. The same procedure will bring good results in selling transportation which, while different from merchandizing in many particulars, is nevertheless a proposition in which every individual in the organization from the conductor up must have the instinct of a salesman.

REMOVING THE EMPLOYEE'S GRIEVANCE

Now that the tumult and shouting over young Mr. Rockefeller's trip to the properties of the Colorado Fuel & Iron Company has subsided, it is time that some serious attention should be paid by railway men to the purposes underlying Mr. Rockefeller's visit. His purpose was to establish points of contact with his employees, believing that the absence of such points of contact was the cause of most of the troubles of the company. Whatever the exact form of the organization put into effect as the result of Mr. Rockefeller's investigations on the spot, its aim and purpose is to give employees a chance to tell their troubles. Mr. Rockefeller's expressed opinion, and that of many others who have investigated the Colorado situation, is that most of the difficulties there have arisen from lack of understanding between the men and the management, and this is traced to lack of opportunity for expression. To remove the possibility of such misunderstanding in the future, in so far as it can be removed by giving the men a voice, Mr. Rockefeller is determined that if a man has anything to say he shall have an opportunity to say it.

In one of the big copper mines that had serious labor difficulties a few years ago, the general manager put into effect a rule that every Tuesday his time was to be devoted to receiving employees and members of their families who had anything that they would like to talk to him about, whether this was a personal affair or something connected with conditions of employment. This general manager says that for a few months most of his callers had a grievance of some kind. These grievances were adjusted without any difficulty at all. Soon the calls by employees almost ceased. In other words, the man who had a kick had got it out of his system. Now most of the general manager's callers are members of the families of employees, who bring their troubles, including those of a purely domestic nature, to the general manager for discussion and, if possible, for solution.

It is not true to say that this sort of thing is no part of a general manager's business. If it results, as it has in this case, in greatly improving the relations between employees and the management, it is about as useful as anything to which a general manager could give his time. It may not be literally true, but it is locally reported at the copper properties in question that another strike would be impossible, for the reason that the women would not allow it. The company has the same general manager that it had during the bitter strike of three years ago. He has now convinced his men and their women folks that everybody can get a square deal from him. This is certainly a big gain, and no one would dispute that it is worth all the time spent in bringing about such a condition of affairs.

Electrical railway labor troubles are nearly always traceable to small causes of discontent. When neglected these afford the labor agitator the opportunity he is looking for to start an organization movement. As a rule it is not until this happens that the management wakens to the fact that it has a labor problem. It is then, however, usually too late to do anything except fight. Evidently here is a fit subject for a good resolution for 1916—namely, for the railway manager to find out for himself how well satisfied his employees are, and what, if any, are their grievances, and to take such steps as are needed to remove these grievances.

It will not answer the purpose to take the opinions of superintendents and others on this question. Public or private opinion among a large body of employees is something that the manager must find out for himself. There is, of course, some risk of disorganization in going over the heads of intermediate bosses directly to the men themselves, but this risk is small in comparison to the risk involved in providing no means of communication between those at the bottom and the man at the top. Nor will occasional attention to this matter suffice. The American working man is determined to have a voice. If he does not get it in one way he will get it in another way. The best means of meeting this situation is to provide some regular and well-recognized means by which the men lower down can at any time communicate with the man higher up in an atmosphere of fair hearing and fair dealing.

This copper mine plan is simple, direct and admirably adapted to electric railway systems, and the more systems on which it is put into effect the fewer will be the labor troubles of the future. It is not to be supposed that the institution of such a scheme means that the general manager will dispose of every petty cause of complaint which arises. The purpose is to provide the employee with a safety valve and to enable the management to find out for itself what is really in the minds of the men it employs. The old formula, "Anyone can see me at any time" is not enough. There must be a definite invitation, with time and place clearly stated, if the kind of relations we are talking about here is to be established between railway managements and their employees. Even if a management thinks that its men have nothing about which they would like to unburden their minds, it can only do good to give them an opportunity to speak out if they have anything to say.

Load Dispatching at East St. Louis

The Author Describes the Method of Centralizing the Control of Power Distribution for a Network of Electric Railway and Industrial Power and Lighting Lines in a Territory of 280 Square Miles with 200,000 Population

By HAROLD W. CLAPP
Vice-President East St. Louis & Suburban Railway

THE East St. Louis & Suburban Railway, with which is affiliated the East St. Louis Light & Power Company, the Alton Gas & Electric Company, and the Alton, Granite & St. Louis Traction Company, has recently inaugurated a load-dispatching system at East St. Louis, Ill. This serves as a means for making more certain an uninterrupted service for power and light customers and for assuring proper supply of electric current for railway purposes in East St. Louis and the surrounding territory served by these properties, as well as for more economical handling of the generation and transmission of electric energy.

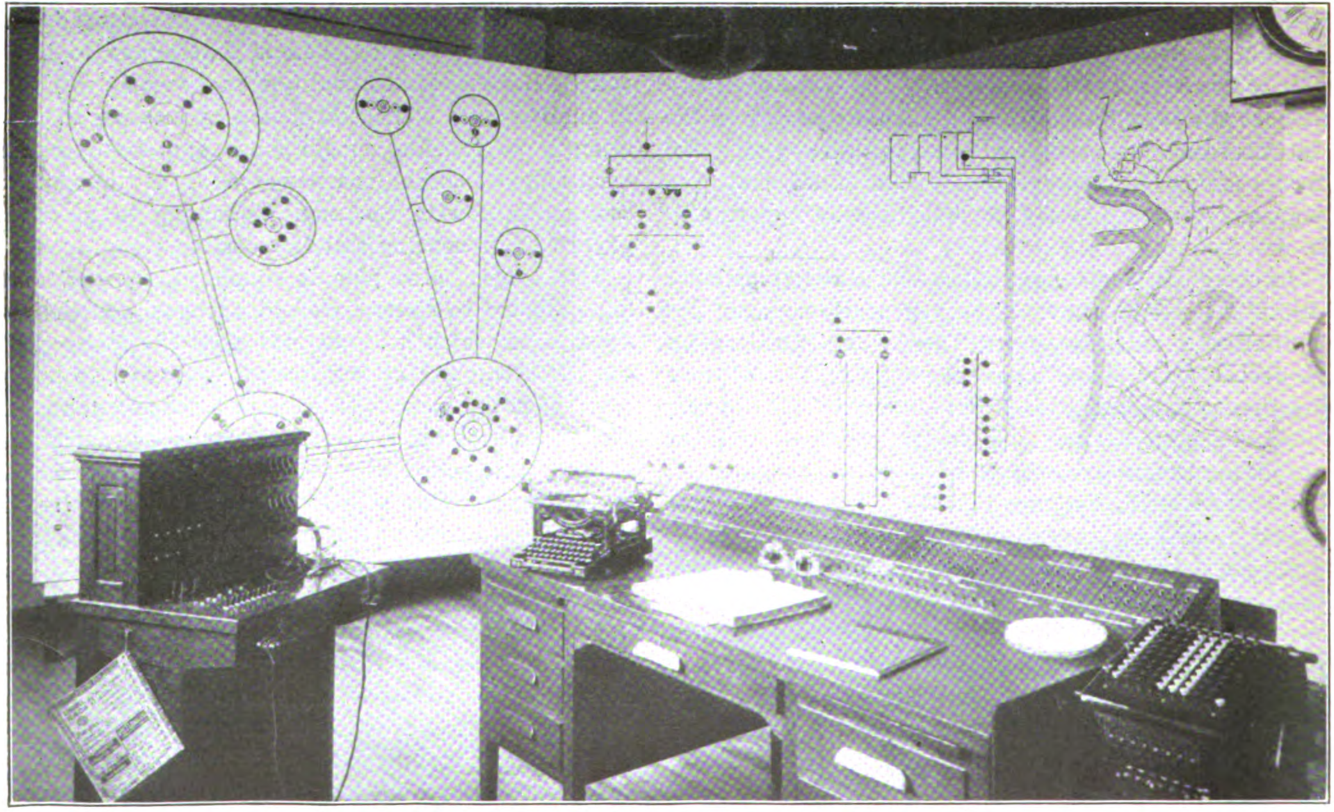
Supervision of load handling is placed in direct charge of three dispatchers, working on eight-hour shifts. These are men of several years' experience as switchboard operators who are thoroughly familiar with the requirements of the system. In order that they might have all necessary information immediately at hand, a dispatching room has been fitted up adjacent to the office of the superintendent of power in the general office building at East St. Louis.

POWER DISPATCHER'S OFFICE EQUIPMENT

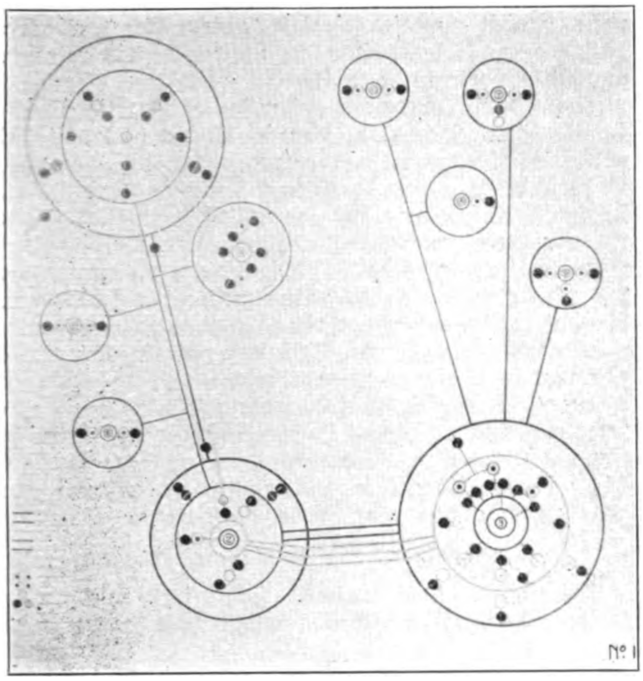
In this office are five large vertical map boards painted white, 8 ft. x 8 ft. in dimensions, these being arranged in a semicircle around a load dispatcher's desk, which stands near the center of the room. Reference to one of the accompanying halftones will give some idea of the arrangement, as it gives a full view of the No. 1 and No. 2 boards at the left of the dispatcher, while the No. 3 board is partly exposed at the left of a building column upon which are the recording voltmeters. The No. 4 and No. 5 boards are to the right of the dispatcher.

The No. 1 board shows the power generating system and the main distributing system between stations and substations. On this the power station at Alton is indicated in the upper left-hand corner by the large circles, with the Alton heating plant just to the right and slightly below it. The Winstanley station at East St. Louis is indicated at the lower right-hand corner, and the Lake Avenue substation in East St. Louis at the lower left-hand corner. The lines drawn between these large circles represent station-to-station tie lines. Within the large circles and indicated by small circles are shown the generators, frequency changers, rotaries, motor generators, boosters, synchronous condensers and transformers. Different colors are used to represent the various pieces of equipment and lines of different voltages.

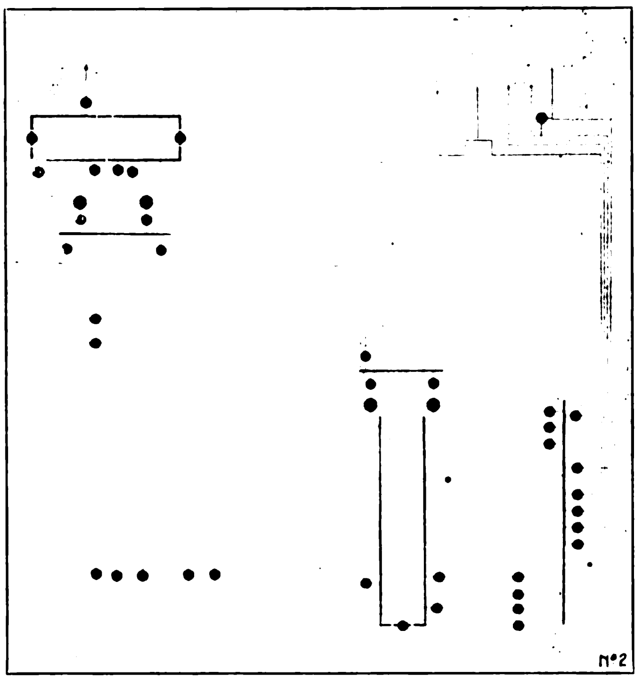
For instance, at the Alton power station, the outside circle is green, representing 66,000-volt, 25-cycle power from the Keokuk hydroelectric station, while the large interior circle is red, indicating 13,200-volt, 25-cycle cur-



EAST ST. LOUIS POWER DISPATCHING—INTERIOR OF DISPATCHER'S OFFICE



EAST ST. LOUIS POWER DISPATCHING—BOARD SHOWING POWER GENERATING AND MAIN DISTRIBUTING SYSTEM



EAST ST. LOUIS POWER DISPATCHING—BOARD SHOWING 25-CYCLE TRANSMISSION SYSTEM DETAILS

rent, either generated at Alton or transformed to that voltage. The two small circles between the exterior circle and the large interior one each represent a 3000-kw. transformer for 66,000-13,200 volts. The circle at the center is in blue, representing 2300-volt, 60-cycle current for power and light purposes. As an example of the method used in showing equipment, between the large blue and the large red circles are shown, at the top, two small circles, or rather groups of three small concentric circles, the inner being in blue, and the two outer ones in red. These represent frequency changers. The straight lines connecting each of these on one side with the large blue circle are in blue, and the straight lines on the other side connecting with the large red circle are in red.

As a further example of the method used in representing machines of different kinds, a 13,200-600-volt rotary for railway service is shown by a red circle with a large yellow dot in the center, and a 13,200-600-volt rotary for commercial power service by a red circle with a large brown dot at the center, red indicating 13,200-volt, 25-cycle power, yellow 600-volt railway power, and brown 600-volt commercial power.

The medium-sized circles at the middle of the left side of the board represent the railway substations at Hartford and Granite City, and the four circles in the upper right-hand section are to indicate the railway substations at O'Fallon, Collinsville, Belleville and Maryville.

OPERATING PROCEDURE

Close to the small circles representing generators, rotaries, etc., are placed small incandescent lamps under lenses corresponding in color to the circles. These lamps are controlled by push-button switches arranged in a double row at the outer edge of the dispatcher's desk. The lighted lamps indicate machines in service, and show by the color of the lenses over them the kind of current being delivered. Whenever a machine is cut in on the line, or is cut off, notification by telephone is given to the dispatcher, who simply presses one of the buttons governing the lamp for that particular machine, and the lamp is lighted or extinguished, as the case may be. Thus there is completed a cycle of operations originating with the dispatcher's order for a change of machines or the placing of an additional machine on the line; the actual performance of the operation by the station man, and its registry on the map board by the load dispatcher in his office.

On the No. 2 board in the dispatching room is given a detailed outline of the 25-cycle transmission system, which operates at 66,000 volts and 13,200 volts, this showing the connection with Keokuk and with the generating equipment at Alton, Winstanley and Lake Avenue. The locations of control switches on the various lines also are indicated. Lamps under colored lenses for the different machines and corresponding to those on the No. 1 board are also placed on the No. 2 board. In addition to this, lamps under lenses represent the switches, these showing lighted when the switches are closed.

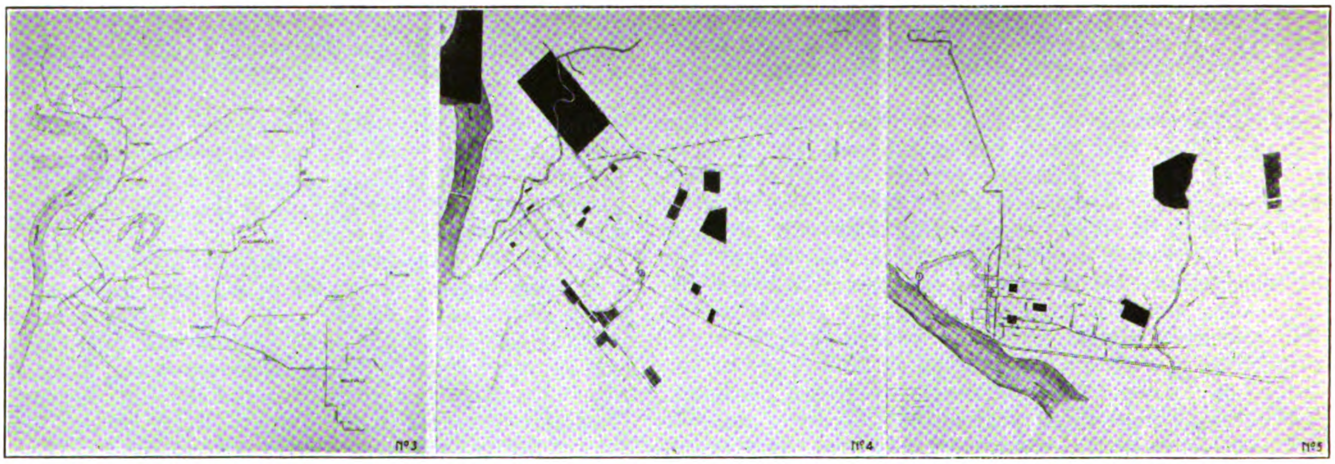
As a further aid in rapid and proper handling of the load, the other three large boards in the dispatching room have proved invaluable for reference. The No. 3 board gives a map of the territory served by the city and interurban lines, indicating the location of double and single trolleys and trolley feeders, each by a different color. Power stations and substations are also indicated. The No. 4 and No. 5 boards show the power and light distributing lines in the cities of East St. Louis and Alton respectively, the largest consumers being located and designated by name. In addition to these, two smaller boards, 4 ft. x 4 ft. in dimensions, are placed just to the rear of the dispatcher, these showing the street arc-lighting systems in East St. Louis and Alton.

In addition to the work of direct supervision of the load handling, the dispatcher keeps a log of all changes affecting the service, such as ordering of lines off for repairs, interruptions from storms or other reasons, and troubles arising from other unusual conditions. From this log a typewritten report is made of all line outages, giving reasons and time of duration. This is sent to all officials directly interested in furnishing service. A book record, alphabetically indexed, is also kept for all lines, and this shows quickly just how much trouble has occurred on any particular line for any given period of time. The system load curves are also made up in this office from meter readings received daily by telephone from all stations.

The dispatcher is supplied with prints of all bus connections for ready reference. He is also supplied with a full set of maps covering the property and lines, which are mounted on rollers and hung in a map case for easy reference. The recording voltmeters previously referred to give a record of voltages on the 60-cycle, the 25-cycle and the 600-volt d.c. commercial power line.

Just under the push-button switches at the edge of the desk controlling the map-board lamps is a row of small, square plates numbered to correspond to the boilers in the different power stations. Each plate has a hole in it into which is inserted a small wooden button colored to represent the boilers on the line, those banked, those cold but O. K. for service, those out of service for repairs, and those set with kindling or oil in readiness for immediately raising steam pressure for emergency use.

Telephone service is provided to take care of all probable difficulties, direct connection being made to the two plants at Alton, and with the Winstanley Station; also with the substations at Lake Avenue, Hartford and Granite City. Communication may be established with the other substations and all other departments through the general office operator. The telephone system is so arranged that the dispatcher may hold a telephone conversation simultaneously with the operators at the stations or with all persons involved in making any change, such as one or more linemen, together with the station operator. This considerably reduces the time consumed in making the changes, and introduces an element of safety which might otherwise be lost.



EAST ST. LOUIS POWER DISPATCHING—BOARDS SHOWING TROLLEY FEEDERS AND POWER STATIONS AND POWER AND LIGHTING CIRCUITS IN EAST ST. LOUIS AND IN ALTON

SCOPE OF THE SYSTEM

Some idea of the ground covered by the load-dispatching system may be obtained from knowledge of the fact that the activities of seven different properties are included. These are the East St. Louis & Suburban Railway, operating several interurban lines; the St. Louis & Belleville Electric Railway, a coal-carrying road; the East St. Louis Railway, operating the city lines in East St. Louis; the St. Louis & East St. Louis Electric Railway, operating the lines over the Eads Bridge; the Alton, Granite & St. Louis Traction Company, operating the local lines in Alton and the interurban lines between five cities and towns and several villages; the East St. Louis Light & Power Company, which supplies electric energy for general commercial, street and residence lighting, and for power purposes in the East St. Louis district; and finally the Alton Gas & Electric Company, which supplies electric energy for commercial, residence and street lighting, as well as hot-water heat and illuminating gas in the city of Alton.

The system comprises 196 miles of track in East St. Louis, Alton, Brooklyn, Venice, Madison, Granite City and Belleville, and on the interurban lines extending from East St. Louis to Alton, 25 miles to the north, to Lebanon 22 miles to the east, to Belleville 15 miles to the southeast, and to Edwardsville, via Collinsville, 22 miles to the northeast. This territory is approximately 280 square miles in area, with a population of more than 200,000. At the present time, 7800 customers are supplied with electricity for light and power, more than 76 per cent of the current sold being for power purposes. A supply of current is taken at 66,000 volts, 25 cycles, from the Keokuk Water Power Development of the Mississippi River Power Company over a transmission line 144 miles in length, in addition to the current generated at the power stations of the system.

PROVISIONS FOR RELIABLE SERVICE

The region about East St. Louis is peculiarly liable to severe electrical storms, which may cause damage enough to impair the service. The entire system, however, has been laid out with a flexibility considered proper to supply current for any emergency and to take care of any possible trouble on the line, sufficient station-to-station tie lines being installed with all necessary switching apparatus. In connection with this an interesting feature of the equipment installed for convenience of the load dispatcher is a "storm detector," similar to that used at the Waterside stations of the New York Edison Company. This is an electrical instrument which uses the principles of wireless telegraphy in its operation. Nearly all summer storms are accompanied by electrical disturbances which cover a field much greater than the storm clouds themselves, and it is these disturbances that cause so much damage to transmission lines and result in interruption of service. Some of these radiations may be intercepted by wireless antennae, and the "storm detector" is the instrument which has been devised for use in connection with them to indicate the approach of storms. Several hours before the storm clouds actually reach the city the bell on the storm detector will begin to strike at intervals of several minutes. If the storm is headed direct for the city, these warnings become more frequent, and at its very near approach the bell will ring continuously. When the intervals between warnings have decreased to a certain length, as determined by experience, the load dispatcher orders the stand-by boilers fired up and brought up to pressure, thus assuring a supply of steam for the stand-by generators.

In addition to the fact that uninterrupted service is better insured by placing the responsibility for handling the load on the load dispatcher, thus producing on the part of the consumer a feeling of dependence in the assertions and efforts made, it is expected that, by the introduction of the load-dispatching system, many economies will be effected in the production of current. The load dispatcher knows which are the most economical units to operate and he knows what load to expect at different periods of the day, under normal conditions. Handling the load becomes a matter of strict adherence to a certain daily routine, keeping in mind always that only sufficient machines must be operated to carry that load economically. In times of emergency resulting from storms, line trouble or other unexpected occurrences, the experience accumulated in load dispatching will make the dispatcher's movements decisive and certain and will reduce to a minimum the chance for outages.

A notable feature of the company's practice in connection with the new system is that the office of the load dispatcher has been thrown open for inspection by the public. It has been the practice to have those persons in direct charge of any of the numerous and varied industries in the territory served by the railway and power system visit this room when a change to electricity for power is being considered, and it has been their general expression of opinion that the utmost is being done to insure good service. In fact, the visit to the dispatching room has been the clinching argument with several prospective customers. It is considered that the load-dispatching system as graphically displayed in this office is an advertising asset of much value in the campaign for more business which is founded upon a definite policy of giving the consumer absolutely dependable service.

Electric Railway Statistics

Figures Are Given by States of the Miles of Track and Number of Cars Owned

THE accompanying table gives statistics of the miles of tracks and cars of the electric railway companies in the United States, made up from the August, 1915, electric railway directory of the McGraw Publishing Company. The dates of the reports in this directory average about June, 1915, so that the table may be considered to represent that statistics of the industry at about that time.

A comparison of this table by States with a somewhat similar table published in the issue of Aug. 29, 1914, will show a total of 46,454 miles as compared with 45,004 last year and 99,405 cars as compared with 97,721 last year. A comparison by States, however, will show some decreases in both cars and miles of track, while in the case of other States there are increases of considerable magnitude. These are due principally to two causes. Last year, in the case of interstate railways, an attempt was made to allocate a proportion of the tracks and number of cars between the different States, but as any such allocation is necessarily an estimate, it was considered wiser in the tabulation this year to place all of the mileage and cars in the State in which the greater part of the system is situated. Another reason for the discrepancy lies in the fact that in a number of cases a considerably larger number of "service cars" will be reported than during the following year. This is probably because the official preparing the statement one year will include certain classes of cars, perhaps construction cars, as service cars, whereas in the following year these will not be included by the person making the report. For this reason, the table this year is arranged so as to include the different types of cars reported. Gasoline motor passenger cars are included in the column of motor passenger cars.

In a few cases this year, where the company owns a large number of service cars compared with the number of passenger cars owned, the total number of such service cars has been intentionally omitted from the table. Instances of these are 3000 service cars reported by the Chicago Tunnel Company, 830 freight cars reported by the East St. Louis & Suburban Company, and 498 "other cars" reported by the Fort Dodge, Des Moines & Southern Railroad. In the case of the electrified steam trunk lines only electric locomotives, motor passenger cars and trail passenger cars for use with the multiple-unit system have been included.

TABLE SHOWING STATISTICS OF ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

States	Number of Companies	Miles of Track	Motor Passenger Cars	Trail Passenger Cars	Electric Locomotives	Express Motor Cars	Freight Cars	Service and Other Cars	Cable and Horse Cars
New England States									
Connecticut	11	1,576	2,102	44	100	....	....	73	....
Maine	16	583	582	8	4	4	56	133	6
Massachusetts	40	3,188	7,979	314	11	10	11	1,112	....
New Hampshire	13	208	264	....	1	2	....	28	2
Rhode Island	3	436	1,068	47	....	....	....	253	....
Vermont	10	124	142	....	....	....	9	11	....
Total	93	6,115	12,137	413	116	16	76	1,610	8
Eastern States									
Delaware	3	138	235	....	....	....	....	76	....
District of Columbia	7	403	1,087	....	....	....	....	444	....
Maryland	11	674	2,152	....	10	1	2	219	....
New Jersey	29	1,471	2,756	3	2	13	7	84	21
New York	107	5,447	15,667	1,123	139	11	35	2,398	180
Pennsylvania	123	4,354	8,477	56	3	13	69	661	....
Virginia	16	594	906	26	....	....	19	184	....
West Virginia	24	519	610	....	....	....	3	33	....
Total	320	13,600	31,890	1,208	154	38	135	4,099	201
Central States									
Illinois	73	3,683	5,833	631	51	....	910	1,019	....
Indiana	44	2,309	1,956	12	....	13	86	206	....
Iowa	30	878	984	13	17	....	....	364	....
Kentucky	10	467	996	14	....	....	21	76	....
Michigan	26	1,658	2,802	8	10	7	10	129	....
Minnesota	13	789	1,213	22	4	....	....	221	....
Missouri	24	1,122	2,474	....	....	....	....	484	....
Ohio	77	4,288	5,374	84	11	6	18	1,198	2
Wisconsin	21	767	892	122	....	....	3	57	....
Total	318	15,961	22,524	906	93	26	1,048	3,754	2
Southern States									
Alabama	14	366	437	33	....	....	2	210	....
Arkansas	11	134	230	....	....	....	....	54	....
Florida	7	176	249	....	....	....	....	49	....
Georgia	16	483	722	8	....	....	....	87	2
Louisiana	8	292	647	....	....	....	....	106	....
Mississippi	11	123	163	2	....	....	....	27	....
North Carolina	14	286	282	....	6	....	2	207	....
South Carolina	7	110	152	6	....	2	....	12	....
Tennessee	14	461	831	....	1	....	3	148	....
Total	102	2,431	3,713	49	7	2	7	900	2
Western States									
Arizona	4	52	41	1	....	....	....	1	....
California	40	3,188	3,611	81	75	4	430	1,739	109
Colorado	13	460	414	157	....	....	....	259	2
Idaho	5	174	58	....	....	....	....	16	....
Kansas	19	449	372	19	....	....	12	105	2
Montana	8	271	127	15	17	....	1	17	....
Nebraska	7	234	481	....	1	....	....	52	5
Nevada	2	11	12	....	....	....	....	......	....
New Mexico	2	10	11	....	....	....	....	......	....
North Dakota	6	38	76	....	....	....	....	14	....
Oklahoma	16	285	227	27	....	4	....	60	....
Oregon	10	720	800	47	19	3	146	548	....
South Dakota	3	26	31	2	....	....	....	3	....
Texas	39	992	1,188	84	....	14	....	208	....
Utah	5	363	275	8	3	2	....	197	....
Washington	13	1,052	1,007	24	27	429	29	451	49
Wyoming	2	22	12	7	....	....	....	3	....
Total	194	8,347	8,743	472	142	456	618	3,673	167
Total, all States	1,027	46,454	79,007	3,048	512	538	1,884	14,036	380

The receipts of the Glasgow Corporation Tramway for the past six months totaled $2,766,160, or almost $194,800 more than in the corresponding six months last year. The passengers carried exceeded 177,500,000, an increase of nearly 13,000,000. This remarkable traffic is largely due to munition work at Clydeside.

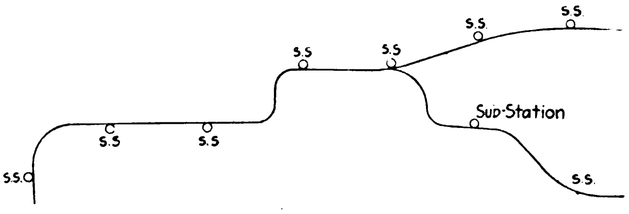
The Return Feeder System of the Interborough

This System, While Special in View of the Practically Insulated Nature of the Track and of the Tremendous Traffic Density, Is an Interesting Example of the Application of Return Feeders on a Large Scale

By I. W. GROSS, New York

THE insulated return-feeder system has in recent years been somewhat widely utilized in the attempt to reduce stray currents on railway lines using direct current with grounded track circuits. This system, which has been extensively and interestingly treated in the columns of the ELECTRIC RAILWAY JOURNAL during the last two or more years, is not new, having been installed as early as 1904, when the Interborough Rapid Transit Company of New York first began the operation of its subway lines. It is the purpose of this article to briefly describe the negative layout as used by this company at the present time on its subway lines and to show the benefits derived from this insulated feeder system.

The present system of subway lines operated by the Interborough Rapid Transit Company consists of approximately 55 miles of equivalent single-track line, part of which exists as four-track section, part as two-track section, and a small portion is a three-track section which is at present normally operated as a two-track line. The different types of subway lines are divided approximately as follows: four-track mileage, 25; three-track mileage, 7; two-track mileage, 23; total, 55.



INTERBOROUGH RETURN FEEDERS—FIG. 1—MAP OF SUBWAY SYSTEM

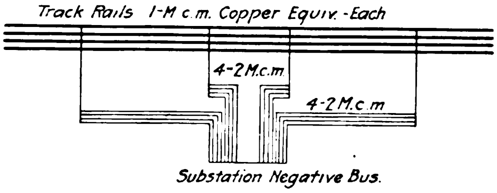
Since the above lines are underground and the density of traffic comparatively great, a signal system is absolutely necessary to the safe operation of the trains. For this purpose one of the track rails is utilized for signal purposes to the complete exclusion of its use for return traction current. One running rail per track, therefore, remains for the return current, additional conductivity being supplied by auxiliary cables.

Power is supplied to the line at 625 volts, direct current, from nine rotary converter substations, located approximately 12,000 ft. to 14,000 ft. apart. The average maximum hour winter input to the substations averages about 8600 kw., alternating current, for a substation feeding a four-track line. From this it is apparent that there is a heavy load on the line. This load is about 0.169 kw. per foot of track, or on a four-track line it is 0.676 kw. per foot. Fig. 1 shows the general layout of the system.

NEGATIVE CIRCUIT LAYOUT

The track-circuit electrical layout is shown diagrammatically in Fig. 2 for a four-track section. All negative feeders are of copper, 2,000,000 circ. mil in size, insulated with paper and covered with lead identically as are the positive feeders. These feeders are distributed to the track in four groups per substation, two long groups and two short ones. The track rails are equalized approximately every 300 ft. by bare cables, of from 250,000 to 1,000,000 circ. mil area, to prevent excessive drop in the rails when cars are starting.

The negative cables run from the substation in underground clay conduits. They are equalized at the track end on a bus which is insulated by fiber from the bus support, which is bolted to the concrete structural work. From this negative bus heavy, bare copper jumpers connect to the track rails.

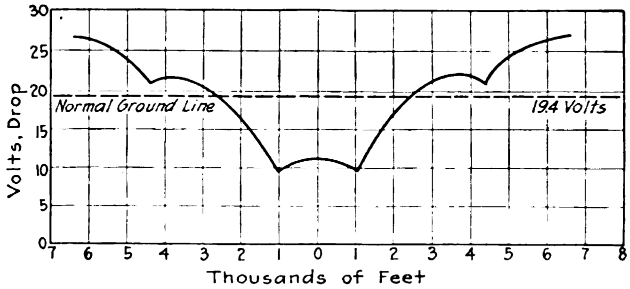


INTERBOROUGH RETURN FEEDERS—FIG. 2—DIAGRAM OF RETURN FEEDER LAYOUT, PREFERRED PLAN

To present the voltage characteristics of this negative return system, average data have been taken over the entire subway lines. Following are the data used:

Total length of line fed per substation	12,720 ft.
Length of short negatives	1,500 ft.
Length between short negatives	2,080 ft.
Length between short and long negatives	3,400 ft.
Length beyond long negatives	1,920 ft.
Average amperes per foot of track	1.22

In computing the voltage drop curves a uniform distribution of the load over an entire section was assumed, and this assumption is clearly quite rational considering the heavy load on the line.

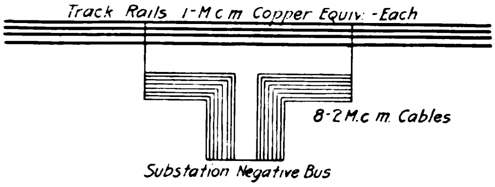


INTERBOROUGH RETURN FEEDERS—FIG. 3—VOLTAGE DROP WITH PREFERRED PLAN

The negative voltage drop curves shown in Fig. 3 were computed from the above data and the four-track layout of Fig. 2. Reference to Fig. 3 shows that no attempt has been made to equalize the drops in the negative feeders. The drop in the short negatives is 9.3 volts, and in the long negatives it is 20.9 volts. The maximum drop at the end of the section is 26.9 volts.

The average drop under the curve, to which the copper loss is proportioned, is 19.4 volts, from which it appears that the maximum drop affecting electrolytic conditions at the end of the line is 7.5 volts, and at the end of the short negatives, 10.1 volts.

The distribution of current in the cables is as follows: Long negatives, 790 amp. per cable; short negatives, 1150 amp. per cable. From this it will be seen that the current distribution is not equal in short and long feeders. In some cases, in fact, it has been found necessary to add another short negative cable to provide sufficient current-carrying capacity in the short negative group.



INTERBOROUGH RETURN FEEDERS—FIG. 4—DIAGRAM OF RETURN FEEDER LAYOUT, ALTERNATE PLAN

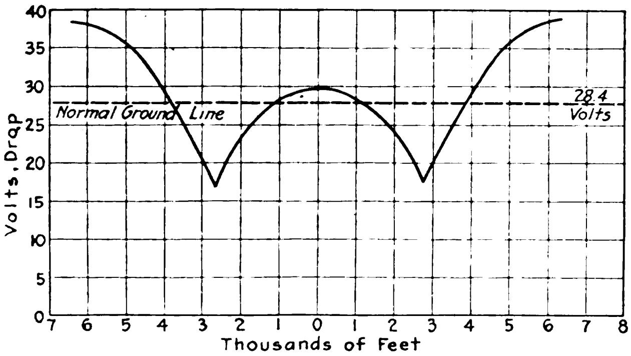
To compare the above-described insulated feeder system with one having equal distribution of current in all negative feeders the scheme of Fig. 4 is presented, and voltage drops were computed for them as before. This scheme involves two sets of negative feeders, with a total feeder length equivalent to that shown in Fig. 2.

A summary comparison of the two schemes is given in the following table:

DATA FOR NEGATIVE CIRCUITS ONLY

	Scheme Shown in Fig. 2	Scheme Shown in Fig. 4
Maximum average volts drop	26.9	38.0
Maximum average volts drop effecting electrolysis, at end of line	7.5	9.6
Maximum average volts drop effecting electrolysis, at the ends of short feeders	10.1	11.6
Average volts drop	19.4	28.4
Maximum hour copper loss, per cent	3.11	4.55
Per cent excess copper loss in one scheme as compared with the other	...	46.2

From the above comparison it is obvious that the scheme shown in Fig. 2 is vastly superior to that of Fig. 4, and the additional cost of installing the former is merely that of placing two additional sets of track equalizers at the end of negative cables, the duct lines being approximately the same in total length.



INTERBOROUGH RETURN FEEDERS—FIG. 5—VOLTAGE DROP WITH ALTERNATE PLAN

INSULATION OF TRACK RAILS

For an ideal layout of a negative track circuit to minimize electrolytic effects it is desirable to keep the ends of all negative feeders at the same potential. In the Interborough subway system, however, this is not essential since the track itself is not inherently a grounded circuit. The rock ballast and ties provide very good insulation between track and ground, so much so, in fact, that extraordinary precautions with paralleling conducting lines external to the subway have never been found necessary on account of electrolytic trouble.

It should be emphasized in passing that the complete insulation of the negative bus is imperative to obtain the full benefits of the insulated feeder system. Reference to Fig. 3 will show the results of grounding the negative bus. The ground line which would normally be at the 19.4-volt line would now be moved to the zero line, if the negative bus were grounded, rendering the entire length of the line electrolytically dangerous and increasing the maximum drop effecting electrolysis from 10.1 to 26.9 volts.

Where the insulated feeder system exists, there is often the temptation to solidly bond foreign conductors carrying stray current to the negative bus. This is extremely bad practice, as it thus tends to ground the negative bus, giving rise to the destructive voltages shown above. This condition can be avoided, where bonding is found necessary, by inserting a suitable resistance in the bond connection to the foreign conductor.

RESULTS AND CONCLUSIONS

The Interborough Rapid Transit Company has used the insulated feeder return system on its subway lines in New York for the past ten years with marked success. This success is due in part to the insulated feeder system and in part to the relatively high insulation between track rails and ground. This insulation of track rails renders unnecessary the keeping of the ends of the negative feeders at the same potential to produce satisfactory electrolytic conditions with respect to parelleling foreign conductors.

The system of insulated negative feeders as used by the Interborough on its subway system gives better electrolytic conditions, and consumes less energy in copper loss than a similar insulated system using the same total length of cable, with only two negative tapping points per substation, instead of four as in the present system.

Equality in feeder loads in the four-tap-point scheme has been sacrificed for the above-mentioned electrolytic advantages and economy in losses.

Rock Slide Delays Operation Through Cut

Kansas City, Mo., spent five years and $400,000 digging a canyon 90 ft. wide and 40 ft. to 80 ft. deep through three blocks of hills to furnish an outlet for traffic from the new Union Station to the south residence district. The Metropolitan Street Railway spent much time and money building a double track through the cut, over which certain cars were to be routed by the station, and by which four blocks of travel by the street cars would be saved in getting from the south part of the city to the business district. The water and gas mains had been laid, and the bids for the pavement had been advertised. Cars were to start over the new tracks, the date being fixed, tentatively.

The board of control made a final inspection, however, before ordering cars over the new route, through the cut. P. J. Kealy and Robert P. Woods, the members of the board, saw that the track work was all right, but they decided against operating cars through the cut on account of hanging walls of rock. Two days later a heavy slide carried rock and debris over the tracks, and knocked some of the rails out of alignment. The cars will continue to use the former circuitous route, until the city can force property owners to remove the excess rock and earth from their property abutting Main Street from Twenty-fourth to Twenty-seventh.

Snow-Fighting Apparatus*

In a Timely Paper the Author Describes the Methods of Removing Snow from the Tracks and Afterward of Disposing of It

BY H. BATES

Assistant Construction Engineer Connecticut Company

IT is becoming more and more important not only to keep the snow from accumulating on the tracks, but in the cities to remove it promptly from the street adjacent to the tracks for a distance at least equal to the width of the average vehicle. While it seems that the municipalities ought to take care of the prompt removal of the snow from the sides of the street, experience shows that it is not being done. Until more can be accomplished in the line of co-operation with municipalities the railways for their own protection will have to clear the streets to a certain extent. When the railway tracks offer the only pathway through a snow-covered street, the speed of the cars will be measured by that of the slowest wagon upon it, and a big part of the loss from snow is traceable directly to reduced car movement.

The snow-fighting problem resolves itself into three parts: First, to keep the snow off the tracks; second, disposal of the snow thereby thrown up on the side of the street, and third, the opening up of lines on which, for one reason or another, snow has accumulated so that service has been temporarily suspended.

To Keep the Snow off the Tracks

All agree that the best way to fight snow is to have sufficient suitable equipment and power so that the snow is never able to collect upon the rails in any such degree that it cannot be taken care of by the equipment. Some railway men say there should be a plow or sweeper for every 2 miles of track, some for every 5 miles, and so on, but every railway man has to determine for his own system just how often each section of track has to be gone over and figure the necessary equipment, taking into account the speed and other conditions. Owing to the natural reluctance of railway companies to invest to any large extent in equipment that is used only a few times in the year, some companies have experimented along the line of temporarily providing regular equipment with plows or scrapers. It seems as though the most economical plan is to provide a certain amount of regular snow-fighting equipment with the addition of service cars, trolley express cars and the like temporarily equipped with plows or scrapers, or both. Along this latter line are various devices.

The main difficulty with a plow in paved streets seems to be its inability to clean off the snow to the top of the rail. I understand that some trouble was experienced on our lines in the recent storm due to wet snow rolling up under the shear and lifting it so that the centers could not be kept down, and this resulted in interference to the motors. Scrapers will accomplish this to a certain extent, but the best results on paved streets, in the opinion of a number of railways, is realized from sweepers.

Snow on the Sides of the Street

As stated, this work in most municipalities falls to the railway companies, therefore many companies are emphasizing the importance of clearing the snow for at least a distance outside of the rails equal to the average width of a vehicle at the same time that the tracks are cleared. With the increases in traffic, the impairment of the service caused by vehicular traffic using the tracks becomes a serious matter. One of the latest developments in equipment for taking care of this trouble is a sweeper used by the New York Railways Company with a 16-ft. outboard rotary broom, which clears a space 12 ft. wide alongside of the tracks. This sweeper was described in the Electric Railway Journal for Feb. 13, 1915. It is stated that heretofore the New York Railways have lost as much as $30,000 a day during the first day or so of a heavy snow storm.

Some railways use wings and outboard scrapers for clearing the snow on the sides, as in Montreal.

Snow Removal

In December, 1911, the American Electric Railway Association collected information from the various companies in regard to their practice in removing snow from highways by means of mechanical devices other than shovels, pungs or carts. The result showed at that time only one road in the country had done anything in the way of the mechanical handling of snow. This was the Lewiston, Augusta & Waterville Railway in Maine, and its device seems to be very similar to the Ridlon snow remover. It is claimed by the manufacturers of this remover that one man with a two-horse snow remover will do more efficient work in one day than fifty men with shovels and five two-horse dump carts. It is operated by lowering the front end of the pan to load and pulling out the bottom, which is a slide, to dump.

At the snow removal conference held in Philadelphia on April 16-17, 1914, a committee was appointed which presented conclusions at a meeting on Dec. 3, 1914, before the American Society of Mechanical Engineers, recommending the use of sewer manholes for dumps and suggesting the following:

"1. The plan of organization and the system to be employed for snow removal should be worked out in advance of the snow season.

"2. The work of removal should commence as soon as the snow had covered the pavements and the indications pointed to the continuance of the storm. This principle is successfully followed by street railways in the removal of snow from their track space and by some cities.

"3. The carrying capacity of the sewer system should be utilized as far as possible to get the snow away from the streets.

"4. When practicable the work should be performed directly by the municipality by day labor.

"5. Co-operation should be sought with the traction companies and use made of adjustable plows and sweepers to open roadways adjacent to * * * street railway tracks at the time that the work of clearing the tracks is being carried on.

"6. Effort should be made to obtain the co-operation of the public and to instruct the householders in the method of the removal of snow from private premises.

"7. The police force of the city should co-operate with the street cleaning force and the services of patrolmen as inspectors should be utilized as far as possible.

"8. A standing committee should be appointed to collect data and report upon such methods or apparatus as may be presented to it." [For further particulars see Electric Railway Journal for Dec. 5, 1914, page 1248.]

The commissioner of street cleaning in New York has stated that "to have every sewer in town available for the disposal of snow as it falls and to secure a sufficient number of men to keep snow moving into the sewer as it falls appears to be the most feasible scheme for the snow-removal proposition." Continuing to quote: "The principal difficulty in snow fighting will be to secure an adequate force of men ready and willing to begin work on the first appearance of snow and to start actually removing the snow not less than one hour after the first flake has fallen under conditions which indicate that a continued storm may be expected."

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*Abstract of paper read at meeting of the Connecticut company section, New Haven, Conn., Jan. 4, 1916. The author also showed slides of different types of snow fighting apparatus and described their construction and use.

There is the possibility of obviating this difficulty to a certain extent by the development of mechanical devices for loading, moving and dumping snow.

CLEARING BLOCKADED LINES

We now come to the opening up of lines on which, for one reason or another, snow has accumulated so that service has been temporarily suspended.

This work usually means digging through hard, packed snow, and sometimes ice underneath, which completely covers the tracks. At the present time the only method which seems to be in general use is to get out with picks and shovels, following with plows as the tracks are dug out. Suggestions along the line of melting or burning out the snow and ice over the rails electrically or with high power blow-torches have been made, the idea being that if the wheels can obtain tractive effort some type of ice cutter might follow to level off the top of the rails. Another suggestion is that a number of heavy-toothed disks somewhat similar to a circular saw be mounted on a shaft underneath the front sweeper, the action being similar to that of the sweeper broom. In this way the ice might be cut out, but it seems questionable whether the rails could be sufficiently cleaned. Nothing seems to have been very fully developed along this line, although study in this direction is well worth while if the present very slow method of hand digging could be supplanted by a quicker method.

Of course time spent on study in this line may be somewhat of an admission that a railway is not able to keep the lines open. If the first part of this snow-fighting problem can be properly taken care of, that of keeping snow off the tracks, the cause of the existence of the third part of the problem, the unopened track, is eliminated and the effect does not have to be treated. For this reason, I think we all agree very properly, effort has been concentrated in developing methods to keep snow from accumulating rather than dealing with conditions as they exist on an unopened line.

The use of salt helps materially in keeping ice from forming and snow from hardening on the rails. Some railways use salt cars, which are placed in operation when a storm starts and all the tracks freely salted. In some States there are ordinances prohibiting the general use of salt, but in such cases special permission can often be obtained for its use at special places.

CONCLUSIONS

The main purpose of this paper is to present what data on this snow-fighting problem I could collect in the short time available, with the idea of bringing out a discussion which would be beneficial to all. While the last storm was ably handled, any suggestion which will reduce further the large expenditures and losses contingent on snow storms is valuable. The cost to our own company for handling the storms on Dec. 13 and 18 was $50,700. This is made up as follows:

Keeping tracks open and maintaining service	$25,800
Extraordinary repairs to equipment	1,600
Removal of snow	9,600
Loss in revenue	13,700

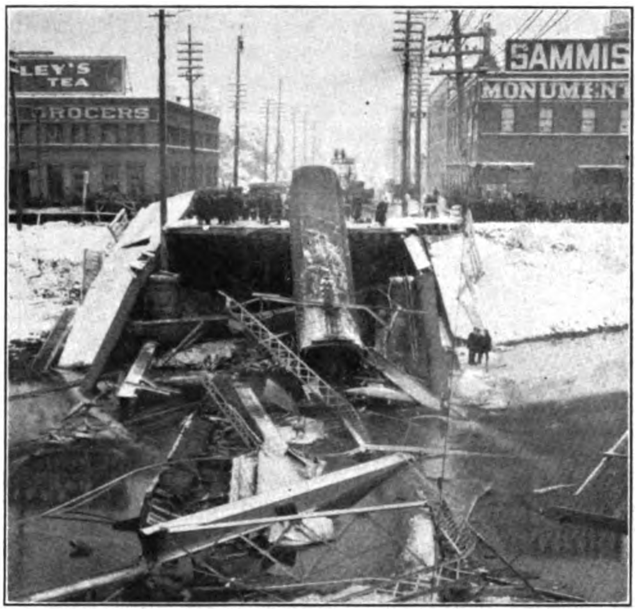
Snow-fighting preparations and equipment must be made and bought for much the same reason that a company insures against fire. It is equally necessary to spend time and money to insure against losses from snow storms. Although I have spoken mostly in this paper of the tangible losses, there is always that intangible, inestimable value of favorable public opinion to be protected.

The great question before this country to-day is that of preparedness—preparedness, as I take it, in order to insure this country to the extent that as long as some one else has a weapon of attack he will not dare to attack us. It is preparedness that is essential in successful snow-fighting, with this difference—that we are reasonably sure of being attacked, and this brings out the other essential, that of the ability to get the jump on nature's storm king.

Bridge Failure in Spokane

Wreck Not Due to Unusual Strain on Bridge—Board of Engineers Reports on Causes of Failure

FURTHER details are now available regarding the recent failure of the Division Street Bridge across the Spokane River in Spokane, Wash., as reported in a recent issue. The accident, which resulted in the death of five passengers in one of the two cars of the Washington Water Power Company that were on the bridge at the moment of failure, has been investigated by a board of four engineers who were called upon to examine the wreck before it was disturbed by the operations of cleaning up the debris and before any considerable rusting had taken place. The unanimous conclusion of this board was that the failure was due to the simultaneous breaking of the bottom-chord eye-bars of the truss because of granulation. No excessive load was on the bridge at the time when it collapsed, and it was considered unlikely that there had ever been put upon the bridge a total load, including pavement, pipes, street cars and other traffic, in excess of that for which the structure was designed. Breaks in the steel work which were caused by the falling of the bridge, and which were plainly not responsible for the failure, showed silky fractures, indicating first-class material. Inspection of the bridge prior to the accident would not have disclosed any defects.



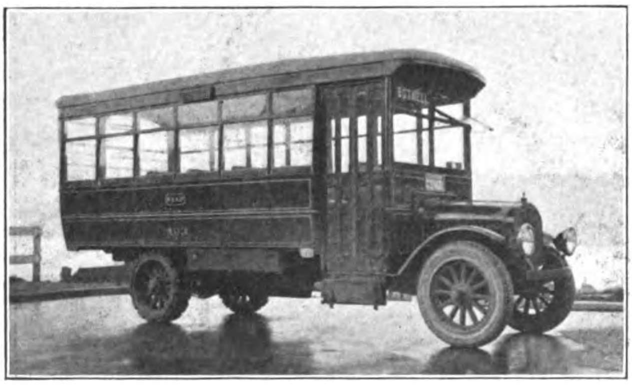
SPOKANE BRIDGE FAILURE—VIEW SHOWING CAR CAUGHT ON EDGE OF BRIDGE AND SEATS OF SUBMERGED CAR IN WHICH FATALITIES OCCURRED

Subsequent to the accident the designer of the bridge, H. L. Cooper, consulting engineer of New York City, stated that the structure had been fabricated at the shops of the Edgemoore Bridge Company in 1892, and he considered that this firm was a leader in high-class constructions of the type in question. His calculations showed that when the bars broke and precipitated the structure into the river, they were carrying about 7800 lb. per square inch or one-seventh of the load that would normally be necessary to break them. The bridge, however, had been damaged in a flood in 1894. At this time, according to his recollection, a railroad bridge which had been washed out came down the stream and struck the specific bars which broke in the accident under consideration. As a result of this blow the bars were abnormally distorted or broken entirely and they had since been rewelded. He considered that if the bars had been taken out and straightened locally at that time their usefulness must have been reduced because this particular class of high-grade steel required annealing after local heating and there were no annealing furnaces in the West with the necessary capacity. The fact that at the time of the failure the up-stream bar of the fractured pair of eye-bars showed the mark of a heavy blow on the up-stream side in the immediate vicinity of the fracture was a circumstance confirming this conclusion.

Auto-Bus Line in Seattle

Equipment of Subsidiary of the Puget Sound Traction, Light & Power Company, with Rates Charged

THE Bothell-Seattle service of the Washington Auto Bus Company, a subsidiary of the Puget Sound Traction, Light & Power Company, was inaugurated on Nov. 15, 1915. The cars used have a "street car" body, built by The J. G. Brill Company, mounted on an International Motor Company's 2-ton "Mack" truck chassis. The seating capacity is twenty passengers, with six non-reversing cross-seats, two longitudinal seats of two passengers each, and one four-passenger seat extending the width of the body in the rear. Three hand straps are provided opposite each longitudinal seat. There are five windows on each side, the top being stationary and the bottom being arranged to raise, and there is a rain vision wind shield in front of driver. All windows have Pantasote curtains.



SEATTLE-BOTHELL BUS

For lighting the cars, four dome lights, aggregating 60 cp., are fed from an 80-amp.-hr. storage battery, which is charged from a 20-amp. Appleco generator. The cars are heated by the exhaust from the motor, a valve being provided for turning heat on or off as desired. The front wheels are equipped with 39-in. x 6-in. non-skid pneumatic tires, the rear wheels with 36-in. x 5-in. dual blocks. The governors are set so that the cars can be operated at a maximum speed of 25 m.p.h.

The present service calls for eight round trips every day except Saturday, when nine trips are run. The distance from Bothell to Seattle is 16 miles, and one hour is taken for the trip. The schedule is operated with two cars, one being held in reserve, and totals approximately 256 miles per day, except Saturday, when it is 288 miles. Transfers are issued to and accepted from the cars in Seattle of the Puget Sound Traction, Light & Power Company.

The following rates are in force:

SCHEDULE OF RATES FROM SEATTLE

To	Miles	One Way	Round Trip	Ten Rides
Bothell	16.0	$0.45	$0.75	$3.00
Kenmore	13.0	.35	.50	2.00
Lake Forest	11.9	.30	.40	1.75
Briar Crest	10.8	.25	.35	1.50
Lake City	9.0	.20	.30	1.40
Chelsea	8.5	.20	.30	1.40
O'Brien's	8.1	.15	.30	1.25
Morningside	7.1	.15	.25	1.25

Bay State Substations

Cost of Substation Construction and Equipment Submitted as Evidence to Public Service Commission in Bay State Fare Hearing

A DETAILED analysis of the cost of five substations of the Bay State Street Railway, Boston, Mass., located on the lines south of Boston, is a feature of the recent inventory of the property filed with the Massachusetts Public Service Commission in connection with the pending fare case. The inventory was made by Sloan, Huddle, Feustel & Freeman, Madison, Wis. The investment cost new of the substations was $411,727, including land, buildings and equipment complete, and the total capacity in rotary converters was 6990 kw., making the average cost $58.90 per kilowatt. The cost data prepared are based on the company's construction and purchase records, and include stated allowances for fixed charges as indicated. In the following tables are printed the detailed equipment costs of these plants, with particulars of building cost in three cases.

The substations are located at Bridgewater, 900 kw.; Brockton, 3750 kw.; Fall River, 3000 kw.; Rockland, 900 kw., and Taunton, 1700 kw. Including overhead charges their total cost includes, land, $30,123; buildings, $82,650; equipment, $298,954, or, reduced to unit cost, land, $2.92 per kilowatt; buildings, $2.25 per kilowatt, and equipment, $29.20 per kilowatt. Exclusive of land the substation total cost is $383,768, or $37.45 per kilowatt. All these plants receive energy at about 13,000 volts, 25 cycles, and deliver direct current at the usual trolley pressures of 550 volts to 600 volts. They were built about ten years ago, and the investment cost new is the total outlay the company had made on Nov. 1, 1914, in the construction of this portion of its system. The fixed charges listed are those incurred during construction, and the figures show, as nearly as may be, the actual investment the company has made in the five substations tabulated.

COST OF SUBSTATION BUILDINGS

BRIDGEWATER (900 KW.), 35 FT. 2 IN. x 60 FT. 6 IN.

Item and Quantity	Unit Price	Total
Excavation, 476 cu. yd	$0.50	$238
Concrete foundations, 170 cu. yd	14.00	2,380
Concrete—3-in. floors—plain, 1200 sq. ft	.16	192
Concrete—6-in. reinforced floor, 417 sq. ft	.50	208
Concrete—3-in. reinforced floor, 349 sq. ft	.25	87
Concrete—4-in. reinforced floor, 119 sq. ft	.35	42
Concrete—10-in. reinforced floor, 984 sq. ft	.60	590
Concrete steps, 12 cu. ft	.35	4
Brick—walls, 74,000	24.00	1,776
Brick—coping and pilasters, 9000	26.00	234
Cut stone, 193 cu. ft	2.50	482
Steel and iron—structural steel, 13,531 lb	.04	541
Steel and iron—wrought-iron railing	....	20
Steel and iron—miscellaneous	....	260
Timber—roof sheathing, 7200 bd. ft	41.00	295
Timber—miscellaneous	....	5
Roofing—slate, 2860 sq. ft	.10	286
Millwork—doors, 214 sq. ft	....	101
Millwork—windows, 473 sq. ft	....	228
Screens, 232 sq. ft	.15	35
Sheet metal work	....	517
Electric lighting	....	393
Heating	....	18
Plumbing	....	175

Item and Quantity	Unit Price	Total
Painting—oil, 583 sq. yd	$0.18	$105
Painting—cold water, 402 sq. yd	.12	48
Fence	....	57
		$9,317
Engineering, interest, insurance and contingencies, 11 per cent		1,025
Taxes, organization, 3.5 per cent		326
Total building cost		$10,668
Total building cost per kilowatt		$11.83

Building, brick and concrete, walls being brick and floors plain and reinforced concrete. Roof supported by steel trusses and covered with slate. Present condition good.

Brockton (3750 Kw.), 34 Ft. 8 In. x 78 Ft. 10 In.

Item and Quantity	Unit Price	Total
Excavation, 599 cu. yd	$0.60	$359
Trenching, 91 cu. yd	.75	68
Concrete—plain footings, 154 cu. yd	14.00	2,156
Concrete floor, 6 in., 2733 sq. ft	.18	492
Concrete curbing, 72 cu. ft	.30	22
Concrete—3-in. walk, 90 sq. ft	.16	14
Concrete—4-in. reinforced floor, 209 sq. ft	.40	84
Concrete—6-in. reinforced floor, 301 sq. ft	.50	150
Brick—walls, 109,000	24.00	2,616
Brick—pilasters, 53,000	26.00	1,378
Cut stone, 510 cu. ft	3.00	1,530
Timber	....	291
Millwork—doors, 381 sq. ft	....	173
Millwork—windows, 1263 sq. ft	....	622
Millwork—screens, 360 sq. ft	....	54
Cast iron, 5113 lb	.04	205
Railings, etc.	....	144
Steel, 37,617 lb	.05	1,891
Slate, 153 sq. ft	.90	138
Roofing—tar and gravel, 2607 cu. ft	.07	182
Sheet metal	....	308
Grating, 266 sq. ft	.35	93
Ventilators	....	20
Electric lighting	....	386
Heating	....	95
Plumbing	....	175
Painting—oiling, brick	....	150
Painting—cold water, 1362 sq. yd	.12	163
Painting—oil, 498 sq. yd	.18	90
		$14,039
Engineering, interest, insurance and contingencies, 11 per cent		1,544
Taxes, organization, 3.5 per cent		492
Total building cost		$16,075
Total building cost per kilowatt		$4.29

Building has brick walls, floors plain and reinforced concrete; roof supported by steel trusses, covered with tar and gravel. Plant in good condition.

Taunton (1700 Kw.), 45 Ft. x 88 Ft.

Item and Quantity	Unit Price	Total
Excavation, 851 cu. yd	$0.50	$426
Concrete—foundations, 295 cu. yd	10.00	2,950
Concrete—6-in., reinforced floors, 3104 sq. ft	.50	1,552
Concrete—4-in., plain floors, 2291 sq. ft	.18	412
Concrete—miscellaneous	....	38
Brick—walls, 147,000	21.00	3,087
Brick—pilasters, 8400	23.00	193
Cut stone, 317 cu. ft	2.00	634
Steel—structural, 23,343 lb	.04	934
Steel and iron—miscellaneous	....	439
Timber—roof sheathing, 14,000 bd. ft	42.00	588
Timber—miscellaneous	....	38
Roofing—slate, 4542 sq. ft	.10	454
Millwork—doors, 303 sq. ft	....	143
Millwork—windows, 962 sq. ft	....	470
Screens, 405 sq. ft	.15	61
Sheet metal	....	587
Ventilator	....	74
Electric lighting	....	513
Heating	....	54
Plumbing	....	200
Painting—oil, 929 sq. yd	.18	167
Painting—cold water, 1101 sq. yd	.12	132
Fencing	....	80
Manhole	....	38
Gravel roadway	....	538
Slate	....	122
		$14,924
Engineering, interest, insurance and contingencies, 11 per cent		1,642
Taxes and organization, 3.5 per cent		522
Total building cost		$17,088
Total building cost per kilowatt		$10.00

Building, brick and concrete, with brick walls and concrete floors, all in good condition.

Fall River substation, irregular building, converted power house, about 86 ft. x 146 ft., approximately 12,000 sq. ft.

Rockland substation building, 31 ft. x 60 ft., brick, concrete and steel.

COST OF EQUIPMENT

Bridgewater (900 Kw.)

Items	Quantity	Unit Price	Total
300-kw. GE rotary converters	3	$4,570	$13,710
330-kw. GE three-phase, air-cooled transformers	3	2,512	7,536
40-in. motor-driven Buffalo blowers	2	165	330
GE motor-driven air compressor and equipment	1	375	375
12,500-volt GE electrolytic lightning arresters	4	300	1,200
Switchboards and wiring	..	....	$7,647
Miscellaneous equipment and tools	..	....	195
Total			$30,993
Engineering, insurance, contingencies, interest, 10.5 per cent			3,254
Taxes and organization, 3.5 per cent			1,085
Grand total			$35,332
Grand total equipment per kilowatt			$39.20

Brockton (3750 Kw.)

Items	Quantity	Unit Price	Total
750-kw. GE rotary converters	3	$10,085	$30,255
1500-kw. GE rotary converter	1	10,578	10,578
825-kw. GE three-phase air-cooled transformers	3	3,872	11,616
1575-kva. GE three-phase air-cooled transformers	1	4,393	4,393
12,500-volt GE electrolytic lightning arresters	1	358	358
70-in. Buffalo motor-driven blowers	2	375	750
GE motor-driven air compressor and equipment	1	375	375
Switchboards and wiring	..	....	16,292
Miscellaneous equipment and tools	..	....	93
10-ton, hand-operated traveling crane	1	1,350	1,350
Total			$76,060
Engineering, interest, insurance and contingencies, 10.5 per cent			7,986
Taxes and organization, 3.5 per cent			2,662
Grand total			$86,708
Equipment per kilowatt			$23.20

Fall River (3000 Kw.)

Items	Quantity	Unit Price	Total
750-kw. GE rotary converters	4	$10,085	$40,340
Foundations for above	..	....	1,210
825-kw. GE three-phase, air-cooled transformers	4	3,872	15,488
Foundations for above	..	....	110
12,500-volt GE electrolytic lightning arresters	1	325	325
70-in. Buffalo motor-driven blowers	2	365	730
GE motor-driven air-compressor and equipment	1	375	375
Oil-testing equipment and filter	1	970	970
Switchboards and wiring	..	....	11,440
Miscellaneous equipment and tools	..	....	334
Total			$71,322
Overhead charges during construction, as above, 14 per cent			9,985
Grand total			$81,307
Equipment per kilowatt			$27.10

Rockland (900 Kw.)

Items	Quantity	Unit Price	Total
300-kw. GE rotary converters	3	$4,570	$13,710
330-kw. GE three-phase, air-cooled transformers	4	2,512	10,048
40-in. Buffalo motor-driven blowers	2	165	330
GE motor-driven air compressor and equipment	1	375	375
12,500-volt GE electrolytic lightning arresters	2	301	602
Switchboards and wiring	..	....	6,380
Miscellaneous equipment and tools	..	....	106
Total			$31,551
Overhead charges during construction, 14 per cent			4,417
Grand total			$35,968
Equipment per kilowatt			$39.96

Taunton (1700 Kw.)

Items	Quantity	Unit Price	Total
500-kw. GE rotary converters	3	$7,017	$21,051
200-kw. GE multipolar booster generator	1	3,788	3,788
300-kw. GE four-pole d.c. belted motor for booster	1	4,775	4,775
550-kw. GE three-phase air-cooled transformers	3	3,062	9,186
55-in. Buffalo motor-driven blowers	2	245	490
12,500-volt GE electrolytic lightning arresters	4	295	1,180
GE motor-driven air-compressor and equipment	1	375	375
Switchboards and wiring	..	....	11,287
Miscellaneous equipment and tools	..	....	183
Total			$52,315
Overhead charges during construction, 14 per cent			7,324
Grand total			$59,639
Equipment per kilowatt			$35.00

Summary of Substation Costs

Substation	Kilowatt Capacity	Land	Building	Equipment	Total, Excluding Land	Grand Total
Bridgewater	900	$1,296	$10,668	$35,332	$46,000	$47,296
Brockton	3,750	2,488	16,075	86,708	102,783	105,271
Fall River	3,000	20,507	28,200	81,307	109,507	130,014
Rockland	900	1,188	12,783	35,968	48,751	49,939
Taunton	1,700	4,644	17,088	59,639	76,727	81,371
Total	10,250	$30,123	$84,814	$298,954	$383,768	$413,891
Average per kilowatt		$2.92	$8.25	$29.20	$37.45	$40.37

American Wood Preservers' Association

Papers Presented Before the Annual Convention Discuss Specifications for Wood-Block Paving, the Foreign Creosote Situation, Use of Zinc Chloride, Timber for Cross-Ties, Butt Treatment of Poles and Wood-Block Flooring

THE twelfth annual convention of the American Wood Preservers' Association was held in Chicago on Jan. 18-20. A number of the papers and reports were of special interest to electric railways, and several of these are abstracted in the following paragraphs.

REPORT OF COMMITTEE ON WOOD-BLOCK PAVING

The committee on wood-block paving presented a report containing specifications covering the manner in which timber should be selected and treated for this purpose, as well as the method of laying the blocks in the street, the specifications applying particularly to Southern yellow pine, although the committee considered the treatment safe for Norway pine, hemlock, black gum and tamarack. The recommendations provided for blocks cut from sound timber with at least six annular rings to the inch, beginning 1 in. from the center of the heart of the block. Not less than 50 per cent of heartwood was required, and green timber was preferred for treatment, though seasoned timber was not excluded. Blocks from 5 in. to 10 in. long were deemed acceptable, although a length equal to twice the depth was preferred. The report recommended 4-in. block for heavy traffic streets, 3½-in. block for lighter traffic streets and 3-in. block on residential streets where the traffic is light. Blocks 3 in. in depth should be 8 in. long and from 3 in. to 4 in. wide. The width and depth should be different to prevent the blocks from being laid on their sides.

The committee also recommended that blocks be laid in the street as soon as possible after treatment. If this could not be done, provision should be made to prevent the blocks from drying out by packing them in close covered piles. The blocks should be sprinkled with water at intervals to keep them moist, and they should be well sprinkled about two days before being laid, making the wood sufficiently wet to swell to its maximum size. The report recommended concrete foundations preferably 6 in. thick, although on light traffic streets 5 in. was deemed sufficient. A mortar cushion not less than ½ in. nor more than 1 in. in thickness composed of one part Portland cement and four parts of sand, was also specified, to which only sufficient water should be added to insure a proper setting of the cement. The committee recommended that the mortar be spread immediately in advance of the laying of the blocks, and that the concrete foundation be cleaned and thoroughly wet down before placing the mortar bed. Under special conditions, especially where vibration was to be expected, it was recommended that the mortar cushion be omitted and a bituminous coating one or two coats in thickness be spread upon a smoothly finished and thoroughly dry concrete base. A bituminous filler and longitudinal expansion joints ¾ in. wide should be installed on 30-ft. streets. The report also recommended rolling the pavement longitudinally and diagonally with a 5-ton steam roller, and when a mortar bed is used the rolling should be completed before the mortar has set.

THE FOREIGN CREOSOTE OIL SITUATION

A paper on the foreign situation in regard to the supply of creosote oil was read by G. A. Lembcke. In this the author stated that, during the months immediately following the outbreak of the European war, it looked as though all shipments of creosote oil from Europe would cease, but that conditions had since so adjusted themselves that Great Britain, during the year 1915, had shipped to this country between 30,000,000 gal. and 35,000,000 gal. This compared with importations of foreign creosote oil during 1912 of approximately 60,000,000 gal., in 1913 55,000,000 gal., and in 1914 43,000,000 gal. Of the creosote received during the year 1915, none had come from Germany or Belgium, which in a large measure accounted for the decrease in the importation of this product. On the other hand, the general business depression and the uncertain supply of creosote caused a number of large railroad systems to abstain for a time from the use of creosote oil. This condition in a measure made the reduced supply received from foreign sources, together with the creosote produced by manufacturers in this country, sufficient to supply the demand.

Although there was a decrease in the total production of creosote oil, the increased demand for coal-tar products in the United Kingdom increased its supply of oil sufficiently to meet the requirements of the United States. The author also stated that the stocks of creosote oil in Germany were entirely exhausted, and that the exportation of creosote oil after the war must of necessity at first be slow and reduced in volume. On the other hand, he said, at the close of the war all of the countries engaged will have an enormous amount of renewal work to do and European consumption of creosote oil will greatly increase. Under these conditions, even though the war should end in 1916, the author deemed it reasonable to suppose that no decided change in price would take place.

USE OF ZINC CHLORIDE

In a paper discussing the unit quantity of zinc chloride that should be used and the method of determining the true strength of the solution, by W. F. Goltra, it was stated that there was a divergence of opinion among users of the material, regarding the strength of the solution and the quantity of dry salt that should be injected per tie, or per cubic foot of timber to protect the wood thoroughly from decay. The author said that it had been almost the universal custom in this country to specify a certain quantity of dry salt per tie or per cubic foot of timber, without taking into consideration the variable absorbing characteristics of individual pieces of timber in the same charge or different species of wood under treatment. Many experiments have been made to find some way of securing uniform absorption, but none have attained the desired end. Instead of specifying so many ounces or pounds of dry salt per tie or per cubic foot of timber, it would be more rational to base the strength of the solution on degrees Beaumé at a stated temperature. In support of his recommendation the author cited the practice of European railways in which the strength of the solution and the quantity of salt per cubic foot were both specified, and in conclusion he offered the following specification: "The zinc solution must have a strength of 3.50 deg. Beaumé at a temperature of 70 deg. Fahr. The same strength should be used for all species of wood and for all sizes of ties, and shall be injected into the wood to refusal."

RATING WOODS FOR TIES

In a paper discussing woods suitable for cross-ties R. Van Metre stated that in considering the value of any species, aside from natural durability and capacity for treatment, there are three points of importance: (1) That it be sufficiently strong to withstand the ordinary strains due to center binding, etc.; (2) that it be sufficiently dense to resist spike pulling and lateral pressure on spikes, and (3) that it be sufficiently hard to have a proper resistance to rail wear.

It is desirable that some classification of the mechanical suitability of the different species as ties be established from a comparison of their mechanical properties. The Forest Products Laboratory has been working on this, and has suggested the practicability of basing a classification upon a composite figure involving the following mechanical properties: Static bending, impact bending, compression parallel to grain, compression perpendicular to grain, and hardness.

This would result in the accompanying classification of some well-known species. The figures given are for average forest-grown material, and individual pieces of any of the species may vary as much as 30 per cent above or below the average.

TIMBERS ARRANGED IN ORDER OF THEIR MECHANICAL VALUE AS TIES

Species	Average Composite Value
Black locust	1,666
Sugar maple	1,140
White oak	1,050
Red oak	972
Beech	955
Longleaf pine	914
Red gum	825
Shortleaf pine	800
Western larch	790
Tamarack	740
Eastern hemlock	700
White fir	610
Lodgepole pine	590
Western yellow pine	560
Northern white cedar	420

The author also urged that more consideration be given to the matter of seasoning, which, he said, would make so-called soft woods serviceable and conserve the supply of red oak.

BUTT TREATMENT FOR POLES

Butt treatment under pressure of only those parts of poles and piles especially subject to rapid decay was proposed in another paper by Frank W. Cherrington as a suitable and economical substitute for the treatment of the entire piece. While the author holds that the creosoting of poles and piles in their entirety is an economical investment, he believes that a butt treatment with pressure by means of a vertical cylinder would be effective, whereas dipping or painting are only makeshifts. Until recently engineers have considered it impractical as well as impossible to treat, by the injection of creosote oil under pressure, the butt only of piling or telephone poles. The author, however, understands that there is now in process of development at least one practical means of accomplishing this long-sought end, by providing a vertical cylinder for injecting by any standard process, any required amount of preservative into the butts only of piling or poles, while the upper parts of the timbers are merely surrounded by the compressing medium, or air.

FAVORABLE REPORTS ON WOOD BLOCK FLOORS

Although it is only a few years that creosoted wood blocks have been used for the flooring of factories, warehouses and other buildings, they have already proved their worth, according to a paper by C. H. Teesdale of the United States Forest Products Laboratory, who summed up the answers to questions submitted to a large number of users of wood-block flooring, as well as to the manufacturers of the creosoted blocks. The results of this investigation indicate that treated wood block makes a desirable type of flooring for many purposes, the records of 160 floors indicating that serious trouble has developed in a very low percentage of cases.

Most of the trouble has come from shrinkage or expansion of the blocks. For dry situations the blocks should be well seasoned before treatment and laid in the floor while thoroughly dry. In wet or alternately wet and dry situations dry blocks would give expansion trouble, hence the timber should be green or only semi-air-dried when laid. Even dry interiors are liable to be accidentally subjected to water, however; hence it would seem desirable as a rule to use bituminous fillers instead of sand filler.

In a few cases it seems likely that wood block should not be used. For example, it should not be used where butter or tobacco products are stored. In some foundries, where hot castings are thrown upon the floor, the blocks have burned through to the foundation. However, wood block has been found to be very satisfactory in many cases where heavy castings are thrown about or where heavy trucks are moved, and it is liked by workmen because it is warm and easy on their feet.

SERVICE TESTS OF CROSS-TIES

There was presented also a report which consisted of a compilation and tabulation of all the data which could be secured on the service tests of ties on both steam and electric roads. In connection with the latter, the following information was given on untreated ties:

1. *Untreated Ties in Interurban Lines.* The following estimates were secured from officials of six companies operating in the Middle West:

Cedar	Untreated	No tie plates	7- 8 years	Michigan
			9-10 years	Michigan
Cedar	Untreated	With tie plates	12-15 years	Michigan
			15-16 years	Michigan
Cedar	Untreated	No tie plates	11-12 years	Illinois
White oak	Untreated	No tie plates	7- 8 years	Michigan
			10-12 years	Michigan
White oak	Untreated	No tie plates	6- 7 years	Indiana

2. *Untreated Ties in Unpaved and Macadam Streets.* Officials of several companies operating in the Middle West supplied the following estimates:

Cedar	Untreated	11-12 years	Illinois
White oak	Untreated	8-10 years	Illinois
Oak and beech.	Reported as badly decayed and removed after two years from track laid on gravel ballast in Illinois.		

3. *Untreated Ties in Paved Streets.* A third and important condition under which ties are used, is in tracks in paved streets. The situation is complicated not only by lack of authentic data, but by the variety of types of construction in use. Some light is thrown on the service secured from untreated ties in these types of track by the following tabulation of opinions expressed by officials of a number of companies operating in the Middle West:

Locality	Species	Life Un-Treated Years	Remarks
Michigan	White oak	12-15	Life of tie equal to life of rail
Michigan	White oak	20	Life of tie equal to life of rail
Michigan	White oak	10	....
Illinois	White oak	20-25	Equal to life of rail, provided tie is not disturbed
Indiana	White oak	20	Life of tie equal to life of rail
Illinois	Hemlock	.....	....
	Tamarack	15-20	Life of rail
	Cedar	.....	....

All the tramway men of the London County Council Tramways, of military age, have been ordered to submit themselves for medical examination, and if unfit for military service to get a certificate to that effect.

Electrification of Transportation Lines*

The Author Discusses the Relative Advantages of the Three Systems Used in this Country

BY N. W. STORER
General Engineer Westinghouse Electric & Manufacturing Company

ONE of the things that has been both an advantage and a disadvantage in the electrification of steam railways has been the fact that there have been several systems, each with many variations and all rivals for the great work of displacing the steam locomotive. This has been an advantage because the competition between the different systems has served to stimulate the advocates of each system to a maximum effort. The disadvantage has arisen because no system has had at any time sufficient superiority over the others to win a decisive battle. Consequently, the railways which hope to adopt the best system have felt inclined to delay electrification until the question of superiority can be decided. At the present time there is much less talk, and both sides are now endeavoring to show by results rather than by words which one is the best.

Of the three systems the straight three-phase type should be mentioned, although it has been adopted only in one small installation in this country, because it is used quite extensively in Italy and is standard on the Italian State railways. There the locomotives usually have two constant speeds, secured either by double windings on the motors or by connecting the motors first in cascade and second in parallel. They operate with 3000 volts on the trolley wire and apply this voltage directly to the motors so that no transformers are necessary, making the machine comparatively simple and of a minimum weight and maximum efficiency. The chief reason that has prevented the use of the three-phase locomotive in this country lies in the double overhead trolley wire. American railway men are hard enough to convince of the advantages of electrification where only one overhead wire is used, and they will not consider the double trolley at all on account of the complicated construction in yards and cross-overs. In this country, also, it would be impossible to gain the advantage of simplicity possessed by Italian locomotives because the service in America is so much heavier that higher contact-line voltages must be used. Consequently, it would be necessary to have transformers on the locomotives.

With regard to the direct-current system, it may be said that the range of voltage between 3000 and 5000 puts this system in the heavy trunk-line class. With these high voltages the transmission loss is low and the substations can be placed from 25 miles to 50 miles apart, but although it is undoubtedly possible to operate heavy trains at a voltage of 3000, it would be much preferable to have a higher voltage if this can be secured with safety. That this is practicable is indicated by the operation of the 5000-volt equipment on the Grass Lake line of the Michigan United Traction Company, which shows that this voltage may be used for both multiple-unit cars and locomotives, as the equipment on this line has operated for 14,000 miles since its installation without a breakdown in the insulation or any other troubles due to high voltage. However, it is to be hoped that a standard may be arrived at in the near future so as to avoid the large number of milestones which mark the progress of the direct-current system in its application to heavy railway work.

The advantage of the direct-current system lies largely in the characteristics of the series motor which is universally used. Mechanically, it is simple, rugged and comparatively inexpensive. Electrically, it has speed and tractive effort characteristics that are especially well suited to the work of rapidly accelerating heavy trains with minimum power consumption, as well as of operating them at full speed afterwards. The steep speed characteristics give an automatic division of load among all the motors in a train, even with maximum variations in wheel diameters. The efficiency of the motor is high, and its reliability and foolproof characteristics make it the most popular of all types of railway motors.

With regard to the single-phase system, it may be said that the advantages center in the high voltage which can be used on the trolley while at the same time ordinary voltages are impressed on the motor and control equipment in the car or locomotive. The high voltage alternating current reduces the cost of the overhead conductor and feeder system to a minimum and enables the railway to use substations without attendants. It has also the advantage of permitting the use of locomotives which have either series characteristics or else induction motor characteristics such as have been installed recently on the Norfolk & Western Railway.

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*Abstract of a paper presented on Jan. 3 before the Pan-American Congress, Washington, D. C.

Recent Pamphlets on Electrolysis

National Bureau of Standards Has Just Issued Two Important Pamphlets on Electrolysis Mitigation

WITHIN the past few weeks two important pamphlets have been issued by the United States Bureau of Standards as follows: Technologic Paper No. 26, on "Earth Resistance and Its Relation to Electrolysis of Underground Structures," and Technologic Paper No. 52, on "Electrolysis and Its Mitigation."

Paper No. 26, which is by Burton McCollum and K. H. Logan, takes up methods of measuring soil resistance, factors affecting specific resistance of soils and the relation of soil resistance to electrolysis. Included are tables of specific resistance of many soils in Philadelphia, Pittsburgh, St. Louis, Washington and elsewhere. A few notes on the application of the principles to electric railways are given, particularly emphasizing the importance of good rail bonding and of well-drained roadbed.

Paper No. 52 was written by E. B. Rosa and Mr. McCollum and it is a most important general treatise on the subject, comprising 143 pages. After a general survey of the subject it takes up three main topics: (1) Methods of mitigation applicable to pipes; (2) methods of mitigation applicable to the railway negative return, and (3) regulations regarding electrolysis mitigation. The methods discussed under the first head include those for keeping the current away from the pipes, those for increasing the resistance of the pipe path, and those for draining current from the pipes. The conclusion reached was that none of the methods tried is suitable as a primary means of preventing electrolysis troubles, but all are to be considered as auxiliary or emergency measures.

For the general mitigation of electrolysis thorough bonding and cross-bonding of track and drainage of roadbed are recommended. Where track is on private right-of-way rails and ties should be kept, as far as possible, out of direct contact with earth. The three-wire system, viewed solely from the standpoint of electrolysis mitigation, promises well, but sufficient operating data are not yet available to show its practicabilty. The most effective methods of mitigation, according to the paper, involve the use of insulated return feeders with or without boosters. In many cases a limited use of insulated joints or pipe drainage may be found advisable.

The authors include the essentials which they think should form the basis of regulations dealing with this subject. These regulations should apply not only to the railway system, but should also define the responsibilities of the owners of underground utilities. They state that under most conditions over-all voltage in railway tracks should be limited to 2 to 4 volts and potential gradients to 0.3 to 0.4 volt per 1000 ft., these being average all-day values. Potential drops on pipe systems should be, roughly, half of these figures.

Copies of the above pamphlets can be secured from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents for No. 26 and 30 cents for No. 52.

The Near-Side Stop

Its Advantages as a Time Saver Are Analyzed, and Examples Are Given from Kansas City Practice

BY W. C. HARRINGTON
Assistant General Superintendent Metropolitan Street Railway

WHEN a comparison is made between the value of the near-side and the far-side stop, the thinking individual will be forced to favor the near-side stop. There are a hundred reasons for so deciding, but the most important is made up of the two principal factors in operation—time and safety.

Where the service stop is made at the far side the motorman has to determine when arriving at the near side the possibilities of making the crossing, and every delay encountered there is a total loss of time from an operating standpoint. If he makes only a safety stop at the near side there will nearly always be an ample number of would-be patrons to board the car to hold it from a few seconds to a minute. Again, he cannot always get a clearance for the crossing the instant he arrives even when there is no one on hand to board the car and this time must also be taken into account as a delay to the service. Those who argue in favor of the far-side stop say that it is not always necessary for the car to stop before making a crossing, but the times when such a stop is unnecessary are few compared with those when it is required.

The average service stop of a city line car is from fifteen seconds to one minute. Some of the safety stops are about one second only in duration when no one boards the car, and the longest stops are over a minute in most places. In Kansas City I believe the average stop will total about fifteen seconds, and when fifteen seconds are charged off to stops at both sides of streets where two lines intersect, fully 50 per cent of the stopping time must be considered a complete loss. Our lines, with but few exceptions, are brought downtown, as every line is a through line where the traffic warrants, and this, of course, gives us a large number of lines operating over the downtown trunks. At times during the peak-load period we have a forty-five second headway on three of the trunk lines and a shorter headway on one of the downtown loops.

The central section of all these lines and trunks may be included in an area of five blocks square from Eighth Street on the north to Twelfth Street on the south and from Wyandotte Street on the west to McGee Street on the east. Within this district there are eighteen north and south crossings, or thirty-six stops which of necessity must be made by every car on a round trip north and south through the business section of the city. In like manner there are fifteen east and west crossings, or thirty stops which must be made by every car on a round trip east and west through the business section. This totals a loss of nine minutes every time the cars operating east and west cross this district, and seven and one-half minutes lost on the lines operating north and south through this section. By dividing this time up between the lines operating east and west on the lines between Eighth and Twelfth Streets we have a loss of time totaling one and four-fifths minutes per car on each trip and one minute on all lines operating north and south between Eighth and Twelfth Streets.

In making the near-side stop universal for the system we eliminate complaints to a great extent from the outlying sections, as the average street car rider at one time or another during the day boards a car in the business section and thereby becomes acquainted with the practice and spreads the knowledge to those who are only occasional riders. The average rider is also much more concerned with the saving of time than he is with his personal safety and the safety of others, and for that reason the uniformity of stops developed when the near-side stop is in practice makes it easier for the trainman to watch the movements of the passengers.

Another feature of the near-side stop, which eliminates accidents to a certain degree, is the fact that the cars are under a fair headway when the far side of the street is reached, and few persons will attempt to board them when they are running at that speed; whereas many men and a few women will endeavor to board the cars when they are operating at a low rate of speed, such as is the case just before a stop is made. This we find is common when the cars are obliged to stop at both sides of the crossing.

Finally, the schedule time is helped because it is possible for the cars to get away promptly after leaving a stop. We find that on level crossings it is possible to get the car under full headway a short time after the rear trucks have passed the last rail of the crossing, even if the controller is thrown off while the car is crossing the rails of the intersecting line.

A comparison of the running time before Aug. 20, 1911, on which date near-side stops were inaugurated, and during November, 1915, in Kansas City, shows that on most runs we have been able to increase the average schedule speed by about ½ m.p.h. This, on our line, amounts to a large total in both time and money. This increased running time has not materially affected the schedules as the savings have been made at points where otherwise a waste of time would result. While the near-side stop has not been wholly responsible for this saving, it has been the predominating factor in forming a basis for the working out of time-saving methods. When we consider that the increase in population during recent years in Kansas City and the Metropolitan Street Railway territory has been large and that the congested district has been constantly widening, the importance of this improvement becomes increasingly manifest.

Union Traction of Indiana Awarded Brady Medal

The committee appointed by the American Museum of Safety to award the Anthony N. Brady medal met in New York on Jan. 21 and selected the Union Traction Company of Indiana, A. W. Brady, president, Anderson, Ind., to receive the medal, and the Elevated Railroads of Chicago, Ill., B. I. Budd president, to receive honorable mention.

The committee of award comprised the following: B. J. Arnold, Chicago, Ill., chairman; Frank R. Ford, New York; Will T. French, San Francisco, Cal.; James H. McGraw, New York; George F. Swain, Cambridge, Mass., and W. H. Tolman, New York, secretary.

ASSOCIATION NEWS

Power Generation Committee Will Study Machinery Rating, 60-Cycle Apparatus, Smoke Abatement, Purchase of Fuel to Specification, Safety Code and Operating Costs—O. T. Crosby Addressed Washington R. & E. Section on Jan. 10—Capital Traction Section Was Organized on Jan. 13

Activities of the Committees

COMMITTEE ON WAY MATTERS

As this issue goes to press the Engineering Association committee on way matters is meeting in New York with all members present but W. F. Graves, who is recovering from the effects of a surgical operation in a New York hospital. A number of representatives of manufacturers of special work are also in attendance. Minutes of the meeting will be given in a later issue.

COMMITTEE ON POWER GENERATION

The first meeting of the Engineering Association's committee on power generation for the current year was held in New York City on Jan. 14, at the association offices. The meeting was devoted to a discussion of the most advantageous methods for handling the various subjects assigned for the committee's consideration by the executive committee of the association, beginning with the matter of reviewing existing standards and specifications. In view of the fact that the standing committees on power generation up to the last year had confined their work to the presentation of a series of papers, there were but few association standards with which the committee was directly concerned, and in consequence no sub-committee was appointed for considering the subject. In regard to the matter of consideration of the new standardization rules of the A. I. E. E. it was decided that the question of ratings and ultimate temperatures was of great importance, and in consequence Chairman J. W. Welsh appointed Messrs. Bromley, Stitzer and Swain from the committee to report upon the subject. To the same sub-committee was also assigned the work of reporting on the advantages and disadvantages of 60-cycle apparatus, the sub-committee chairman for this subject being Mr. Stitzer.

With regard to the subject of smoke abatement it was decided that a sub-committee composed of Messrs. Rolston, Stott and Freeman should make a report in the form of a review of the most recent developments, and another sub-committee, composed of Messrs. Stott, Freeman and Sinclair, was appointed to report upon the new boiler code of the A. S. M. E., with a view to recommending action in regard to it by the association. The form for specifications for the purchase of fuel, which was submitted by last year's committee, was assigned to a sub-committee composed of Messrs. Freeman, Kelsay and Rolston for consideration in connection with the possible incorporation of provision for the fusing temperature of ash and other additions, and to Messrs. Kelsay, Rolston and Sinclair was assigned the consideration of the new safety code of the National Bureau of Standards.

In the matter of investigating operating costs for railway power systems it was decided to compare actual results from a number of power stations by the standardization method suggested by last year's committee with the idea of determining the extent to which standard comparisons could be carried. This investigation was to be carried out by the committee as a whole owing to the great scope of such a comparison and the work involved in the collection and compilation of the necessary data. Subsequent to an extended discussion regarding ways and means of handling this subject, the committee adjourned to meet again early in the month of May at such place as may be decided upon by the chairman.

Activities of the Company Sections

PUBLIC SERVICE SECTION

The regular meeting of Company Section No. 2 was held in Newark, N. J., on Jan. 20. Papers were delivered by C. F. Bedwell, assistant engineer, on "Construction of Carhouses" and by R. H. Harrison, mechanical department, on "Construction of Car Shops." These papers were illustrated with lantern slides and they aroused much interest. The discussion was led by C. D. Smith, traffic investigator, J. R. Case, division master mechanic and H. H. George, assistant engineer maintenance of way.

CONNECTICUT COMPANY SECTION

The regular meeting of this section was held on Jan. 4 at the Hotel Taft, New Haven, with 100 members in attendance. As customary, the meeting was preceded by a dinner during which musical entertainment was furnished.

The speakers at the meeting were J. P. Alexander of the Westinghouse Electric & Manufacturing Company, who gave an illustrated talk on the company's plant at East Pittsburgh, Pa., and Harold Bates, assistant construction engineer of the company, who spoke on "Snow Fighting." An abstract of the latter's paper is given elsewhere in this issue of the ELECTRIC RAILWAY JOURNAL. This paper was illustrated with lantern slides.

WASHINGTON R. & E. COMPANY SECTION

The regular monthly meeting of the section was held in the offices of the Potomac Electric Power Company on Jan. 10, with more than 100 members in attendance. Charles S. Kimball presided.

Oscar T. Crosby, an early president of the company and instrumental in building up the property, delivered an address on "Peace and Preparedness." He compared the pioneering of peace with that of electric railway development, and contrasted the operating conditions on the early electric railway operated in Richmond, Va., with those existing on the Washington system at present. Col. George Truesdell, former District Commissioner and at present a director of the company, spoke on the early history of the company. Vice-President W. F. Ham also spoke briefly regarding the development of the company-section movement. Some musical numbers and the serving of a buffet luncheon completed the program.

Thirty members of this section connected with the transportation, accounting and engineering departments have enrolled in a Sheldon School course in the "Science of Business Building." Two members have already completed the course with credit.

CAPITAL TRACTION COMPANY SECTION

The eighth company section of the association was formally organized by the Capital Traction Company in Washington, D. C., on Jan. 13. The program announced in last week's issue was carried out. Addresses were made by Martin Schreiber, E. B. Burritt, Harlow C. Clark, C. C. Peirce, H. C. McConnaughy and also by several officials of the Washington Railway & Electric Company.

The following officers and directors were elected: President, R. H. Dalgleish, electrical engineer; vice-president, F. Morrill, roadmaster; secretary, J. Fleming, purchasing agent; treasurer, A. Wilkinson; directors, D. S. Carll, E. Von Culin, C. J. Hoshall and E. L. Grayson.

D. S. Carll, vice-president and retiring general manager of the Capital Traction Company, presided until after the election of officers, and took the opportunity of thanking the employees for their loyal support during his long term of active association with them. George E. Hamilton, president of the company, assured the section of the hearty support of the company. He spoke of the value of association as leading to concentration, resulting in efficiency, which spells power and success for employees and company alike, and emphasized the fact that the success of the company depends in a large measure on the attitude of the platform men, who form the point of contact between the company and its patrons.

Mr. Peirce brought out certain facts affecting the relations between the public and the utility, with particular reference to courtesy. He took as a text "Courtesy Is the First Line of Defense Against Unfair Attack." He said in part:

"Remember that men in the street railway world are all salesmen, simply selling transportation in place of merchandise. There is a splendid opportunity to make friends of one's customers in the street railway business. The electric railway is the great retailer of transportation. All its employees help to sell its product. The public knows that a man named Smith or Brown is the head of the road, but it praises or blames the company from the impression it gets of Jones or Robinson on the car platform. If the conductor or motorman has a twenty-four-hour habit of courtesy, the public thinks that the chief must be a pretty good sort. It knows that every concern partakes of the personality of its head. Business to-day, in every line, depends more and more on friendship. Competition is keen, but where price and quality are anywhere near equal, the man you like gets the order. The basis of friendship is personality. In the last hundred years inventions that have abridged distance have caused civilization to make gigantic strides. But these annihilators of time and space have also tended to efface personality. This is particularly true in great corporations, the organized evidences of these inventions. Now, however, the pendulum is swinging in the other direction. Literally, and by means of making his name and his company widely and favorably known, the big man is emerging from the cloistered seclusion of his private office. His desk is up near the front window so the public can look in and see what kind of a person it is buying from."

Chicago Loop Traffic Analyzed

Chart Showing Number of Passengers Delivered at Different Streets Suggests Changes in Routeing

Pedestrian congestion can be relieved in the Chicago loop during the passenger delivery period by rerouteing of the surface line cars. This, at least, is the conclusion drawn by the Chicago Bureau of Transportation of which R. F. Kelker, Jr., is supervisor, after analyzing the passenger delivery of the surface and elevated lines. The results of this traffic study were plotted on a chart so that they could readily be interpreted by the local transportation committee and the managements of the surface and elevated lines, to whom they were submitted for consideration. This chart, which was accompanied by data relating to the daily distribution of passengers by streets and by divisions, is shown in the accompanying illustration. The data collected cover the distribution of all passengers entering the loop district between 6.30 a. m. and 12.30 p. m. by both the surface and elevated lines. This time interval during which the traffic counts were taken was considered, for all practical purposes, to represent the delivery period of in-bound traffic.

On the original chart passenger delivery to the various streets from the north section of the city is shown in red, that from the west in white and that from the south in blue. A unique feature of this chart is that the passenger traffic from the West Side is charted exactly in the center and that from the North Side is shown on the left and that from the South Side on the right. This brings out very strikingly the unequal distribution of traffic delivery which leads to pedestrian congestion on the sidewalks and at street intersections.

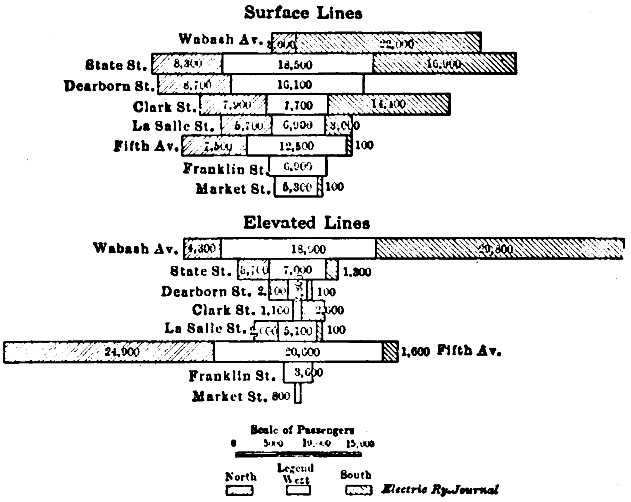


CHART SHOWING PASSENGERS DELIVERED TO DIFFERENT STREETS IN CHICAGO LOOP DISTRICT

The conclusion drawn from this study was that if by rerouteing the delivery of the surface lines could be made more uniform and centered on Clark Street, congestion in pedestrian traffic would be greatly diminished, and the rerouteing of cars would benefit the railway service. In other words, cars would be turned back at Clark Street and thus tend to increase the delivery there and, at the same time, reduce the delivery at the congested points on State Street and Wabash Avenue. This would shorten the car trips, eliminate operation over several congested loop blocks and make it possible to reduce the headway. Similar data were collected to show passenger delivery to the east and west streets and showed that some cars could profitably be turned back before entering the Chicago loop district.

COMMUNICATIONS

Delivery of Cars During 1916

LACONIA CAR COMPANY
BOSTON, MASS, Jan. 18, 1916.

To the Editors:

The present market conditions in the steel industry, to which you have given editorial attention recently, so far as they relate to the delivery of cars, are certainly serious, if deliveries are of importance, and also as to prices which must be charged for the cars.

Prices on bars and structural steel have advanced at least 50 per cent during the past six months, and deliveries in many cases are subject to the mills' convenience and rarely inside of five or six months except a few items. Sheet steel has advanced at least 50 per cent and galvanized as well as rust-resisting sheets, used in many cases for roof covering, have almost doubled in price, and some of the mills report they are oversold on these items and will not give any definite promise on deliveries.

Inasmuch as steel is being used in nearly every type of car for the underframes, and in some cases in the car bodies, the inability of the steel companies to make deliveries is in itself a serious proposition. In the past prices have been more or less dependent upon the lumber market, an advance of 5 or 10 per cent having generally been the limit. It will therefore be seen that railway companies can save materially by purchasing cars when the steel mills are able to deliver and prices are low. I will also state that at this time the steel mills are so filled up with orders that they refuse to quote in some cases unless the prospective buyer is considered one of their regular customers.

CORNELL S. HAWLEY, President.

Maintenance Costs of Coasting Recorders

JACKSONVILLE TRACTION COMPANY
JACKSONVILLE, FLA., Jan. 6, 1916.

To the Editors:

I have followed with interest the numerous articles which have appeared recently in the ELECTRIC RAILWAY JOURNAL on results with coasting time recorders, but have been disappointed that all of these articles have neglected the important question of the maintenance and operating cost of the recorders themselves.

Mr. Morse of the El Paso Electric Company has placed the cost of car meter maintenance at about $2.44 per car per annum, and my experience with some sixty ampere-hour meters indicates that inclusive of calibration this cost is a fair figure. The energy loss in a 100-amp. ampere-hour meter is about 10 watt-hours per eighteen-hour day. The stationery used in the recording and comparison of meter records costs about 80 cents per car per annum, so that the total maintenance and operating cost of ampere-hour meters is about $3.35 per car per annum.

A similar statement of the cost of coasting time recorders, including repairs and renewals, inspection, adjustment, energy loss, fuse renewals and cost of type ribbon and paper would furnish much needed data.

J. H. VANDER VEER, Engineer.

[NOTE.—The above inquiry was referred to the Railway Improvement Company, which states that so far as it knows none of the users of coasting recorders is keeping the actual mechanical up-keep costs separate owing to their insignificance. At Fort Worth, for example, the expense is absorbed in regular shop operations. The same fact holds true of the Third Avenue Railway. This company has 1125 recorders in service, and those which cannot be adjusted by the regular inspectors are sent to the shop for attention by a man who receives $17.50 a week. At present this man has time for other duties.

Some users have efficiency departments for keeping records, the costs of which department and records appear in their recorder maintenance accounts.

The Railway Improvement Company adds that a fair comparison between the two is impossible because the meter indicates only, but does not print energy consumption; whereas the coasting recorder not only records coasting time, which is the reciprocal of energy consumption, but also running time. This necessitates a duplex printing mechanism and clock movement which are not a part of the meter system cited in the above letter.—EDS.]

Improved One-Man Operation in Australia

ELECTRIC SUPPLY COMPANY OF VICTORIA, LTD.,
BALLARAT, VICTORIA,
AUSTRALIA, Dec. 10, 1915.

To the Editors:

I have been closely studying your JOURNAL of late with regard to the operation of one-man cars, and the experience of the general manager of the Winona (Minn.) Railway, published in your issue of Jan. 30, 1915, and also the article by Mr. Richardson in your last Convention Number on one-man cars in the Seattle division of the Puget Sound Traction, Light & Power Company have been very interesting to me.

We began operating one-man cars about three years ago in our two properties in Victoria, at Ballarat and Bendigo. We had practically nothing to guide us, and therefore worked out the system from our own experience. Owing to the number of men recruiting, we have lately had to extend the operation of one-man cars at Ballarat to our Botanical Gardens and Lake route, which is one of our principal pleasure resorts in the summer months. On busy occasions, particularly on Sundays, there are a large number of people to be delivered at the Gardens 3 miles from the center of the town and picked up from there and brought back into the town. We have placed hinged notice plates at each end of the cars centrally over the top of the dash, one side of which is marked "Pay As You Enter" and the other "Pay As You Leave." On the Gardens routes we normally run as we do on all the other routes with the "Pay As You Enter" sign exposed when cars run into the center of the town, and "Pay As You Leave" when outward bound. On Sundays during the busy time this system is exactly reversed, the hinged notice signs readily advising the public. This avoids a great deal of the congestion that would ensue from a full car load having to pay as they leave when arriving at the Gardens, and another car load waiting to board the car having to pay as they enter. By varying the system in this way we find we are able to deal with this heavy traffic with very little if any loss on our schedule time.

We have made a small improvement in the design of the fare boxes, by installing a strip of looking-glass at an angle of 45 deg. in the upper part of the box, which allows the coins to slide past it, and reflects in a horizontal plane the coins as they are dropped upon the hinged plate. Tramway managers will appreciate the moral check upon passengers making payments in this public manner. It is possible for a passenger or officer to sit in almost any part of the car and note what fare has been paid into the box. Formerly this could be detected only by those who were in close proximity to the box.

We have now released thirty-seven conductors by the use of the fare box-one man car system. I was somewhat surprised to see no reference made at the recent Municipal Tramway Conference in London to the possibility of running one-man cars, especially in view of the close consideration this subject has received by American operators for the last twelve months.

Our experience of nearly three years has shown that one-man cars can be run quite satisfactorily and deal with loads at times up to sixty or seventy passengers per car, besides greatly reducing the number of accidents. I believe that a careful consideration of this system is worth the while of the majority of tramway managers, the personnel of whose companies may be affected by the war.

P. J. PRINGLE,
Chief Engineer and General Manager.

[NOTE.—In view of the fact that the population of Ballarat, from the latest available census report was 48,607 and that of Bendigo 44,458, as compared with the maximum population of 25,000 for any city in America where one-man cars are operated, according to the recent report of the Transportation and Traffic Association, the above communication shows a practical illustration of the possibility of extending this form of operation to many cities of larger size.—EDS.]

Car Operation Efficiency

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA., Jan. 11, 1916.

To the Editors:

A most interesting and valuable contribution to the literature on this subject is found in C. C. Chappelle's article in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 15. From time to time numerous engineering papers and articles have been presented using speed-time curves for the purpose of illustrating the effects of changing operating conditions as well as for determining the correct equipment to apply. The manufacturers of railway equipments have for years endeavored to assist the operating departments of the electric railways in thoroughly understanding the fundamental principles governing efficient operation of cars. In spite of the progress due to these efforts, there is much yet to be desired. Mr. Chappelle's discussion of these principles brings out a point which is frequently overlooked in practical operation, namely, that under a given set of conditions, the power input to the car is determined by what he designates as "time-element factors." Therefore, his article should be of great assistance in securing full appreciation of the possibilities for economy which may result from a careful analysis of operating conditions.

He mentions the large investment in present equipment and the impracticability of obtaining the maximum economy which might be secured by scrapping it and installing new equipment designed to take advantage of all the recent developments in the construction of cars and electrical apparatus. In this connection it is well to note that probably on many roads the rolling stock is being operated at less than its maximum efficiency. In such cases there exists the opportunity for the application of the fundamental principles to decrease operating expenses and improve service without incurring the great expense accompanying a complete change of equipment. A study of the service conditions will bring to light incorrect operating features such as overloaded and underloaded equipments, wrong gear ratios, slow acceleration and braking rates, stops of unnecessary length, poor arrangements of schedule, headway and layover, etc. It will also furnish the data required for making a logical application of the fundamental principles to correct such defects as may be discovered. Consideration of these facts in conjunction with Mr. Chappelle's article makes it evident that every railway operator should be fully acquainted with all the details of his service conditions in order to get the most economical results from the equipment which is under his control.

In the matter of determining the most economical schedule, only the cost of energy and the platform expense have been considered. Apparently, the maintenance and fixed charges also should be taken into account. However, these are minor factors in comparison with the cost of energy and crew wages, so that the general conclusions will not be affected materially. In the production of the same mileage per car the maintenance and fixed charges would be practically unchanged. If higher schedules are used to produce more car mileage probably the total maintenance would be increased, although that per car-mile might be less. The total fixed charges would not be changed, consequently the fixed charge per car-mile should be decreased. Evidently the total maintenance and fixed charges per car-mile would be decreased, although the value per car annually would be greater. It is important to remember that the benefits to be derived from higher schedules are greater when the platform expense is high as compared with the cost of energy. It is also interesting to note from Fig. 15 that the average per cent coasting for the most economical results is greater for Case "A" than for Case "B." This illustrates the fact that the numerous variables encountered make the problem somewhat different for each railway.

If schedule speeds for different runs and at different times of day are once adjusted to be the most economical in each case, Fig. 15 indicates that approximately equal amounts of coasting should be secured with stops varying in frequency over the range ordinarily found in city service. This being the case, the coasting time alone will indicate directly the relative efficiencies of various motormen. However, it is not always possible to adjust schedules to the most economical value on account of the necessity for maintaining certain headway and meeting competition. For instance, one motorman in all-day service might be 100 per cent efficient when securing 40 per cent coasting. On the same line, the rush-hour service might be such that an extra motorman on a tripper would be 100 per cent efficient with only 20 per cent coasting. Hence it is necessary to have a record of the number of stops and the standing time as well as the coasting time in order to make fair comparisons. A knowledge of the frequency and duration of stops is also necessary in order to satisfactorily analyze a service and determine from the analysis what schedules are the most economical. Such analysis followed by adjusting schedules to the most economical value will be highly profitable to many railways. An instrument for measuring and recording running time, coasting time, standing time and number of stops would make such an analysis a comparatively simple problem and also insure proper operation of the equipments on the economical schedules as determined.

F. E. WYNNE,
Engineer Railway Section, General Engineering Division.

A new tramway system at Las Palmas, on the island of Majorca, off Spain, will probably be placed in operation in March. The date of the inauguration has had to be retarded somewhat on account of the war, as the plant has only been retained with difficulty.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

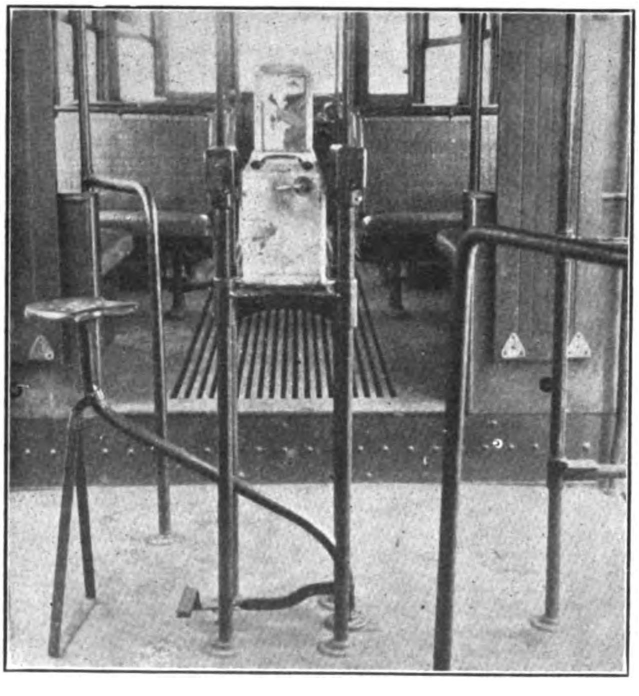
Combined Conductor's Seat and Register-Operating Mechanism

BY E. C. SHERWOOD

Superintendent of Equipment Manhattan & Queens Traction Corporation, Long Island City, N. Y.

The accompanying illustrations show a conductor's seat and fare-operating device devised by the writer, and tried out on the cars of the Manhattan & Queens Traction Corporation. It is the intention to equip all of the cars with this device later. The equipment has been designed particularly for center-entrance cars or other cars in which the conductor is stationed at a particular point which must be passed by all passengers entering the car. It is designed to make the work of the conductor less arduous.

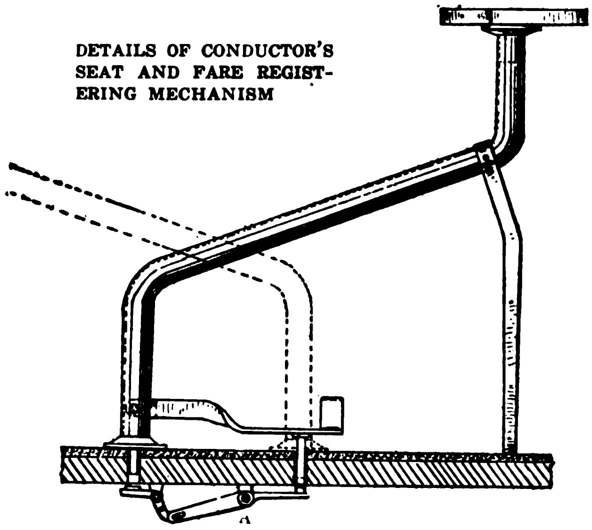
The removable seat consists of a saddle mounted on the end of a bent pipe, which terminates at the lower end in a pin. This pin fits loosely in a hole in the car floor, for the purpose of holding the end of the pipe support in place. Projecting from the pipe near the upper end is a triangular strap support. There may be as many holes as desired in the car floor for the purpose of receiving the pin, thus permitting the seat to be moved.



CONDUCTOR'S SEAT INSTALLED IN CAR

Under the car floor is provided a shaft for operating the register. Simple levers and bell-crank levers are mounted so as to be operated by pins pushed through the floor, rotating the rod *A*. A foot lever is pivoted at a point near the bottom of the pipe stand, by means of which the register rod can be operated.

In designing this arrangement the writer had in mind to provide a restful position for the operator, to arrange the component parts for general convenience, to protect the operating pin so that it cannot be inadvertently operated by passengers entering or leaving the car, and to keep the perforations through the floor closed to prevent the passage of foreign material which might interfere with the operation of the register-operating mechanism.



DETAILS OF CONDUCTOR'S SEAT AND FARE REGISTERING MECHANISM

The illustrations show one form of the equipment, but obviously the details can be considerably altered. Letters patent have been granted to the writer for the device, and these have been turned over to the Lord Manufacturing Company.

Friction in Trolley Bases

BY "VULCAN"

A.M.I.C.E., A.M.I.E.E., England

To prevent undue wear of overhead line the upward pressure of the trolley wheel against the wire should be as small as possible consistent with the maintenance of sufficient contact to prevent the wheel from jumping the wire and sparking.

This pressure is not uniform on different electric railways, the value depending chiefly on the type of trolley gear used, curve smoothness and general layout of the overhead line, speed of cars and condition of track. In some cases a tension as low as 15 lb. is found sufficient, whereas in others 30 lb. or more is necessary to obtain satisfactory operation. It is, however, a fact that in many instances the tension is far more than is necessary, resulting in excessive wear of trolley wheels and overhead wire.

In the accompanying figure is shown a diagrammatic sketch of a type of trolley base, commonly used in this country, fitted with plain bearings. A few simple calculations will serve to indicate the conditions in this form of base.

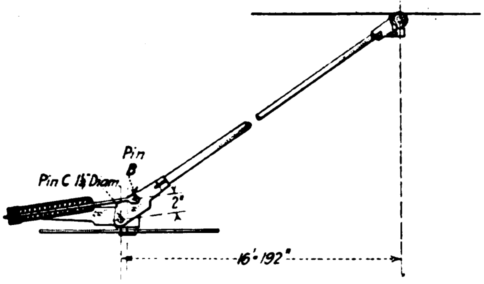
Let the pull of the springs on pin *B* be assumed at 2400 lb. Neglecting friction of bearings this would provide an upward pressure of the trolley wheel of $2400 \times 2 \div 192$, or 25 lb. The pressure on pivot pin *C*, allowing for the weight of the pole, is approximately 2500 lb. Taking the coefficient of friction as 0.25, the force of friction on pin *C* is 2500×0.25, or 625 lb. The moment of friction on pin *C* is 625 × ⅝, or 390 in.-lb. The equivalent force applied at the end of the pole required to overcome pin friction is 390 ÷ 192, or 2.03 lb.

The latter figure takes no account of the friction on the pin *B*, and on the boss faces, etc. Assuming these to be half of the latter, the equivalent force applied at the end of the pole required to overcome the total friction on the trolley base will be, say, 3 lb.

The friction referred to will cause a reduction in the trolley wheel contact pressure from 25 lb. to 22 lb., when the trolley is caused to move upward by a rising trolley wire; and it will likewise cause an increase in the trolley tension to 28 lb. when the trolley is forced in a downward direction by an overhead line which is falling to a lower level.

The figures show that ordinary friction may cause the wheel contact pressure to vary by 28 lb. — 22 lb. = 6 lb., or a 27 per cent variation from the minimum, and these results are borne out by measurements taken in actual practice. With joints in a worn and dry condition, a difference between the minimum and maximum contact pressures have often been found to exceed 10 lb., both measurements being taken with the trolley wheel at standard height.

For purposes of adjustment, the common method of measuring trolley tension by means of a spring balance fixed to a rope is simple and satisfactory if carried out properly, but simple though it may seem the writer's experience is that the great majority of workmen do not realize the effect that joint friction has upon the contact pressure of the trolley wheel.



FRICTION IN TROLLEY BASES—DIAGRAM OF TROLLEY BASE FOR USE IN CALCULATING EFFECT OF FRICTION

The result is that spring-balance readings taken by different men on the same pole are not in agreement. This causes uncertainty which is often responsible for the adoption of a higher contact pressure than is really necessary.

The following system has been adopted by the author with good results. A rope of a length equal to the normal trolley height, and including a spring balance, is hooked at its upper end to the trolley head. The lower end contains a stirrup which is held in contact with the ground by the workman's foot.

In taking trolley tension readings two values are obtained and duly recorded as follows:

With the foot on the ground and in the stirrup, the rope is grasped above the spring balance and pulled downward about 2 ft. It is then gently released so that the spring gradually takes the tension. The spring balance will now show the value of the contact pressure which would obtain on a rising trolley wire. The readings shown are entered up on the record slip under the heading "minimum tension." The foot holding the stirrup is then lifted, say, 2 ft. from the ground so as to allow the trolley to rise a similar distance. The stirrup is pressed gently downward to the ground. The balance will now indicate a tension equivalent to the trolley contact pressure under conditions where the trolley wheel is running on a downwardly sloping overhead wire, and the reading shown is now the "maximum tension" and is entered accordingly. The spring adjustments can then be made properly. The difference between minimum and maximum readings gives an indication of the condition of the lubrication of pins and rubbing faces.

Many of the older trolley-base designs involve an excessive amount of friction to the vertical movements of the pole. In some cases this is due to the fact that the bearings are far larger than is necessary for the work they have to do, and considerable improvement can often be effected in these, by boring out and brass-bushing the holes, and using case-hardened pins of smaller diameter.

With the object of reducing to a minimum the type of friction referred to, certain designs of trolley base, besides following the customary practice of using ball or roller bearings for the center swivel pin, have adopted these also for the vertical motion bearings of the pole. This arrangement undoubtedly meets a long-felt want and constitutes a progressive step of much importance. By reducing friction to a minimum, the design allows a smaller trolley tension to be used than is possible with the older types of trolley base, and is thus advantageous from the points of view of maintenance and operation.

Economy in Buying Good Shovels

BY CHARLES H. CLARK
Engineer Maintenance of Way Cleveland (Ohio) Railway

Very few contractors or corporations are inclined to buy good shovels. As a rule each laboror furnishes his own shovel, and the varieties and sizes furnished would fill tool boxes, without any two being alike.

When a man owns his own shovel you cannot expect him to throw it down and do other work. No. He will take his shovel and hide it under his coat, which may be 500 ft. or 1000 ft. from his work. You cannot blame him, but it costs you a lot of money while he is walking around taking care of his tools. Did you ever see some of the shovels the men bring to work? They may have blades 7 in. long and hold about one-half what a new shovel will carry. Now a man will not work any faster with a short shovel than he would with a new shovel. Therefore he should have a full-sized shovel that will stay full-sized and not wear out. The old-fashioned idea of buying cheap shovels is being gradually replaced by buying good shovels cheap.

In my own experience I have used shovels which have cost about 40 cents each, but have long since found that an alloyed steel shovel which will cost about 90 cents will outwear the former at least four or five to one.

I observed one company that had about 200 men working on a job. Of these 200 men at least half had shovels that were just about half-size and certainly not strong enough even with that half to be able to do anything else than to go into the loosest dirt. It is only human nature that the foreman is in sympathy with the workmen and will let them work when they do not have tools that are at all able to give recompense for the $1.75 per day. This work was costing that company $350 per day. At an expense of $200, had they bought shovels for the men, they could have saved $200 a week in efficiency.

Some superintendents of construction will not allow a man to go to work who has not a good shovel. He is looking at the shovel and not at the man. It is easier for them to furnish the man with a good shovel than it is to furnish the man with a poor shovel. It would seem that the only diploma that a laborer needed was that he have a good-sized shovel.

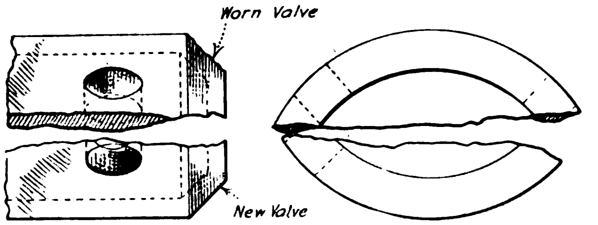
To avoid losing shovels, we have given each shovel a private mark. We drill three holes in the form of a triangle in the blade, about 5 in. on each leg. In this manner we are keeping our shovels. The shovels, of course, are not allowed to be taken from the work, but if they are taken from the work they are easily identified. I have never seen any of these shovels in anybody's hands except those of men working for us.

A good shovel should be made with a very thin blade, very tough and hard, have a good handle and hang so that a man can use it without tiring.

Hints on Compressor Maintenance

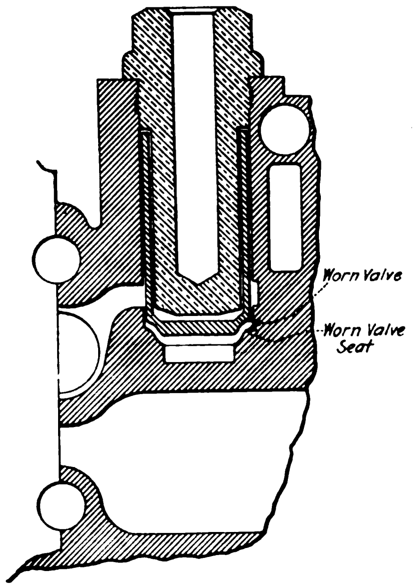
BY R. H. PARSONS
Electrical Foreman

Ten years ago one of the greatest sources of trouble experienced in the operation of electric railways was the air-brake equipment. Some of the early equipments were so dangerous that even after going to the expense of fitting up a large number of cars with air brakes, some companies discarded them and returned to hand brakes. However, as electrical apparatus generally has improved, the air-brake parts have been made better until now, with careful inspection and proper general overhauling, they give practically continuous service.



COMPRESSOR MAINTENANCE—FIG. 1—PARTIAL SIDE AND END VIEWS OF NEW AND WORN VALVES

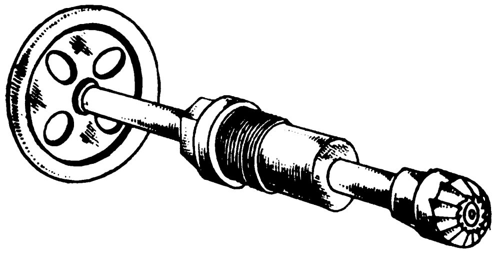
The compressor itself is the largest and most important part of this equipment, and upon it depends the reliability of the service. The choice of the proper period between overhaulings of the compressor depends altogether on circumstances, assuming that proper weekly inspections are made. In some service a compressor will operate three or four years without removal from the car; in others, it must be taken down and overhauled every twelve or eighteen months. When it is overhauled no care should be spared to make it just as good as it was when turned out of the factory. It should be entirely stripped and cleaned, all old oil and dirt should be removed, and the oil grooves and channels should be cleaned.



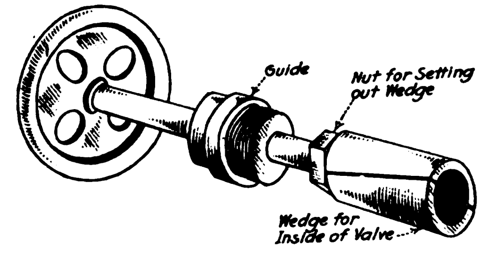
COMPRESSOR MAINTENANCE—FIG. 2 —WORN VALVE AND SEAT IN HEAD

The armatures and fields should be tested and repaired when necessary, as is often the case, for in the best cared-for compressor some oil will be found covering the insulation of the fields, armature, brush-holders and wiring. This oil must be removed and its effects remedied, frequently involving the retaping of the field coils. The commutator must be turned and slotted also, the shaft straightened if bent, and the bearings refitted.

It has been found in a great many cases that baking of compressor armatures has been caused by slightly bent shafts, throwing a heavy load on the windings. This often will be found to be the cause when other causes have been suspected. The reason for the bending of the shafts is that many of the compressor armatures are fitted with shafts which are too small at the pinion fit, and which are thus easily bent. If electric welding is available it is advisable to cut off the pinion end of the armature shaft and weld on a new piece of steel of good quality and of diameter large enough to permit turning the bearing fit to the original size, and the pinion fit enough larger to insure its withstanding the shocks which formerly caused it to bend. Then the pinion should be rebored to fit the rebuilt added shaft. The result will be the elimination of 75 per cent of the bent shafts and baked armatures and fields. If not practicable to weld a new piece on the old shaft, larger shafts should be made and the old ones thrown away.

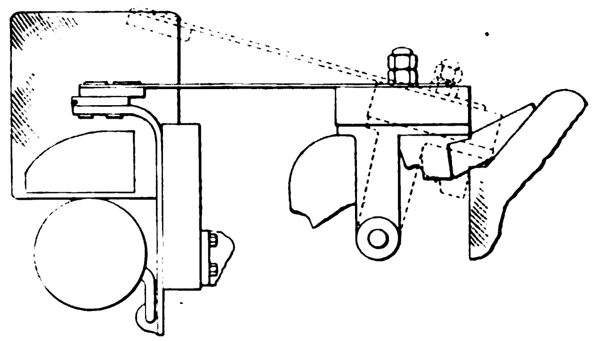


COMPRESSOR MAINTENANCE—FIG. 3—REAMER FOR SURFACING VALVE SEAT



COMPRESSOR MAINTENANCE—FIG. 4—REAMER FOR CYLINDRICAL SURFACE OF VALVE

It is not intended here to give instructions for the reassembling of the compressor, as that is well taken care of by the air-brake companies, but a few points which have been found of value will be noted. First, it is absolutely necessary that the compressor valves go out of the shop tight, and fitted so they will stay tight for a reasonable time. Fig. 1 shows a valve with a correct face and one with a worn face. Fig. 2 shows a worn valve and seat in head.

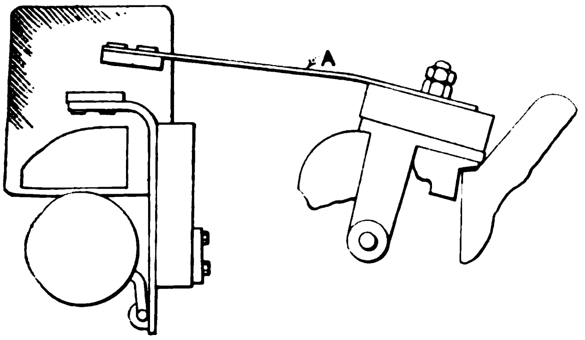


COMPRESSOR MAINTENANCE—FIG. 5—CONTACT DEVICE OF O. B. GOVERNOR

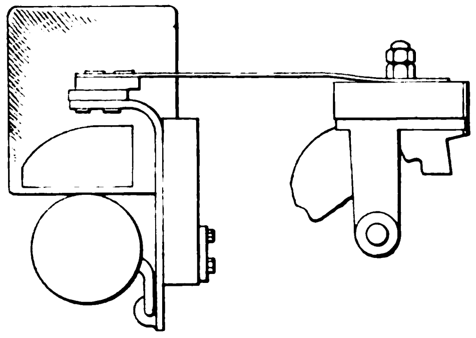
As it would be impracticable to make air-tight joints of these misfits by grinding only, it is found necessary to face the valve seat in the head, and this can be done quickly and properly by the use of the reamer illustrated in Fig. 3.

This was made by attaching a reamer, having the same shape as the original valve seat, to a ½-in. rod. The rod was fitted with a wheel for turning, and it passes through a guide constructed like a valve cap, screwed into the head in place of the valve cap. This keeps the reamer in perfect alignment, and a new seat of correct shape and size is the result.

The valve itself is worn in the same manner, and the irregularities must be filled or cut out in a lathe. If there is metal enough, the old valve can be faced to nearly its original shape, and then ground in. Fig. 4 represents a tool found convenient for grinding in the valves. It is made exactly like that used for the valve seat, except that the lower part is cylindrical outside, the stem inside being tapered. The cylindrical part is placed inside the valve and the nut above is screwed down, causing the lower part to expand and tightening itself inside the valve. This tool is also fitted with a guide for the stem which screws into the head in place of the valve cap. Ground glass and powdered emery mixed in equal proportions will be found excellent for grinding in these valves.



COMPRESSOR MAINTENANCE—FIG. 6—CONTACT ARM BENT TO IMPROVE CONTACT



COMPRESSOR MAINTENANCE—FIG. 7—BENT CONTACT ARM IN CLOSED POSITION

On replacing the head of the compressor it will be found that if the joint, after having been thoroughly cleaned, is shellacked on both sides of the paper gaskets it will be permanently airtight.

A practice which, if carefully followed, will keep compressor armatures on the cars a long time is this: About every three or four months the brush-holder yoke should be removed and cleaned carefully. Then all oil and dust should be wiped from the string band and oil collar with good, clean cheesecloth, after which yoke, brush-holder insulators and string bands should be painted with an oilproof paint, with special emphasis on the word "Oilproof." Oilproof paint costs about $2 per gallon, but as a small amount per armature is needed, it is inexpensive to use.

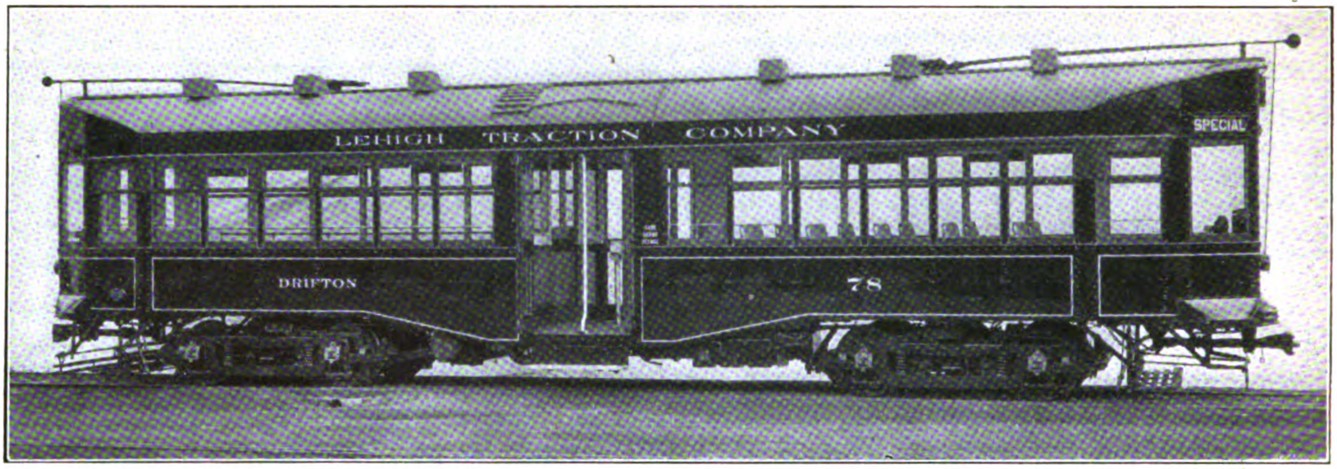
Often very little attention is paid to the air strainer, or the purifier, whichever is used. The purifier is a decided improvement over the old hair strainer, but even this needs attention, a little cleaning out and fresh oil about three times a year being sufficient. If hair strainers are used, they should be opened and the hair removed, picked up and thoroughly blown out at least twice a year.

It will be found advantageous also to use the modern methods of installing and removing pinions, that is to heat them in boiling water, placing them on the shafts while hot, and allowing the shrinkage due to cooling to normal temperature take the place of hammering to make a tight fit. For pinion removal a regular screw puller may be used, and a little heat from a blow torch can be substituted for a very heavy pressure on the end of the shaft and pounding. Heavy pressure of the screw of the puller destroys the armature shaft center, and a very little pounding will spring the shaft. It is most satisfactory practice to keep a set of bearings with each spare armature, and when the shaft becomes worn or bent and must be turned, the bearings can be babbitted and bored to fit. No trouble will be experienced with properly fitted babbitted bearings.

A simple "stunt" which will help to keep the Allis-Chalmers O. B. governor in service is given below. Much trouble has been experienced in the operation of this governor on account of its not keeping its setting, and burning out its contacts. Fig. 5 shows the carrier arm and contact shoe as originally furnished. The arm is straight, and when contact is made it comes up with a slap. At about the end of its travel, when about to cut out, the mechanism which operates the arm begins to move, getting ready for its quick break, but while doing so it raises the arm a little, releasing the spring tension, raising the contact, and causing a small arc. This gradually eats away the surfaces of the contacts until good connection is impossible. Fig. 6 shows the improvement mentioned, namely, the bending of the carrier arm at *A*, while Fig. 7 shows the contact made with bent arm. This arm gives better service than the straight one because, when making contact, the arm contact hits the stationary contact before the mechanism comes to the end of its travel, and on account of its bend makes a wiping contact. When all the way in, the arm makes a good, heavy contact. When cutting out, as the toggle begins to move with a tendency to open the contacts, the carrier arm slides back but holds its contact until the governor cuts out with a snap, the blow-out taking care of the arc in spite of the lessened distance between the contacts.

Simplified Adding Machine

A simplified adding machine has recently been placed upon the market by the Mechanical Accountant Company, Providence, R. I. It has been brought out because heretofore all non-listing machines have been designed to perform multiplication, division, square root and, in fact, any arithmetical problem, but more than half of these machines are used merely for addition. With the double-touch method of operation, many keys on the larger machines have been not only useless, but an actual incumbrance. By this double-touch method operators depress the "three" key twice to add six or the "three" and "four" to add seven, thereby increasing the speed and accuracy. Up to the present time the machine has been built in one size only with a capacity of $9,999.99, but larger sizes will soon be manufactured.



SIDE VIEW OF HAZLETON CAR

Cars of High Seating Capacity for Hazleton

The Lehigh Traction Company, Hazleton, Pa., has recently had built by The J. G. Brill Company ten all-steel center-entrance prepayment city cars of modern design, shown in the accompanying illustrations, which provide unusual facilities for a remarkably large seating capacity.

The general dimensions of the cars are as follows:

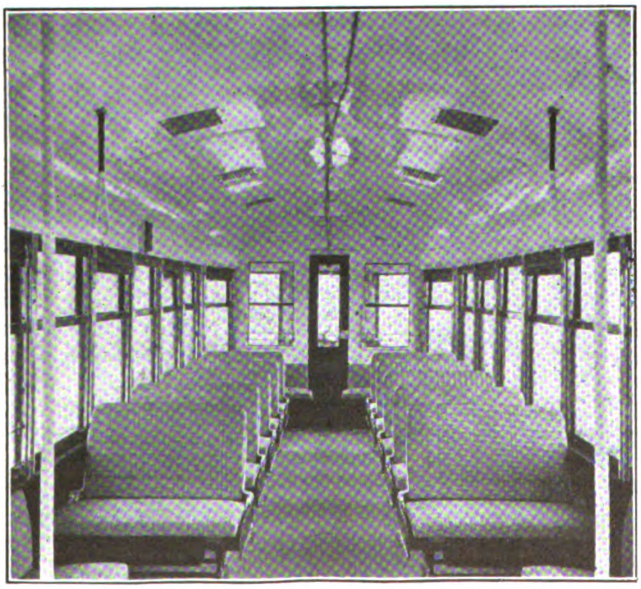
Length over anti-climbers	48 ft. 8 in.
Length over vestibule	47 ft. 2 in.
Bolster centers, length	26 ft. 6 in.
Wheelbase	6 ft.
Width over sills	9 ft.
Height, rail to sill at bolsters	2 ft. 10⅛ in.
Height, sill to trolley base	8 ft. 10 in.
Wheels	30 in. dia.

The center-entrance well is equipped with outward folding doors and Stanwood grilled-metal safety-tread folding steps mechanically operated by a lever on a post in the center of the well. The door entrance is 43 in. wide. The height from the ground to the step is 14 in., from step to floor of well 13 in., and from well floor to the interior car floor 10 in.

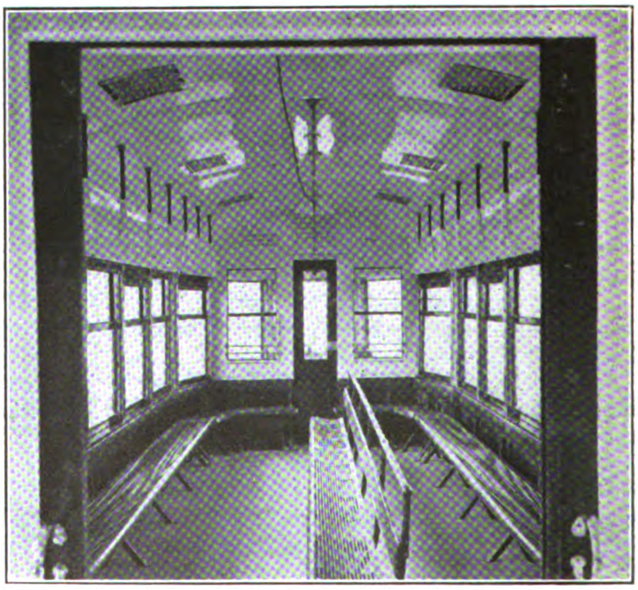
The chief feature of the car is the varied arrangement and high capacity of the seating plan. The two passages on each side of the center-entrance well are not arranged similarly. The main passage is separated from the wall merely by a riser and a small seat partition with white enameled stanchion at each side. At this end five Brill Winner cane cross-seats are located on each side with two longitudinal seats at the center entrance end and two seats situated adjacent to the steel bulkheads separating the motorman's compartments, which are V-shaped to conform to the tapering of the car width at this point. The smoking compartment, however, is separated from the center entrance well by a steel bulkhead with a sliding door opening, 3 ft. 4 in. wide. This section is equipped with longitudinal mahogany slat seats instead of cross-seats, together with the unusual addition of a long longitudinal seat, facing one side only, situated in the center of the compartment. This extra bench brings the seating capacity of this section up to forty persons, which, added to that of the main section, makes a total seating capacity of seventy. This compartment is well supplied with straps equipped with Rico sanitary covers and hung from a casting on the ceiling. The motorman's access to his compartment is provided at the end of each passenger compartment by means of an 18-in. swinging door.

The interior flooring of the car is composed of cork covered with linoleum. The interior steel and Agasote material is finished in white enamel. The curtains, equipped with fixtures of the Curtain Supply Company, are of double-faced Pantasote material. The cars are heated by Peter Smith electric heaters. The Consolidated push-button system is used. Ventilation is obtained through the Agasote arched roof by means of six Railway Utility ventilators on each side of the roof.

The car bodies are mounted on Brill 27-M. C. B. 2X



MAIN COMPARTMENT OF HAZLETON CAR



SMOKING COMPARTMENT OF HAZLETON CAR

trucks, equipped with four GE-247-D motors operated by Type MK control. The trucks have Stucki side bearings. Brake equipment includes General Electric straight air brakes and Lord staffless hand brakes.

Other specialties include Tomlinson couplers, General Electric headlights, H. B. lifeguards, Earle trolley catchers, U. S. No. 13 trolley base, Hunter destination signs and Electric Service Supplies Company's pneumatic gongs.

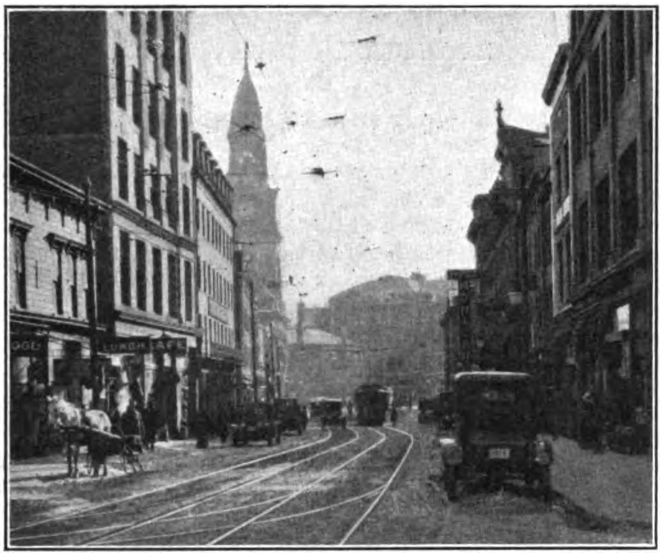
Electrically-Driven Tower Wagons on the Bay State Street Railway

Two storage-battery emergency wagons for line work are being operated by the Bay State Street Railway, Boston, Mass. They are assigned to the Wakefield and the Quincy line foremen's divisions. In all, there are seventeen foremen's divisions in the system, but all except the two mentioned have horse-drawn tower wagons.

A Lansdowne tower truck was put in service by the Bay State Company about two years ago. This serves the Wakefield division, with 79.1 miles of trolley wire. In September, 1914, the second electric battery vehicle, a 2-ton General Motors Truck Company chassis with a Trenton hand-elevated two-stage steel tower, was put in service on the Quincy division, in which there are 80 miles of wire. This vehicle has been in continuous operation, with scarcely more than a day per month out of service. Its mileage capacity fully meets the requirements, and the operating costs are economical.

The batteries of the vehicle, consisting of sixty Edison A-8 cells, are charged from the exciter busbars, at the Quincy power station of the company. If occasion arises, a boosting charge can be given at any time, while the men are engaged in line repairs, by making an electrical connection by means of a trolley hook and grounding to the rail, the 550-volt railway power being stepped down to 110 volts through grids located directly beneath the battery box. The current is controlled by circuit breakers.

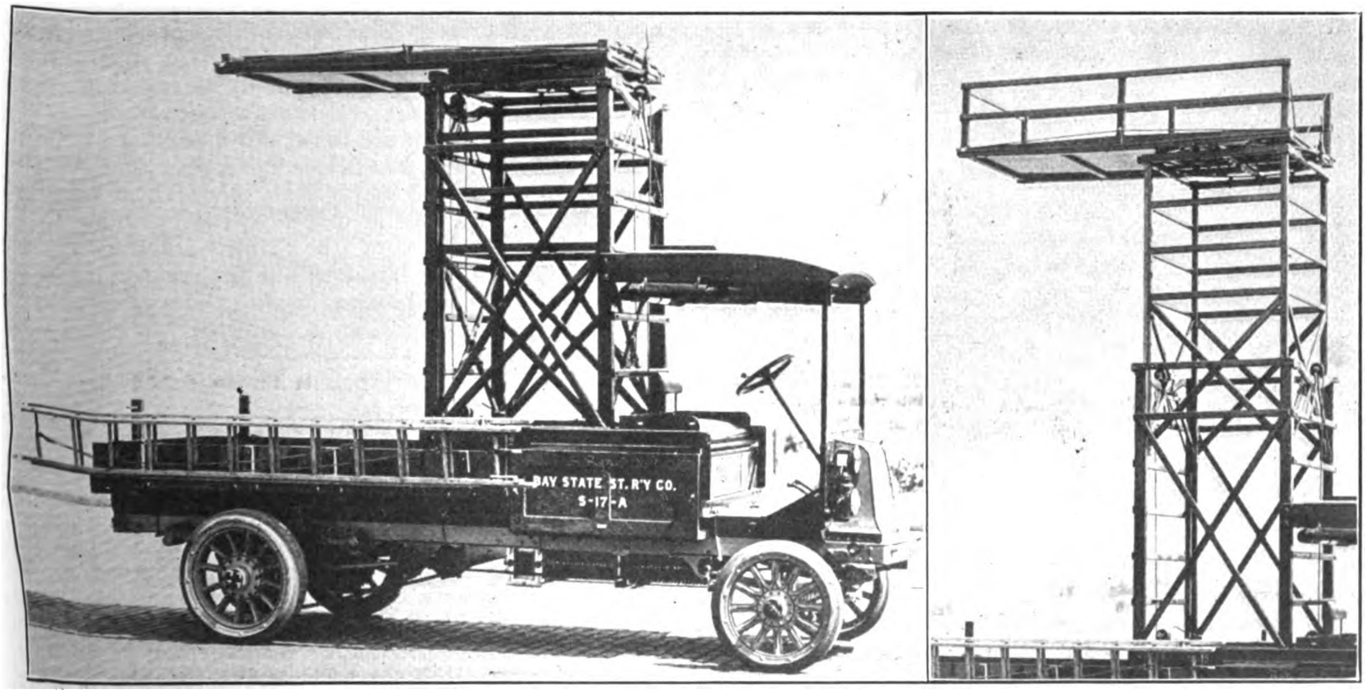
Data on mileage, kilowatt consumption and operating costs of a vehicle of the electric battery type used in emergency work, were published in the Electric Railway Journal of May 23, 1914.



FERRO-TITANIUM RAILS AT FALL RIVER, MASS.

Titanium-Treated Mayari Rails

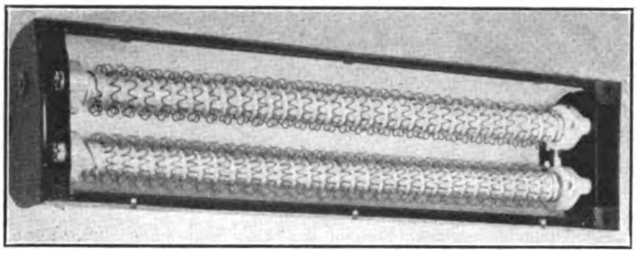
The Bay State Street Railway, of Boston, Mass., has recently purchased 300 tons of 9-in. girder rail, Pennsylvania Steel Company sec. 401, and 50 tons 9-in. guard rail, Pennsylvania Steel Company sec. 291, both treated with 0.1 titanium added in the form of ferro-carbon-titanium, and, in the main, compositions specified by the American Electric Railway Engineering Association. Slight changes were allowed in the carbon content, however, due to the use of Mayari steel, the required percentage range of carbon being from 0.65 to 0.80 instead of from 0.70 to 0.85, as in the A.E.R.E.A. "Grade B" specification. This rail costs about $2 per ton more than untreated carbon rail. The drop test is about the same as in testing carbon rail, untreated, a 2000-lb. tup falling 12 ft. on a rail suspended 3 ft. between supports being used. The rails arrived late in October and hence cannot be extensively used in heavy work this season, but installations are being made in Fall River and Methuen, Mass.



ELECTRIC TOWER WAGON WITH PLATFORM LOWERED, AND TOWER WITH PLATFORM RAISED

Most Recent Heater Installation on New York Subway Cars

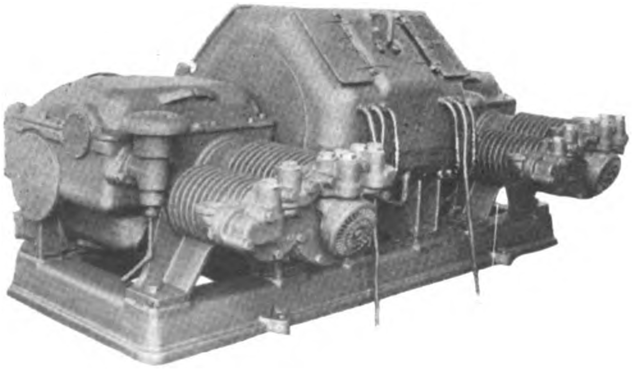
The Interborough Rapid Transit Company has recently placed an order with the Consolidated Car-Heating Company for electric heaters for 311 cars of the new type. This heater is illustrated herewith. Attention is directed to the glazed porcelain support of the ventilated type, which is designed to furnish ventilation without weakening the porcelain, either mechanically or in its insulating properties. It also ventilates the coil uniformly. The coil is supported on two ridges for its entire length and does not rest down in the groove in the porcelain as in heaters of the older types. There are also no holes to collect dirt and moisture and eventually short-circuit the coils. The highly-glazed fine-quality porcelain permits of the heater to stay clean longer than does unglazed porcelain. The double-back construction, a feature of Consolidated heaters, is well shown at the top in the illustration, as is also the junction space at the ends of the heater. The end cap is of metal to prevent warping and is lined with fiber to prevent grounds and short-circuits. The heater is extremely light, the metal parts being made entirely of pressed steel. The coils are of Consolidated "Nokoro" wire, which is a non-corrosive alloy of uniform resistance. The heater is a logical development of the old Consolidated features, which have so successfully stood the test of traction operation for many years.



RECENT CAR HEATER FOR INTERBOROUGH RAPID TRANSIT COMPANY

High-Voltage Air Compressor

For the locomotives of the Chicago, Milwaukee & St. Paul Railway's electric zone, a novel design of two-stage air compressor has been developed. This machine, which was built by the General Electric Company, has a piston displacement of 150 cu. ft. of free air per minute against a working pressure of 135 lb. per square inch, and in complete form it consists of three units—two compressors and a 3000-volt d.c. motor, all assembled on a common base. Each compressor unit is complete in itself, consisting of one low-pressure and one high-pressure cylinder properly balanced, and the two compressor units are geared so that their maximum points of load are 90 deg. apart, thus producing a well-distributed load on the motor. This has two sets of armature windings on one core, and there is a 1500-volt commutator at each end, one set of windings being connected to each commutator. The motor is of the series self-ventilated type, with commutating poles, and each set of windings is insulated so that it has an ample margin for successful operation at voltages considerably above normal. This is the largest electrically-driven air compressor yet built for railway service, but it was designed with a special view to incorporating the advantages that have been developed in the smaller sizes of air compressors. Approximately ninety of the machines are now under construction.



HIGH-VOLTAGE DUPLEX COMPOUND AIR COMPRESSOR

Proposed Extension of Riksgräusen Railway

According to a recent issue of *Engineering*, the Board of the Swedish State Railways has just forwarded a communication to the Government in which the electrification of the remaining portion of the Lapland iron ore railway, the Kiruna-Svartön (Lulea) section is strongly recommended. It is stated that the electrification of the section between Kiruna and Riksgräusen, which was described in an illustrated article in the ELECTRIC RAILWAY JOURNAL of Sept. 5, 1914, has fully met, and in some respects exceeded, expectations as to operation. The various difficulties which have arisen have been overcome with one exception, i.e., the disturbances in the telephone and telegraph lines constructed along the railway. This difficulty, which was very serious at first, has been reduced through suitable arrangements, but not yet entirely removed. Investigation as to the most effective manner of overcoming the trouble is still being carried on. Now that sufficient experience is available as to electric iron ore traffic, the State Railway Board considers it particularly desirable that the electrification should be extended so as to include the Kiruna-Svartön section. Such extension would provide uniform operation over the whole of the railway line where iron ore traffic is conducted, thus making possible a more economical use of material and personnel, deriving greater profits on operation, and the advantage of not having to buy foreign coal during these times of high prices. The desirability of uniform traffic arrangement has been further emphasized on account of the conditions at present prevailing as regards the ore traffic between Kiruna and Riksgräusen, this having been materially reduced, while the traffic southward to Svartön, on the contrary, has decidedly increased. The revenue from the Porjus power station would, in addition, be increased by a greater output of energy. Should the Government approve of the State Railway Board's recommendation, the latter will be prepared promptly to forward a report and estimate of the cost of electrification of the Kiruna-Svartön section.

The Portuguese Government has approved the electrification of the railroad between Lisbon and Cascaes, belonging to the Royal Portuguese Railway Company. The company at first proposed to carry out the electrification on its own account, but after examination it was decided to throw open to competition the construction of the section and its electrification on lease. As rental, the sum of $81,816 is to be paid for the first year of operation, which represents the maximum net receipts hitherto obtained on this line in any year, and the rental will increase to $87,270 in the succeeding four years, while the Portuguese Railway will also participate in 10 per cent of the gross receipts in future years.

NEWS OF ELECTRIC RAILWAYS

NEW YORK INVESTIGATION TURNS TO COMPANIES

Officers of Railway Companies Are Now Being Questioned—Inquiry to Close Feb. 1

As previously stated in the ELECTRIC RAILWAY JOURNAL there remain no more of the old members of the first district commission to investigate, the sole survivor of the old regime, J. Sergeant Cram, going out of office automatically on Feb. 1. Bent on inquiry, however, the investigators have turned to the regulated companies and have sent letters to the utilities asking for certain information about the personnel of officials, attorneys and others holding positions of trust with the transit corporations. Up to Jan. 17 all the corporations except the Brooklyn Rapid Transit Company had replied to the questions propounded by the inquisitors. President Whitridge of the Third Avenue Railway came forward with a reply that provoked Chairman Thompson of the committee to announce that he would subpoena Mr. Whitridge to appear before the committee on Jan. 20. The old order in politics may have changed, but Mr. Whitridge does not seem so sure about it. He said:

"A refusal to answer your inquiries merely because they relate to matters which are none of your business would probably be misconstrued and might subject us to further attacks of the same kind which some public authorities and a portion of the press feel at liberty to launch at street railways.

"In consequence of the misconduct or stupidity of various official bodies special counsel is occasionally necessary. During the last twelve months the Board of Estimate in this town proposed to grant franchises for the operation of omnibuses which, had they been passed, would have constituted, in one street, at least, a most unwarranted and serious competition with the Third Avenue Railway, and in other places were obviously a nuisance to the public. John M. Bowers was employed to appear and oppose the grant of such franchises.

"You may possibly not be aware of it, but there formerly existed in this commonwealth what is generally known as a system of strike legislation, which was a proposal by one person or another to procure legislation inimical to corporations in the hope of terrorizing them into making payments to those interested. I remember upon one occasion urging a Senator to vote against a certain proposition to amend a code of civil procedure, and he replied, 'Oh, you lawyers merely talk; what I am asking is, is there anything in this for Mrs. C. and the six little C.'s,' and later I heard of a member of the Legislature who, commenting upon some reform movement, remarked, 'If I cannot use my opportunities in Albany, I might as well stay at home and attend to my grocery business.' We have some reason to fear a recrudescence of this state of affairs and consider that it is prudent to spend the sum of $250 a year in order that we may know what is being proposed."

On the same day that Mr. Thompson announced his intention of requiring Mr. Whitridge to appear before the committee he explained in a general way the features of the new bill for the reorganization of the Public Service Commission.

Speaker Thaddeus C. Sweet of the Assembly said on Jan. 20 that the Assembly would not vote the Thompson committee any more money for expenses, giving the committee only that part of the $30,000 asked by Senator Thompson that is to pay debts already contracted, and would under no circumstances agree to the resolution passed by the Senate extending the life of the committee for another month from Feb. 1. The speaker was quoted as follows:

"Senator Thompson has done all the investigating necessary. Further than that, he has exceeded his authority in spending the State's money, and the Assembly wants to know just what the $30,000 more asked for is to pay. If it is owed for debts regularly contracted, it will be paid. But there will be no more money appropriated, if I can help it, for further investigation by this committee. I have no purpose in this stand except the good of the State. I am not trying to block any inquiry that should be made, as I see it. If there is any phase of the situation that has not been looked into, that is the fault of the committee. It has had plenty of time and plenty of money."

Governor Whitman has referred the Thompson committee's charges against Public Service Commissioner Robert C. Wood, now resigned, to District Attorney Swann of New York County.

NEW YORK CENTRAL IMPROVEMENT IN NEW YORK

Company to Expend $50,000,000 in Reconstructing and Electrifying Its West Side Line

A new agreement has been reached between the city of New York and the New York Central Railroad concerning reconstruction of the Central's right-of-way along the west side of the city and the elimination of tracks at grade along Eleventh Avenue. The agreement provides for covering the tracks under Riverside Park, under Riverside Drive, north of Manhattan Street, and through Fort Washington Park, and provides for a viaduct to give communication with the docks at Dyckman Street. With the carrying out of the improvements the line will be electrified.

These improvements will cost $50,000,000 and will take six years to complete. The entire cost will be borne by the railroad, except that the city will contribute certain real estate.

Negotiations leading up to this agreement have been carried on by the port and terminal facilities committee of the Board of Estimate, of which Comptroller Prendergast is chairman, and Ira A. Place, vice-president of the New York Central Railroad. Mayor Mitchel and President McAneny of the Board of Aldermen, though not members of the committee, have taken a lively interest in the discussion.

From Spuyten Duyvil to St. John's Park the tracks of the New York Central Railroad at present run at grade, sometimes skirting the river bank, as is the case along Riverside Park; sometimes enlarging into yards, as at Seventy-second and Thirty-eighth Streets, and sometimes occupying city streets, as in Eleventh Avenue. The proposed reconstruction work will get them entirely out of the way—in some places by covering them, and in other places by elevating them on ramps, viaducts or elevated structures.

The work will begin at the city line, where the New York Central Railroad now has small yards. The lines are to be rearranged and a four-track swing bridge is to be thrown across the Harlem, to which tracks approaching from the North and East will have access by means of ramps.

Before entering into the legal agreement between the railroad and the city the Board of Estimate & Apportionment will have made available for a period of thirty days a complete report accompanied by plans, so that the public may have a full opportunity to present their views.

Ernest P. Goodrich, consulting engineer to the Borough President of Manhattan; Charles W. Staniford, chief engineer of the department of docks and ferries, and John F. Sullivan, engineer of the bureau of contract supervision of the Board of Estimate & Apportionment, are serving as consulting engineers to the committee on port and terminals of the Board of Estimate & Apportionment. These engineers, in conjunction with the New York Central Railroad. represented by its engineers, George A. Harwood, chief engineer of electric zone improvements, and H. D. Jewett, designing engineer west side improvements, prepared the plans which have met with the approval of both the city and railroad authorities for the proposed improvement and the extension of facilities of the New York Central lines within New York City, from the city line north of Spuyten Duyvil Creek to a southerly terminal in the vicinity of Canal and West Streets.

CONSTRUCTION IN MARCH ON BUFFALO-NIAGARA FALLS HIGH-SPEED LINE

The International Railway, Buffalo, N. Y., has become the legal owner of the right-of-way of the Frontier Electric Railway between the Buffalo city line and Niagara Falls, valued at approximately $1,200,000. The deeds transferring the property from Marshall J. Dodge, New York, to the company have been signed and everything is now in readiness for the construction of the International Railway's double-track high-speed service between Buffalo and Niagara Falls through Tonawanda and North Tonawanda. There were many changes of titles from the time the Buffalo, Thousand Islands & Portland Railroad Company acquired a route for a proposed electric freight service between Buffalo and Niagara Falls. When the freight line was abandoned years ago a holding company, known as the Fairland Realty Company, was incorporated and the property turned over to it. The deed calls for a strip 66 ft. wide from Buffalo to Niagara Falls through Erie and Niagara Counties. It is reported construction work will be started in March.

The Public Service Commission of the Second District has made an order setting out the manner in which the new high-speed line of the International Railway between Buffalo and Niagara Falls shall cross the various streets, highways and other tracks and approving the franchises which have been granted by the cities and towns through which the line will pass. As previously stated, most of the operation will be on private right-of-way. Important roads will be crossed on viaducts, as will all main lines of steam roads. The franchises approved include those from the city of Buffalo and town of Tonawanda for crossing Kenmore Avenue. A condition of the order which the company will have to accept is that if at any time in the future the crossings not provided at grade should be sought to be eliminated, the company will hold itself a party to such proceedings as if it were a steam railroad, and will pay a steam railroad's share of the cost of such a separation of grades, and not plead exemption as a street surface railway under the law. In addition the commission requires the railway to go to the Supreme Court for an order approving these crossings in the village of La Salle and the towns of Tonawanda and Wheatfield, and to accept and file with the commission the agreement with the city of Buffalo whereby the company is bound to pay its share of any future elimination of the crossing of Kenmore Avenue.

OPERATING AND CONSTRUCTION PROBLEMS BEFORE CLEVELAND COUNCIL

By a vote of seventeen to nine the City Council at Cleveland, Ohio, enacted legislation on the evening of Jan. 17, giving the Cuyahoga County Commissioners the right to build subway approaches to the new Superior-Detroit bridge across the Cuyahoga River. Mayor Harry L. Davis announced that he would give the ordinance close study.

Councilman Schwartz introduced an ordinance requiring all cars to stop on signal at night, regardless of the alternate stop practice. At the same time two resolutions requiring that the Cleveland Railway furnish chairs for conductors were adopted.

An ordinance was introduced by Councilman Sledz providing for the extension of the East Seventy-ninth Street line to Broadway and along East Seventy-first Street to Lansing Road.

Fielder Sanders, street railway commissioner, was instructed to report on the feasibility of issuing free transfers to children on their way to and from school. Commissioner Sanders was asked also to take up the question of having cars stop on the near side of streets, and Councilman Myers fathered an ordinance requiring that all cars going toward the Public Square be operated as pay-as-you-enter cars and all going in the opposite direction be operated as pay-as-you-leave cars. While this custom is observed on some of the lines, it is not universal, because of the difficulty encountered in the use of several different styles of cars.

Common Pleas Judge P. L. A. Lieghley has refused to issue an order enjoining the city of Lakewood from putting into operation the new franchise granted the Cleveland Railway by referendum vote last November, as asked by City Solicitor R. J. Curren on the request of a taxpayer. The petition urged that the franchise does not comply with the requirements of the new city charter.

The Cleveland, Akron & Canton Terminal Railway is preparing to ask for a number of amendments to its franchise within a few weeks. They deal with the engineering problems met with in the construction of a freight subway under East Fifty-fifth Street.

REPORT ON PITTSBURGH ORDINANCES

A more adequate system of transfers, the through routeing of cars and the ultimate construction of a downtown subway loop were offered as a solution of the transportation problem of Pittsburgh, Pa., by two committees of the Pittsburgh Chamber of Commerce in a joint report read on Jan. 18 at a luncheon in the Fort Pitt Hotel. The report analyzes the twenty-two traction ordinances in the interest of the Pittsburgh Railways introduced for the second time in the City Council on Jan. 17. The report states that, even if amended to conform with the suggestions made in the report, the ordinances would not deal adequately with the transportation problem. One reason given for opposing the ordinances is that they are not specific enough as to what use the company will make of the grants. The report suggests that the matter of service and transfers should be made subjects of separate ordinances embodying an agreement between the city and the various companies.

The ordinances for the traction franchises, which as previously noted were introduced in Council a second time on Jan. 17, came up for consideration in committee on Jan. 18. The Councilmen decided to begin consideration of the grants on Jan. 21. It is expected at that meeting to decide upon hours and days on which the various organizations interested in the ordinances may be heard.

The situation in Pittsburgh with respect to the franchises was reviewed in the ELECTRIC RAILWAY JOURNAL of Jan. 8, page 96.

HAPHAZARD SERVICE IN MEXICO CITY

The Mexico Tramways ever since their seizure about a year ago by the Mexican leaders in power, have been suffering badly from slip-shod operation, according to information received at the New York office of the Pearson Engineering Corporation, Ltd., which is purchasing agent for the property. The lack of technical experience of the present street railway officials who were substituted for the former operators, and their inability to require of their motormen employees a skillful and economical operation of the reduced number of cars now in service, are attested by the orders which have been received from time to time by the New York company for new electrical repair equipment, especially motor parts, such as armatures, field coils, commutators to replace those which have been burnt out and injured through carelessness and ignorance in using excessive current. In view of the high maintenance costs, arising from unscientific management, it is not believed that the Mexican officials have any intention of buying any new rolling stock or other equipment, except that required for such repairs as those above mentioned which are necessary to continue the present reduced service.

TURBINES RATED AT 60,000 KW. BEING CONSIDERED FOR NEW YORK SUBWAYS

Both the General Electric Company and the Westinghouse Electric & Manufacturing Company handed in bids and specifications on Jan. 19 to Henry G. Stott of the Interborough Rapid Transit Company of New York City for two 60,000-kw. steam-turbine units. Each unit will be made up of three separate electric generators driven by one high-pressure and two low-pressure turbines, the latter being connected in multiple. These will be the largest steam turbines in the world, the next largest having been ordered from the General Electric Company recently by the Detroit Edison Company and rated at 50,000 kva. No decision has been reached as yet on the choice of turbines, the Interborough Rapid Transit Company being undecided on single 60,000-kw. units or the equivalent in 30,000-kw. turbines.

MISSOURI ROAD PLANNING TO BUILD

The Kansas City & Tiffany Springs Railway has received franchises from Clay and Platte Counties, Mo., for building and operating the electric interurban across the county highways. It will soon go before the utilities commission with a request for permission to issue bonds, probably asking for $35,000 a mile, and for issuance of stock. The company is planning now to build only in Clay and Platte Counties, the main line northward from Kansas City detouring to reach Parkville on the route to Tiffany Springs, a spur extending to Campbellton. The purposes of the spur are to touch the main line of the Quincy, Omaha & Kansas City Railroad at Campbellton, and to open a tract of land between the main line and the town. The granting of the Clay County franchise resulted in the circulation of rumors that the company would build to Liberty, now served by the Kansas City, Clay County & St. Joseph Railway. The Tiffany Springs company, however, does not intend to build to Liberty or St. Joseph, or to parallel any part of the St. Joseph company's line. The Tiffany Springs company had once entertained a tentative proposal to buy the 10 miles of Quincy, Omaha & Kansas City track, not now used, between Gower and Trimble, the latter being about 25 miles north of Kansas City. The railroad company had sought permission from the utilities commission to sell this 10 miles, and it is a possibility that the deal may yet be consummated at a price said to be less than $5,000 a mile. The Tiffany Springs company is using an old graded right-of-way near Parkville of a road begun forty years ago, the graded portion of the projected steam road extending northeastward from Parkville to Smithville, and thence toward the Iowa line, northward and eastward, touching country not now served electrically and not well served by steam road, as to passenger traffic.

NEW TRANSIT PROPOSITION IN CINCINNATI

City Engineer Frank Krug has suggested that a tunnel be built under Price Hill in which cars may be operated in connection with the rapid transit loop. The Rapid Transit Commission, through President E. W. Edwards, has been in consultation with a number of steam railroads entering the city and finds that they are ready to proceed with the construction of a new union depot. This information was necessary in order to know just how the loop tracks should be built.

Mr. Edwards intimated at a recent meeting that Eastern interests have begun negotiations for the lease of the loop. Letters favorable to making connection with the loop have been received from all interurban railways except the Cincinnati, Milford & Loveland and the Cincinnati & Columbus, both of which state that financial conditions will prevent them from building their own connections. The commission, however, expressed the belief that the city should not build the connections and that the companies would find a way to do this on account of the advantages it will offer.

A letter was received from Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, in which he says that all preparations have been made to extend the Rushville line by way of Brookville and Harrison to Cincinnati, if arrangements can be made to have the cars reach the business section of the city. The line would enter the city over the Cincinnati & Westwood road at Queen City Avenue. Mr. Henry wants the city to build a viaduct at that point over the steam railroad tracks to carry both the railway tracks and general traffic.

REPORT ON AMENDED BUS PETITION IN NEW YORK

The bureau of franchises has presented to the Board of Estimate of New York City its preliminary report upon the amended application of the Fifth Avenue Coach Company for the right to operate motor buses in the Borough of Manhattan. In its summary of conclusions the bureau says:

"1. That any franchise providing for compensation to the city, based on net profits, should also provide for city supervision of all operations in and about such enterprise.

"2. Such provisions would require a technical staff to protect the city's interest, which would probably incur more expense than would be warranted by the return to the city.

"3. A franchise providing for compensation to the city on the basis of gross receipts is generally more advantageous to the city than one based on net receipts.

"4. The contract submitted by the Fifth Avenue Coach Company does not give the city sufficient supervision to insure the collection of any sum in excess of $75,000 yearly.

"If the board does not deem it advisable to depart from its heretofore fixed policy in this respect, then there is to be determined what action should be taken upon the proposal of the New York Motor Bus Company, Inc. If, however, the board feels that it should consider a franchise providing for compensation to the city on the basis of net receipts, then it would seem that the board should draft a contract which will, in so far as possible, protect the interests of the city, and then request proposals based on that form of contract."

CHICAGO ENGINEERING BOARD APPROVED BY TRANSPORTATION COMMITTEE

The local transportation committee of the City Council of Chicago has approved the recommendations of the subcommittee in regard to the appointment of Messrs. Arnold, Ridgway and Parsons as a board of engineers to inquire into and report on transit conditions in Chicago. The ordinance covering the appointments has been sent to the Council. Final action upon the measure is expected to be taken during the week ended Jan. 29.

It is estimated that the cost of doing the work intrusted to the engineers will be approximately $220,000, with $30,000 for each of the three engineers and $130,000 for the engineering staff. Although the date for the completion of the report is set for March 1, the ordinance is so worded that the time may be extended. As a matter of fact it is not expected that the report will be ready to submit until perhaps along in the summer or the fall of this year.

EXPERTS IN NEW DEFENSE PLAN

Details of the plan devised by a committee of the Naval Consulting Board for rendering available in time of war the industrial resources of the United States were announced on Jan. 15 by the Secretary of the Navy.

The scheme of organization, to which public attention was drawn for the first time on Jan. 14 in a letter from President Wilson read at the National Democratic Club, is to be carried out through the American Institute of Mining Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, the Institute of Electrical Engineers and the American Chemical Society.

These societies will be called upon to appoint a board of five members for every State in the Union, which will undertake the task of getting information regarding manufacturing facilities, resources and capacity for the production of military supplies. With the manufacturing plants so enrolled, it is proposed to place small orders which will keep them in touch and trained for use in emergencies.

The purpose as announced by President Wilson is "to assist the Naval Consulting Board in the work of collecting data for use in organizing the manufacturing resources of the country for the public service in case of emergency."

New Bedford Employees Ask for Increase.—Representatives of the 500 employees of the Union Street Railway Company, New Bedford, Mass., have asked for a wage increase to a maximum of 35 cents an hour, with changes in working conditions.

New Working Agreement in Augusta.—The Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., has signed a three-year contract with its men. The men are to be paid by the hour and there is to be a sliding scale based on the length of service with maximum pay to five-year men.

Toledo Asks Commission to Rescind Appraisal Action.—City Solicitor Harry S. Commager of Toledo, Ohio, appeared before the Ohio Public Utilities Commission on Jan. 17 and presented arguments against the postponement of the date on which the Toledo Railways & Light Company is to file its inventory and appraisal. He stated that the city desires action at once. The commission had already postponed the date to July 1.

Brooklyn Company Objects to Cleaning Paths Between Elevated Tracks.—A writ of certiorari has been issued by Justice Whitaker of the Supreme Court to the Brooklyn Rapid Transit Company directing the Public Service Commission to produce in court all of the records relating to an order issued by it in reference to the cleaning of the paths between the tracks of the elevated railroad structures. The petitioner said that the order of the commission was unjust, illegal and unnecessary.

Increase in Wages in Dallas.—The Dallas Consolidated Electric Street Railway, the Rapid Transit Railway, the Metropolitan Electric Street Railway and the Northern Texas Traction Company have increased the wages of all trainmen approximately 5 per cent. The increase is 1 cent an hour for both motormen and conductors. The old scale of wages ranged from 20 cents to 25 cents an hour; the new scale will range from 21 cents to 26 cents.

Workmen's Compensation Measure in Kentucky.—The proposed workmen's compensation measure has been introduced into the Kentucky Legislature, now in session. The measure was drafted during the summer by a volunteer commission on which manufacturers, shippers and labor were represented. No State fund is provided for and employers may, according to the draft as it exists at this time, insure with a commercial company, with a mutual concern, or carry their own insurance if they can show that they are able to do so.

Railroad Securities Bill Introduced.—Mr. Miller of Minnesota has introduced into the House of Representatives a bill to regulate the issue of securities by transportation, telegraph and telephone companies engaged in interstate commerce. The Interstate Commerce Commission would receive general supervision over the issue of securities by corporations subject to the terms of the bill, and in every instance the corporation would be required to inform the commission fully as to details of any such proposed issue, the disposition of the proceeds and such other information as the commission might require. Penalties of fine and imprisonment are provided in cases of violations.

Full Proceedings of Valuation Conference Now Published.—The Utilities Bureau, 1009 Finance Building, Philadelphia, has just published the January issue of *The Utilities Magazine* containing the complete proceedings of the Conference on Valuation held in Philadelphia on Nov. 10 and 11, 1915. Abstracts of the papers and discussions at this conference were published in the ELECTRIC RAILWAY JOURNAL of Nov. 13 and 20. The full report now issued, with the revised discussions, is divided into thirteen parts covering the following topics: Reproduction theory, original cost, franchise values, land values, depreciation, going value, unit prices, financial aspects of valuation and regulation, making and maintenance of priced inventories, valuation by approximation, opinion testimony, constitutional protection in valuation, and valuation and the future of public utilities. The price of this special issue is $2.

New York Commission Reports to Legislature.—The annual report of the Public Service Commission for the First District of New York was submitted to the Legislature during the week ended Jan. 15. It shows the heaviest year's work in the history of the commission. The report states that seventy-three contract sections upon the city-owned lines of the dual system of rapid transit are either completed or under way, leaving only sixteen sections yet to award. Rapid transit contracts awarded during the year 1915 aggregated more than $26,000,000. During the year the commission held 812 hearings, considered 337 formal cases and held 118 meetings. The reports of accidents on railroads and street railways for the year show a decrease in the total number of accidents and a decrease in the number of persons killed from 292 in 1914 to 237 in 1915.

New York Transit Improvements Go into Service.—Several of the improvements in the transit facilities of Greater New York made under the dual contracts have been completed and placed in service since Jan. 1. The third track on the Manhattan Elevated Railway, described and illustrated in the ELECTRIC RAILWAY JOURNAL for Jan. 15, was opened for service on Jan. 17. On Jan. 15 the Brooklyn Rapid Transit System placed in service the Fourth Avenue subway extension to Eighty-sixth Street and on Jan. 17 the same system installed service on the center track which has been installed on the Broadway elevated line. This service, however, applies only to the line below Myrtle Avenue on Broadway across the Williamsburg bridge into the Center Street subway. Work north of Myrtle Avenue is in progress on both the stations and the third track.

Contract Let for Tunnel Under East River.—The Public Service Commission for the First District has awarded the contract for the construction of Section No. 3 of Route No. 8, the tunnel portion of the Fourteenth Street-Eastern District rapid transit railroad, to be operated by the New York Municipal Railway Corporation, to Booth & Flinn, Ltd., the lowest bidders, for $6,639,023, subject to a stipulation to which the bidders have already agreed, that they will complete the tunnel ready for operation in twenty-seven months instead of thirty-four months, as called for in the original draft of the contract. Bids for the construction of this section were opened on Dec. 7, 1915. The section runs from a point under Fourteenth Street, Manhattan, about 80 ft. west of Avenue B, to and under the East River to a point under North Seventh Street, Brooklyn, near Bedford Avenue. The plans call for a two-track railroad.

Increase in Franchise Valuations in New York City.—The State Tax Commission of New York announced on Jan. 14 that it had added $41,970,700 to the special franchise valuation of corporations in New York. The increase is the largest in franchise valuations ever made in one year in New York State. The Brooklyn Rapid Transit system franchise was assessed at $6,202,600 more than last year. The Third Avenue Railway valuation was raised $8,016,700. Basing its valuations on the revenue, the commission decreased the franchise valuation of the New York Railways system by $5,561,000, placing its assessment figure at $29,439,000. The Manhattan (Elevated) Railway also got a decrease of $5,367,000. The total increases for New York City were $53,366,900, and the total reductions $11,396,200, making a total increase over the 1915 figures of $41,970,700. The total value of special franchises in New York City for 1916 is placed at $459,755,850. The special franchise valuations for the rest of the State will be made public soon.

PROGRAMS OF ASSOCIATION MEETINGS

United States Chamber of Commerce

The fourth annual meeting of the Chamber of Commerce of the United States of America will be held at Washington, D. C., on Feb. 8-10. The questions to be considered include those of both domestic business and foreign trade.

Central Electric Railway Association

A four-day cruise is being arranged for the June meeting of the Central Electric Railway Association. The steamer South America of the Chicago, Duluth & Georgian Bay Transit Company will be chartered to leave Toledo, Ohio, at 11 a. m. on June 27, reaching Detroit between 3.30 o'clock on the afternoon of the first day and arriving at the Soo locks at 12.30 p. m. on June 28. The steamer will arrive at Mackinac Island, Mich., at 5 a. m. on June 29, and leave at 10 a. m. for Harbor Springs, where another stop of two hours will be made, following which the boat will proceed to Macatawa Park or Holland, Mich., arriving at 7.30 a. m., June 30, and end the cruise at Benton Harbor, Mich., at 11.30 a. m.

New England Street Railway Club

The regular monthly meeting of the New England Street Railway Club will be held at the American House, Boston, Mass., on Jan. 25. The meeting will be an innovation. It will be a manufacturers' night, in charge of a committee representing the manufacturing interests in the club. A special program has been arranged. At the close of the dinner the regular meeting will be held, followed by a brief address by Cornell S. Hawley, president of the Laconia Car Company and past-president of the American Electric Railway Manufacturers' Association. Mr. Hawley's subject will be "Relations of the Street Railways and the Manufacturers." After Mr. Hawley's address an entertainment will be given in the form of modern minstrelsy by the New England Street Railway Club jubilee singers.

Financial and Corporate

ANNUAL REPORTS

Lehigh Valley Transit Company

The statement of income, profit and loss of the Lehigh Valley Transit Company, Allentown, Pa., for the years ended Nov. 30, 1914 and 1915, follows:

	1915	1914
Revenue from transportation:		
Passenger revenue	$1,550,125	$1,446,694
Other transportation revenue	99,297	78,076
	$1,649,422	$1,524,770
Revenue from other railway operations: power sales, etc.	407,453	344,235
Total operating revenue	$2,056,875	$1,869,005
Operating expenses	1,130,835	1,052,693
	$926,040	$816,312
Taxes	73,552	97,961
Operating income	$852,488	$718,351
Non-operating income	136,146	122,948
Gross income	$988,634	$841,299
Deductions from gross income:		
Interest on funded debt	$550,279	$530,894
Rent for leased roads, etc	64,172	53,341
Interest on unfunded debt	2,035	17,915
Amortization of discount on funded debt	20,441	20,432
Miscellaneous debits: legal expenses, etc	28,319	10,596
	$665,246	$633,178
Net income	$323,388	$208,121

Notwithstanding the unsettled business conditions prevailing during the major part of the fiscal year, the company showed the largest earnings in its history. The operating revenue for the year increased $187,870 or 10.05 per cent. This increase was made up of an increase of $103,431 or 7.15 per cent in passenger revenue, $21,221 or 27.18 per cent in other transportation revenues, and $63,218 or 18.36 per cent in non-transportation revenue. The increase in operating expenses, however, amounted to $78,142 or 7.42 per cent, while taxes decreased $24,409 or 24.90 per cent.

As a result of these changes the operating income showed an increase of $134,137 or 18.67 per cent. The non-operating income increased $13,198 or 10.07 per cent, but the deductions from income increased to a greater extent, $32,068 or 5.068 per cent, on account of larger interest and rental payments and legal expenses, etc. Net income finally gained $115,267 or 55.38 per cent. Out of this amount dividends of $174,288 or 3½ per cent on the outstanding preferred stock were paid, and the surplus was increased from $191,374 to $344,295 or 79.9 per cent.

During the year the freight service of the company was extended to Norristown and Telford, improvements were made to the freight stations at Allentown, Perkasie and South Bethlehem, and two trail cars were built to care for the increasing business. Although the steam roads raised their freight rates during the year, the rates of the Lehigh Valley Transit Company remained the same as originally filed. The surplus from the freight business increased $2,781 or 22 per cent during the year. The surplus from the Adams Express business increased $1,101 or 13.5 per cent. The company operates a freight service that connects with the lines of the Philadelphia Rapid Transit Company at Chestnut Hill, Philadelphia.

The company suffered an approximate loss in receipts of $25,000 on account of jitney competition, which was especially noticeable in April, May and June. It is said that the physical characteristics of the territory served by the company are not favorable to jitney operation on a large scale.

Beginning with the fiscal year 1911, there was credited to maintenance, renewals and depreciation an amount equal to 22 per cent of the gross earnings of the railway lines. All items of maintenance and renewals are charged to this account, the balance being set up to accrued depreciation reserve. This showed a credit of $229,537 as of Nov. 30, 1915.

Washington Railway & Electric Company

The statement of income, profit and loss of the Washington Railway & Electric Company, Washington, D. C., and its subsidiary companies for the calendar year 1915 follows:

Gross earnings from operation	$5,191,627
Miscellaneous income	22,328
Gross income	$5,213,955
Operating expenses (including taxes and depreciation)	3,009,072
Gross income less operating expenses, taxes and depreciation	$2,204,883
Fixed charges	1,187,997
Surplus income	$1,016,886
Preferred stock 5 per cent dividend	$425,000
Common stock 7 per cent dividend	455,000
	$136,886
Distribution to conductors and motormen under profit-sharing plan	$15,527
Sinking fund requirements—Potomac Electric Power Company	105,400
Miscellaneous items—net credit	6,958
Credit to profit and loss	$22,917

The gross earnings from operation during 1915 showed a material increase of $143,192 or 2.8 per cent. The miscellaneous income, however, decreased $11,562 or 34.1 per cent, so that the gross income increased $131,629 or 2.5 per cent. The operating expenses, including taxes and depreciation, increased $115,336 or 3.9 per cent, with the result that the gross income less such charges increased only $16,293 or 0.74 per cent. Fixed charges also increased $10,880 or 0.92 per cent, and the surplus income gained $5,413 or 0.53 per cent.

The operating expenses as above indicated included the sum disbursed or set aside for maintenance and depreciation on both the railway and the lighting properties, the amount being $921,940, an increase of $68,612 over 1914. With the current credit to profit and loss, the total profit and loss surplus is now $1,043,346, the balance on Jan. 1, 1915, having been $1,020,429. During the year the railway carried 65,536,072 revenue passengers and 20,378,525 free transfer passengers, a total of 85,914,597. This was an increase of 442,992 over 1914. A total of 10,701,755 miles was traveled by the cars of the company.

At the annual meeting of the company on Jan. 15 Oscar L. Gubelman was elected a director to succeed William B. Hibbs, resigned. Mr. Gubelman is connected with the New York banking house, Knauth, Nachod & Kuhne.

Chicago City & Connecting Railways Collateral Trust

The surplus income of the Chicago City & Connecting Railways Collateral Trust, Chicago, Ill., for the year ended Dec. 31, 1915, amounted to $57,299 after the payment of $500,000 on participation shares. A statement regarding the non-payment of the full cumulative annual dividend on the preferred participation shares was published in the ELECTRIC RAILWAY JOURNAL of Jan. 15. The financial statement of the company for the year follows:

Dividends	$1,704,352
Interest	88,855
Other income	21,956
Gross income	$1,815,163
Interest on bonds	$1,094,750
Bond redemption	105,000
Interest on bills payable	24,784
General expense	24,557
Taxes	8,772
Total disbursements	$1,257,864
Net income	$557,299
Deduct: Dividends on participation shares	500,000
Surplus income	$57,299

Louisville Railway

Notwithstanding depression in business, an increased number of privately owned automobiles and competition from jitney buses, the Louisville (Ky.) Railway closed the year 1915 with an increase in surplus earnings, all regular dividends paid and improvements amounting to $100,000 nearly completed. The increase, not large, was gained by economies, increased efficiency and "safety first." The estimated decrease in gross earnings up to Dec. 31

was $250,000, while there was a decrease of $280,000 in expenses. Increased taxes and increased interest charges, however, narrowed the margin. For the city lines and those of the Louisville & Interurban Railway together, the increase in surplus earnings for eleven months was $4,189. The interurban lines brought most of the increase, the city lines' share being only about $100.

During the year a reduction was secured in the cost of damage suits, the safety campaign receiving the credit therefor. The fuel bill was reduced by $24,000 through the use of the new power house at Twentieth and High Streets, while curtailments and reductions in various departments made up the other savings. In regard to revenues, it is said that noticeable improvements in the weekly statements were apparent for more than a month, the last week in November showing daily increases for the first time in a year and a half. An especially encouraging feature is the fact that receipts from lines serving industrial sections are now showing substantial increases.

Trackage improvements have included the reconstruction of a large part of the Market Street line and the extension of the Chestnut Street line to Shawnee Park via Madison Street. These two improvements alone make up virtually the whole of the $100,000 expended. An additional $30,000 will be expended this year on the latter extension, which will shortly be in operation.

Jitney competition has not as yet proved so serious a problem for the Louisville Railway as it has in some other sections. At present about forty cars are running under municipal restrictions, while at the most during the last summer not more than eighty were in operation. One company which undertook to operate a line of buses, constructed to carry ten or more passengers, failed, and the cars are now hauling building materials.

IMPROVED CONDITIONS IN CENTRAL STATES

Referring to conditions in the market for investment securities, the investment banking firm of Bowman, Cost & Company, St. Louis, Mo., says that a noticeable improvement has been registered in the last month for both long-term and short-term issues of public service corporations. Where theretofore the inquiry converged on the undistributed mortgage obligations of successful companies, the appetite of the public (due to a growing return of confidence as well as the superabundance of idle funds) has unquestionably been whetted by the splendid showings of earnings in many instances. Moreover, it is felt that the broader viewpoints of many public service commissions in the matter of rates, capitalization, competition and other elements of utility operation, must not be overlooked in a consideration of the more favorable conditions. For that matter, the attitude of the public should also be cited, as regards indiscriminate rivalry between municipally-owned and privately-operated plants. The vote at Springfield, Mo., on Jan. 11 against municipal ownership is said to have registered a significant change in public opinion in some of the smaller communities. In general, the firm finds a substantial inquiry for good mortgage obligations and looks for continued improvement in prices, barring the unforeseen. Quotations are yet below the normal in many instances, but this is a condition which will not last indefinitely in view of the consecutive showings of profits by leading utilities.

OAKLAND-ANTIOCH EARNINGS IMPROVING

Report for Five Months Ended Nov. 30, 1915, Shows Encouraging Volume of Business—Freight Earnings Show Big Increase

A report of earnings for the Oakland, Antioch & Eastern Railway, Oakland, Cal., for November, 1915, and the five months ended Nov. 30, 1915, which has just been made public, shows a volume of business which the management regards as very encouraging. The operating expenses in November amounted, it is estimated, to only 53 per cent of the operating revenue, while the operating expenses for the entire five-month period were 50 per cent of the operating revenue. An interesting feature of the report is that freight earnings for November, 1915, were 68 per cent greater than in November, 1914. Despite the abnormally heavy travel caused by the exposition, the freight-earning increase for November, 1915, was proportionately larger than the passenger increase. Comparative statements for these periods are as follows:

MONTH OF NOVEMBER

	1915	1914	Increase
Operating revenue	$65,949	$40,550	$25,399
Operating expenses	34,518	32,996	1,522
Operating income	$31,431	$7,554	$23,877
Deductions, taxes	2,240	1,081	1,159
Net income	$29,191	$6,473	$22,718

FIVE MONTHS ENDED NOV. 30

	1915	1914	
Operating revenues	$316,532	$259,338	$57,193
Operating expenses	174,808	172,905	1,902
Operating income	$141,724	$86,433	$55,291
Deductions, taxes	11,200	5,763	5,437
Net income	$130,524	$80,670	$49,854

Officials of the company have unofficially stated that the volume of business done since the close of the exposition has been considerably greater than was anticipated, and that as a result the financial outlook for the road has materially improved. The company expects to defeat the application for a receivership recently filed in the local courts, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8.

Caldwell (Ida.) Traction Company, Ltd.—The total receipts of the Caldwell Traction Company, Ltd., for 1915 (December estimated), amounted to $14,783, while the total operating expenses for the year were $11,371, leaving a net of $3,412. The estimated net for 1916, covering the old lines and the Wilder branch, is set at $17,046. The total reproduction cost of the company's property is fixed at $173,955.

Central Arkansas Railway & Light Corporation, Hot Springs, Ark.—The Central Arkansas Railway & Light Corporation, a subsidiary of the Federal Light & Traction Company, has called for tenders through the Columbia Trust Company for as many of its first lien fifteen-year 5 per cent sinking-fund bonds as may be purchased with $32,733, now available for the sinking fund.

Chicago (Ill.) City Railway.—The Illinois Trust & Savings Bank, the First Trust & Savings Bank and Lee, Higginson & Company are offering at 99¾ and interest $1,000,000 of first mortgage 5 per cent gold bonds of the Chicago City Railway of 1907 due on Feb. 1, 1927, but redeemable as a whole upon any interest date before maturity, at par and interest, but only in case the property shall be purchased by the city or its lawful licensee.

Chicago (Ill.) Railways.—The Chicago Railways has sold to Harris, Forbes & Company an additional $1,500,000 of first mortgage 5 per cent twenty-year bonds, making the total amount of these bonds outstanding $54,455,000.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—The twenty days of grace within which the Ohio Electric Railway was to pay its rental to the Cincinnati, Dayton & Toledo Traction Company expired on Jan. 14 with the rental unpaid. J. M. Hutton, chairman of the bondholders' protective committee, returned on Jan. 17 from Philadelphia, where he had conferred with Randall Morgan and the interests associated with him in the control of the Ohio Electric Railway. A proposal from that company will probably soon be submitted to the committee. Seemingly the committee is disposed to insist upon the payment of the rental and the continuance of the present basis of settlement. It is said that the committee has plenty of financial backing to warrant it in reorganizing the company to operate its own line. Previous items referring to this case were published in the ELECTRIC RAILWAY JOURNAL of Jan. 1 and 15.

Columbus Railway, Power & Light Company, Columbus, Ohio.—The Columbus Railway, Power & Light Company has sold $3,500,000 of 5 per cent first refunding and extension mortgage bonds to E. W. Clark & Company, Philadelphia, and Kissel, Kinnicutt & Company, New York. In connection with the sale of these bonds the company has called for payment $2,639,000 of its underlying bonds.

Dallas (Tex.) Electric Company.—Stone & Webster and the Old Colony Trust Company, Boston, Mass., are offering at 99½ and interest to yield 6.12 per cent $750,000 of Dallas Electric Company terminal mortgage five-year 6 per cent coupon notes in the denomination of $500 and $1,000. The notes are a direct obligation of the Dallas Electric Company and are secured by a first mortgage on the terminal facilities and office building of the Dallas Interurban Terminal Association.

Fresno (Cal.) Interurban Railway.—The California Railroad Commission has authorized the Fresno Interurban Railway to issue $212,500 of common stock of a par value of $100 at not less than $80 a share and $350,000 of first mortgage 6 per cent twenty-five-year bonds previously authorized at 90 per cent of their face value. The commission has further authorized the company to issue 6 per cent certificates of indebtedness for $350,000 to net the full face value. These issues are to refund 580 shares of common stock and $110,000 of bonds previously authorized, the balance to be used as heretofore directed.

General Gas & Electric Company, New York, N. Y.—Among the utility properties reporting good earnings for 1915 is the General Gas & Electric Company, which controls various electric, gas and railway properties, including the Rutland Railway, Light & Power Company, Rutland, Vt., and the Northwestern Ohio Railway & Power Company, Toledo, Ohio. Each of the properties showed an increase in gross earnings over 1914, the aggregate being $227,532 of 10.3 per cent. December earnings increased $43,016 on the combined properties. Of the earnings of 1915, 66.2 per cent were from electric light and power companies; 19.9 per cent from gas companies, and 13.9 per cent from railway properties. The regular quarterly dividend of 1.75 per cent on the cumulative preferred stock was paid on Jan. 3, together with past accumulations aggregating 0.75 per cent. This pays up all past accumulations and places the stock on a regular 7 per cent basis. The properties of this company are operated by W. S. Barstow & Company, Inc., New York.

Illinois Traction System, Peoria, Ill.—The Illinois Public Utilities Commission has authorized the St. Louis, Springfield & Peoria Railroad to issue $1,000,000 of 5 per cent preferred stock and the Bloomington, Decatur & Champaign Railroad to issue $500,000 of 5 per cent preferred stock to retire like amounts of general mortgage bonds. The application of these companies, which are subsidiaries of the Illinois Traction System, was noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18.

Lancaster & York Furnace Street Railway, Millersville, Pa.—It is reported that the Lancaster & York Furnace Street Railway and the controlled Lancaster & Southern Street Railway have suspended operations owing to financial troubles. An application for a receiver for these companies was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 1.

People's Street Railway, Wanamie, Pa.—Q. A. Gates and Charles E. Graham, Wilkes-Barre, Pa., have asked the court in that city to appoint a receiver for the People's Street Railway of Nanticoke and Newport, Pa. They are also seeking an injunction to restrain the majority stockholders from paying to the officers of the company salaries which they claim are excessive. The plaintiffs also charge that the majority stockholders permitted a franchise in Warrior Run to expire through neglect and that the officers have used company funds to build dwellings on land the company does not own.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—The California Railroad Commission has authorized the Petaluma & Santa Rosa Railway to issue interest coupons maturing on Oct. 1, 1916, and April 1, 1917, as evidence of the interest to accrue on the outstanding 217 second mortgage bonds. These bonds matured on April 1, 1915, but were extended for two years with the provision that semi-annual interest should be regularly paid. For coupons maturing on Oct. 1, 1915, and April 1, 1916, it was held that commission authorization was not necessary, such coupons falling under the one-year indebtedness clause.

Portland Railway, Light & Power Company, Portland, Ore.—Preliminary statements of earnings of the Portland Railway, Light & Power Company show considerable improvement during the last quarter of the year. The net earnings were as follows: September, $196,000; October, $237,800; November, $246,300; December, $268,500. The net earnings for the year are said to be $2,987,974.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—A circular which has been sent to the first mortgage bondholders of the San Francisco, Napa & Calistoga Railway in regard to the favorable showing of the company says in substance that damage claims amounting to $135,000 from the wreck of June, 1913, have been paid out of earnings and a $36,000 stock assessment, without abnormally increasing the floating debt. For the year ended Nov. 30, 1915, the company showed net after taxes, etc., of $79,145. Deducting $36,000 for bond interest, a balance of $43,145 remained for corporate purposes.

Seattle (Wash.) Municipal Street Railway.—According to the report of A. L. Valentine, superintendent of public utilities, the two municipal railway lines of the Seattle Municipal Street Railway were operated during December at a loss of $2,713. Loss on the Lake Burien line, Division "C," amounted to $889, while the loss on Division "A" totaled $1,824.

United Railroads of San Francisco, San Francisco, Cal.—The California Railroad Commission on Jan. 14 authorized the United Railroads of San Francisco to issue 6 per cent interest coupons payable on June 30, 1916, to be attached to 400 outstanding bonds of the Ferries & Cliff House Railway. The United Railroads must call in the interest coupons now attached to these bonds and substitute the new ones. A detailed note regarding the application in this case was published in the ELECTRIC RAILWAY JOURNAL of Jan. 15.

Washington Water Power Company, Spokane, Wash.—D. L. Huntington, president of the Washington Water Power Company, in a recent statement to the Council of Spokane, said the company's street railway business was being conducted at a loss, and that he understood that this was also true of the operation of the lines of the Spokane Traction Company, controlled by the Spokane & Inland Empire Railroad. The consolidation of the two local lines has been suggested before, but, it is declared, the absorption of one system by the other has not proved practicable. The organization of a holding company has been advanced as a possible solution of the objections raised to an actual merger. The jitney bus and the increasing number of privately owned automobiles are said to have affected the earnings of the companies materially.

Waverly, Sayre & Athens Traction Company, Waverly, N. Y.—The stockholders of the Waverly, Sayre & Athens Traction Company and the Sayre Railway at their recent annual meetings voted to consolidate under the name of the former company. The Sayre Railway, a 1.5-mile line, was formerly operated under a perpetual lease, and all its stock was owned by the Waverly, Sayre & Athens Traction Company.

DIVIDENDS DECLARED

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1¼ per cent, preferred, Series B; quarterly, 1¼ per cent, common.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., quarterly, 1½ per cent, preferred.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent.

Montreal (Que.) Tramways, quarterly, 2½ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec.,	'15	$508,830	....	....	....	....
1 " "	'14	480,710	....	....	....	....
12 " "	'15	5,436,895	....	....	....	....
12 " "	'14	5,559,535	....	....	....	....

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec.,	'15	$2,213,472	$1,237,668	$975,804	$815,497	$160,307
1 " "	'14	2,074,522	1,202,653	871,869	807,016	64,853
6 " "	'15	12,416,972	6,959,936	5,457,036	4,895,793	561,243
6 " "	'14	11,945,123	6,898,721	5,046,402	4,847,955	198,447

Traffic and Transportation

STUDYING ELECTRIC RAILWAY GRADE CROSSINGS

At a meeting of the executive committee of the Syracuse conference for greater safety at electric railway grade crossings, held in the offices of the Second District Public Service Commission at Albany, N. Y., on Jan. 14, definite steps were made toward the study of the problem of protection for both the electric railways and vehicles which the executive committee will later formulate into a possible legislative program. Committees on which will be appointed both automobilists and representatives of the railways, with State officials, were provided for to make recommendations on the various phases of the problem for which the members of each will be best qualified. These committees, six in number, with the character of membership, are as follows:

Physical surroundings of crossings—Two railway men, two motorists and Edwin Duffey, State commissioner of highways.

Fixed signs and signals—One railway man, one motorist and Mr. Duffey.

Methods of operation—One railway man, one motorist and Francis M. Hugo, Secretary of State.

Car and vehicle signal equipment—One railway man, one motorist and the Secretary of State.

Publicity and education—Twenty-four members from all parts of the State.

Regulation of urban traffic—Three motorists, two railway men, Commissioner Duffey and the Secretary of State.

The meeting of the committee on Jan. 14 was called to order by Seymour Van Santvoord, chairman of the Public Service Commission and of this committee. George A. Ricker, consulting engineer of the New York State Automobile Association, was made secretary of the committee. General discussion related largely to the need of publicity and the education of the public as to safety at electric railway grade crossings.

The grade crossing elimination act applies only to steam raliroads, and there is at the present time no statutory provision for greater safety at electric railway crossings nor no standard practice in protecting these crossings. With the growing use of the automobile, accidents at these crossings have increased, and it is the hope of this conference that means may be devised to minimize them through better protection, the standardization of signals and operation, and possibly through legislation. The next meeting of the executive committee will be held in Syracuse within two or three weeks.

Those who were present at the meeting in Albany on Jan. 14 were: Seymour Van Santvoord, Charles R. Barnes, electric railway inspector of the commission; Thomas Penney of the International Railway, Buffalo; Peter G. Ten Eyck, third vice-president of the New York State Automobile Association, Albany; James P. Barnes, New York Electric Railway Association, Rochester; B. E. Tilton, New York State Railways, Rochester; George C. Diehl, American Automobile Association, Buffalo; Howard Osterhout, representing the Secretary of State, Albany; George A. Ricker, consulting engineer of the New York State Automobile Association, Albany, and Edwin Duffey, state commissioner of highways.

UNIFORM REGULATIONS FOR STREET TRAFFIC

Among the important features of the standard code of traffic regulations as compiled by the street traffic committee of the Safety First Federation of America are the following:

Prohibiting the use of the muffler cut-out.

Prohibiting excessive emission of smoke or gases.

Prohibiting the unnecessary use of warning signals.

Providing that all vehicles shall carry lights from one hour after sunset to one hour before sunrise.

Approval of the near-side stop regulation for street cars.

Providing car-stop safety zones for persons getting on or off street cars.

Providing for protecting the car-stop safety zones from encroachment by vehicles, either moving or standing.

Requiring that all vehicles must come to a full stop at least 5 ft. behind a street car when stopping or which has stopped to receive or discharge passengers.

Requiring pedestrians to cross the street at the regular crossing, to cross with the traffic and comply with the signals of traffic officers.

Recommending the licensing of all motor vehicle drivers or operators, subject to suspension or revocation by the issuing authority. It is contended that the adoption of this regulation by the various State Legislatures will result in a material reduction of highway accidents. The chief requisite for securing the license shall be proper physical, mental and moral qualifications.

It is proposed further to eliminate the possibility of street accidents by standardizing signs and signals, and the street traffic committee has approved of the mechanical traffic semaphore that has been in successful operation on Fifth Avenue, New York, and adopted in Detroit, Baltimore, Washington, St. Louis, Boston, New Orleans and other cities.

The electric railways were represented on the committee by Joseph A. McGowan, secretary and treasurer of the Terre Haute, Indianapolis & Eastern Traction Company, and F. W. Bacon, vice-president of the Kentucky Traction & Terminal Company, Lexington, Ky.

Toronto Jitneys Decreased.—The new regulations that have been enforced by the police authorities of Toronto, Ont., since January have had a marked effect on the jitneys. It is a safe estimate that more than half have been taken off the road.

Steam Train Hits Illinois Traction Car. — Ten persons were injured on Jan. 16 when a parlor car in an Illinois Traction System train was struck by an Illinois Central Railroad train at a railroad crossing in the streets of Springfield, Ill.

Experiment with Felt Curtains.—Felt curtains which can be rolled up and down, operated by motorman or conductor, will be furnished on the open ends of fifty cars on the Sutter Street line of the United Railroads, San Francisco, Cal. If the experiment proves successful all the open cars of the company will be similarly equipped.

Scranton Jitney Ordinance Sustained.—The Court of Common Pleas of Lackawanna County has sustained the jitney ordinance of the city of Scranton, Pa. The court held that the municipal regulation of vehicles used for hire within the corporate limits of the city was a valid exercise of the police power which has been granted to municipal corporations.

Car Work Planned in St. Louis.—The United Railways, St. Louis, Mo., expect to continue the work of rebuilding cars, closing the rear platforms and installing the automatic signal system as rapidly as it is possible to put the cars through the shop. In order to expedite traffic it is the intention to equip motor cars drawing trailers with independent air compressors, so that it will not be necessary to stop these cars at charging stations. The equipment of trains with independent compressors will afford great relief to the charging stations.

Through Service Established.—With the completion of the extension of the Arkansas Valley Interurban Railway to Hutchinson, Kan., on Dec. 22, through passenger service was inaugurated between that point and Wichita, Kan.; Valley Center, Kan.; Sedgwick, Kan.; Newton, Kan.; Halstead, Kan.; Burrton, Kan., and intermediate points. Physical connections for interchange of carload business with steam lines have been completed at Burrton and Valley Center, and additional connections at Hutchinson and other junctions will soon be provided.

Appeal to Employees Against Jitneys.—The Chamber of Commerce of Portland, Ore., has issued a letter to all its employees recommending that they stop patronizing jitney buses. It is pointed out that while the Chamber of Commerce does not desire to interfere with the personal liberty of its employees, the request is made in the interests of the safety of the employees and the general welfare of the city. Accompanying the request is an explanation of the dangers of patronizing jitneys and the reasons why it is not deemed advantageous to the community that the jitney should receive support.

Bills Introduced Affecting Washington Lines.—Mr. Clark of Florida has introduced into the House of Representatives two bills affecting the electric railways in the District of Columbia. One measure would confer police powers on all conductors and motormen on all electric and other street railways in the district. The other measure would require all transportation companies, firms and persons within the district to provide separate accommodations for the white and negro races and to prescribe punishments and penalties for violating its provisions and to provide for its enforcement. Both have been referred to the Committee on the District.

Physical Connection of Oregon Lines Ordered.—Physical connection of the tracks of the Southern Pacific Company and the Oregon Electric Railway at Water Street, Albany, within thirty days has been ordered by the Oregon Public Service Commission. The order was issued after an exhaustive investigation by the commission of the business which would result from an interchange of traffic. The commission specifies that the cost of making the trackage connection shall be borne equally by both lines and the freight and cars shall be transferred from one line to another for a reasonable amount without discrimination or unreasonable delay.

Appeal of Coupler Case to Be Heard Soon.—A date will be set within the next three weeks for final arguments in the United States Circuit Court of Appeals of the appeal of the International Railway, Buffalo, N. Y., from its conviction two years ago of violation of the federal safety appliance act by not having automatic couplers on its interurban cars. The railway contends it is a street railway only, and is exempt from this provision of the interstate commerce act. The government put in proof of traffic arrangements between the International Railway and steam lines providing for interchange of freight, etc., and it also contended that the International Railway used the old Erie Railroad right-of-way for part of its interurban system. The government is prosecuting this case merely as a test issue upon which to bring actions against other electric railways which are not equipping interurban cars with automatic couplers as provided for under the safety appliance act.

Plans for Improving Springfield Service.—C. V. Wood, president of the Springfield (Mass.) Street Railway, says that substantial improvement in the handling of cars through the downtown district will shortly be effected by the diversion of certain lines from Main Street to Dwight Street, the latter being a parallel thoroughfare to the former. Better movement through the city from north to south and vice versa will result from the recent completion of the Dwight Street underpass at the Union Station. Mr. Wood referred to the difficulties of operating 223 cars an hour through a single artery of travel and pointed out that through diversion and consequent extension of minimum headway much freer movement is to be anticipated. No date was set for the opening of the enlarged Dwight Street service. Practically every available car is now in service, and new cars are being added to the equipment as rapidly as possible. An investigation of service conditions has lately been concluded by the Springfield Board of Trade, but no public recommendations have resulted.

Maine Commission Approves Fender.—The Public Utilities Commission of Maine has approved the Acme fender of the Eclipse Railway Supply Company for use on the cars of the Atlantic Shore Railway. The law requiring fenders on all electric cars operated in Maine was passed at the legislative session in 1915 to become effective on Nov. 1, 1915. In September, 1915, the Public Utilities Commission called a conference on fenders and in October the railways presented written requests for an extension of time until March 1, 1916, under the fender requirement in order to test various devices. This extension was granted. In passing upon the application of the Atlantic Shore Railway the commission said: "We are not committed in our opinion to any particular make of fender. We do not wish to be understood as saying that we will or will not approve a particular type of fender. Herein we are doing no more than deciding the application of the Atlantic Shore Railway, giving our reasons therefor and making some general observations, which may or may not be of importance in future matters."

Recent Work of the Associated Bureaus of the Pittsburgh Railways.—The continuation by the associated bureaus of the Pittsburgh (Pa.) Railways of its efficiency work has enabled the bureaus to reduce their force and at the same time take over additional work. The associated bureaus are now preparing to handle the workmen's compensation business and with the exception of the medical end of it the bureaus probably will be able to do so without further increase in the number of employees. The company was unfortunate in sustaining a rather severe accident on the night of Jan. 1 when a car was derailed and overturned and forty-three people were taken to the hospital. As evidencing its handling of these matters the associated bureaus of the company finally disposed of fifty-two of the total of 103 injured within forty-eight hours after the occurrence. The members of the bureaus held a dinner at the Fort Pitt Hotel on Dec. 23. Some time ago they issued a safety coin for general distribution at the Pittsburgh Exposition, and the demand was so great that they later distributed several thousand additonal coins.

Employees' Booster Meetings.—Employees of all departments of the United Gas & Electric Company, which also operates the city lines of New Albany and Jeffersonville, Ind., and of the two interurban lines, have been enrolled in an informal "Boosters' Club," which has begun a program of monthly meetings. The third of these meetings is to be held during the latter part of this month, when some form of entertainment and instruction will be provided. The meetings are held in a public hall in the Carnegie Library, which is directly opposite the main offices of the company. Committees of the members, serving each for three months, are in charge of the programs for the meetings. The first meeting was addressed by Chester P. Wilson, president of the Public Service Company, and there was an eight-piece orchestra and a supper for those who attended. The program for the January meeting has not been announced as yet, the purpose being to hold up interest by the surprise feature. These meetings are designed more to promote goodfellowship among employees than for any other one purpose, the idea being that if those who are engaged in different departments are enabled to get acquainted with each other outside of working hours they can be counted on for better co-operation during business hours.

Accurate Watches Lead to Increased Business.—As described in the ELECTRIC RAILWAY JOURNAL for Nov. 20, 1915, by R. B. Hull, general manager of the Conestoga Traction Company, Lancaster, Pa., that company has recently installed a time-inspection system. In addition to a large number of suburban and interurban lines, this company operates in Lancaster itself a number of routes usually on a headway of ten minutes. Mr. Hull reports now that traffic began to increase within a few weeks after the time inspection system went into effect. The residents along the lines noticed that the passing time of cars was more dependable and hence they arrange to ride instead of walk. To encourage this extra travel the company has already issued a separate time-table for the College Avenue Line to show the time the cars leave Penn Square, the center of the city; the time they reach James Street and College Avenue, the approximate center of the line, and the time they reach the suburban terminal. The cars also are operating on seven-minute instead of ten-minute headway. For College Avenue alone the company has printed 30,000 cards for distribution in the cars. It is planning to issue similar time-table cards for other lines. A feature of operation on the Conestoga system is that all cars leave from Penn Square on schedule time invariably. The company appreciates so greatly the value of reliable service that it always has cars ready to take the place of any delayed incoming car. The crews of the incoming and outgoing cars are replaced in accordance with the usual practice which is followed for set-back operation.

Personal Mention

Mr. Douglas C. Moore has resigned as superintendent of the Duluth division of the Duluth Street Railway, which operates in Duluth, Minn., and Superior, Wis. He has been connected with the company for seventeen years.

Mr. R. B. Campbell has been appointed assistant to Mr. George Theis, Jr., president of the Arkansas Valley Interurban Railway, Wichita, Kan. Mr. Campbell will have supervision of executive detail and will be assigned special duties.

Mr. George E. Towner, for more than three years superintendent of the lines of the Portland, Eugene & Eastern Railway at Eugene, Ore., has tendered his resignation to Mr. T. L. Billingsley, general superintendent of the Southern Pacific Company's system of city lines in western Oregon to take effect on Feb. 1.

Mr. Harry W. Dowman, for the last two years with the auditing department of the Union Traction Company of Indiana, has been made clerk to Mr. G. H. Kelsey, supervisor of the power of the company, with headquarters in Anderson. Before taking up his work at Anderson Mr. Dowman was with the Cleveland (Ohio) Electric Illuminating Company.

Mr. T. G. Cowan has been appointed superintendent of the Warren-Bisbee Railway, Warren, Ariz., to succeed Mr. Ralph Cadwell, whose resignation from the company was noted recently in the ELECTRIC RAILWAY JOURNAL. Mr. Cowan has been manager of the Bisbee Improvement Company and the Douglas Improvement Company and was head of the Courtland Water Company.

Mr. David S. Carll, whose retirement from the office of general manager of the Capital Traction Company, Washington, D. C., was noted briefly in the ELECTRIC RAILWAY JOURNAL of Jan. 15, relinquished the position voluntarily, desiring after twenty-five years of continuous service with the company to be relieved of the arduous duties of that office. He continues as vice-president and a member of the board of directors of the company. The board's appreciation of Mr. Carll and its estimate of his worth and service are expressed in the following resolution: "Resolved, that the board of directors of the Capital Traction Company, appreciating the worth and services of David S. Carll, who for a quarter of a century has served this company with unselfish devotion and energy and materially aided in its growth, development and welfare, do now unanimously vote to concur in his wish to be relieved from the arduous and exacting duties and labors of general manager, and are gratified that he will continue as a member of this board, and that he consents to serve as a vice-president, with an assignment of lighter duties, to which office it is our pleasure to elect him."

Mr. H. C. Prather has resigned as assistant general manager of the Empire United Railways, Inc., Syracuse, N. Y., to become connected with the Peter Smith Heater Company, Detroit, Mich. Mr. Prather has been assistant general manager of the Empire United Railways for the last year and a half. Prior to that time he filled various positions on the Buffalo, Lockport & Rochester Railway, rising from master mechanic to general manager. Altogether he has been employed by the Beebe lines about seven years. Mr. Prather has been engaged in electric railway work more than twenty years. His connections other than those mentioned have included the Union Traction Company of Indiana, United Railways of St. Louis, Brooklyn Rapid Transit Company, the Public Service Railway and the Roanoke Railway & Electric Company. Mr. Prather was held in the greatest esteem by both officers and employees of the Empire United Railways, as was indicated on Jan. 8, when twenty-five of the officers and department heads tendered a dinner to him at the Hotel Onondaga, Syracuse. On Jan. 9 Mr. Prather was presented with a beautiful leather bag by the trainmen and employees of the company. On Jan. 10, the wives of officers entertained Mr. and Mrs. Prather at a dinner dance.

H. O. BUTLER

Mr. H. O. Butler has been appointed assistant superintendent of transportation of the United Railways, St. Louis, Mo., under Mr. Bruce Cameron, superintendent of transportation of the company, as announced in the ELECTRIC RAILWAY JOURNAL of Jan. 8. Mr. Butler was born at Hogansburg, N. Y., on June 7, 1868. He has been in the employ of the United Railways since 1888, when he entered the service as a gripman on the Olive Street line. He has been successively gripman, conductor, foreman, supervisor and division superintendent. His appointment as assistant superintendent of transportation is a mark of the appreciation in which he is held by the United Railways. He is recognized by the employees and officers of the railway as a persistent, efficient and faithful official, and his appointment will doubtless add greatly to the effectiveness of the official staff of the company. The United Railways controls all the local lines in St. Louis. It operates 441 miles of track, 1438 passenger and 242 other cars.

Mr. Edward Harris Maggard, whose appointment as general manager of the Petaluma & Santa Rosa Railway, Petaluma, Ca., was noted briefly in the ELECTRIC RAILWAY JOURNAL of Jan. 8, was born at Meridian, Miss., in 1875. He moved to Texas with his parents in 1877, and was educated in the public schools at Corsicana and Dennison. He entered the service of the Missouri, Kansas & Texas Railway at Dennison, Tex., as call boy in 1889 and served as such until 1893, when he resigned to accept a position with the Southern Pacific at Houston as clerk in the freight office. He served in that capacity until 1900, and then resigned to enter the service of the El Paso & Northeastern Railway at El Paso, Tex., as chief clerk in the freight office. He was promoted to agent of this company, and from agent to superintendent of terminals. In 1907 he resigned from the El Paso & Northeastern Railway and entered the service of the Petaluma & Santa Rosa Railway as general freight and passenger agent. He continued in that capacity until promoted to the office of general manager recently, to succeed the late Elmer M. Van Frank.

F. W. BROOKS

Mr. F. W. Brooks, general manager of the Detroit (Mich.) United Railway, has been elected vice-president of that company. Mr. Brooks was born at Waco, Tex., on March 4, 1865. He was educated in private schools in Waco, the Waco Military Academy and the Texas State College, making a specialty of engineering in the latter institution. He became identified with the construction of the New Orleans & Texas Pacific Railway in 1882, and afterwards with the construction of extensions of the Cincinnati Southern Railway. He was later associated with the engineering and other departments of the Louisville, New Orleans & Texas Railway, which was afterward acquired by the Illinois Central Railroad. Mr. Brooks went to Detroit in 1895 as general manager of the Rapid Railway, an interurban line operating between Detroit and Port Huron. This was his first connection with the electric railway business. In 1903 the Rapid Railway having come under the control of the Detroit United Railway, Mr. Brooks was made assistant general manager of the latter company, and shortly after he was made general manager.

Mr. George D. Woodside has been elected president of the West Chester (Pa.) Street Railway, succeeding Mr. Meyer Schamberg, who becomes vice-president, taking the place of Mr. Jonas Rice, who will continue with the company as general manager.

Mr. Harry H. Brown has been appointed superintendent of the Duluth division of the Duluth (Minn.) Street Railway to succeed Mr. Douglas C. Moore, whose resignation from the company is noted elsewhere in this issue. Mr. Brown was educated at Colby College in Maine and was connected with the Lewiston, Augusta & Waterville Street Railway for some time. He became connected with the company in Duluth four years ago.

J. H. HANNA

Mr. J. H. Hanna, formerly chief engineer of the Capital Traction Company, Washington, D. C., has been elected vice-president of the company in charge of operation, as noted briefly in the ELECTRIC RAILWAY JOURNAL of Jan. 15. Mr. Hanna was born in Henderson, Ky., in 1871, where he prepared, in the public schools, for Princeton University. At Princeton he entered the engineering courses, and was graduated in 1892 with the degree of civil engineer. For two years after leaving college he engaged in steam railroad engineering work and then entered the service of the Washington & Georgetown Railroad, predecessor of the present Capital Traction Company, Washington, D. C. The following year he was appointed assistant superintendent, and four years later he became superintendent and assistant engineer of the same company, being appointed chief engineer in charge of all construction and maintenance about seven years ago. Mr. Hanna is prominent in technical association affairs. He is a member of the American Society of Civil Engineers and of the American Institute of Electrical Engineers as well as the American Electric Railway Engineering Association, of which last he was president in 1914. He also is a past-president of the Washington Society of Engineers. The Capital Traction Company operates 65.39 miles of underground conduit line and owns 442 motor cars and 251 other cars.

Mr. Arthur F. Blaser, who has been appointed chief engineer in the office of the street railway commissioner at Cleveland, Ohio, was born in Holmes County, Ohio, in 1876. He was graduated from the College of Wooster, Wooster, Ohio, in 1903, and two years later was graduated from the civil engineering department of the Case School of Applied Science, Cleveland, Ohio. Mr. Blaser then spent a few months with the King Bridge Company and afterward taught in an Ohio school for some time. In the autumn of 1907 he went to Berlin and spent a year there in the *Technische Hochschule*. After some time spent in the bridge department of the municipal government at Cleveland and in grade elimination work for the Nickel Plate Railroad, he taught two years in Case School. He then entered the employ of Wilbur J. Watson & Company, consulting engineers, with whom he remained until he accepted his present appointment.

OBITUARY

Harry L. Cooper, son of Thomas Cooper, for a number of years manager of the railway and lighting division of the Westinghouse Electric & Manufacturing Company at Philadelphia, died on Jan. 17 following an operation for appendicitis. The Messrs. Cooper, father and son, were very popular members of the party which took the trip to the San Francisco convention on the "Red Special" train, and to them the news of young Mr. Cooper's death will come as a great shock. Harry Cooper was connected with the sales organization at Philadelphia of the International Motors Company and was twenty-seven years old on Dec. 6, 1915.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Glendale, Cal.—The Pacific Electric Railway has received a franchise from the Council to build an extension of its line in Glendale and has secured 2½ acres for a terminal. The company has also received a franchise from the Council of San Bernardino to construct, after Feb. 3, a line along Orange Grove Avenue, San Bernardino.

San Diego, Cal.—The San Diego Electric Railway has asked the Council for a forty-eight-year franchise to construct an extension of its line on University Avenue to Euclid Avenue. Construction on the extension will be begun immediately after the granting of the franchise and it is expected that cars will be operating over the new line by March 1.

Santa Barbara, Cal.—R. H. Gaud of the Riviera Company has applied to the California Railroad Commission for permission to transfer to the Santa Barbara & Suburban Railway a franchise on the foothills along the Riviera property.

Kansas City, Mo.—The Kansas City & Tiffany Springs Railway has received a franchise from the County Court to construct its proposed line from Kansas City to Tiffany Springs. [Dec. 25, '15.]

Portland, Ore.—It is reported that the Portland Railway, Light & Power Company has asked the Council for a franchise to operate over the new interstate bridge.

Beaumont, Tex.—The Beaumont Traction Company has asked the Council for a franchise to construct an extension on Doucette Street, eastward from Irving Avenue to the city limits and thence to the Magnolia Refinery, south of the city.

Dallas, Tex.—The Dallas Northwestern Traction Company and the Dallas Southwestern Traction Company have received an extension of time on their franchises until Dec. 31, 1916, in which to begin construction of their proposed lines to Denton on the north and Glen Rose on the south. E. P. Turner, Dallas, president. [Oct. 16, '15.]

Midvale, Utah.—Harry S. Joseph, who proposes to build an electric railway between Bingham Canyon and West Jordan, has received a franchise from the county commissioners to build an extension of the line to Midvale. [Jan. 8, '16.]

Seattle, Wash.—The Puget Sound Traction, Light & Power Company has asked the Council for a franchise permitting the company to abandon its line on Twenty-third Avenue from Louise Street to Jefferson Street.

Morgantown, W. Va.—John Madagan, president of the South Morgantown Traction Company, recently appeared before the Council of Morgantown in relation to an old franchise held by his company. He stated that it is the desire of the company to place its tracks on the South Morgantown Bridge, extend them along Front Street and thence up Walnut Street, completing the loop by a connection with the present terminus on Walnut Street west of High Street.

Waukesha, Wis.—The Milwaukee Electric Railway & Light Company has received a franchise from the Council to erect electric transmission lines through Waukesha.

TRACK AND ROADWAY

Phoenix (Ariz.) Railway.—This company has received an extension of time until Oct. 1, 1917, in which to complete the work of double-tracking its West Washington Street line between Seventh and Seventeenth Avenues.

San Francisco-Oakland Terminal Railways, San Francisco, Cal.—Residents in the district traversed by Cutting Boulevard are considering the construction of a line on that thoroughfare. The plan is to build a line from the main tracks of the San Francisco-Oakland Terminal Railways, crossing the tracks of the Southern Pacific Company by a viaduct and extending along Cutting Boulevard through the new municipal tunnel to a connection with the municipal wharf. The line would be operated by the San Francisco-Oakland Terminal Railways.

Tidewater Southern Railway, Stockton, Cal.—This company has filed a petition asking the Council of Stockton to grant it permission to electrify and operate the Western Pacific Railway Company's line on Hunter Street and Hazleton Avenue.

Connecticut Company, New Haven, Conn.—Residents of East Hartford have asked the Connecticut Company to extend its line from the present terminus of the Burnside line through Forbes Street to Silver Street to connect with the tracks on South Main Street, forming a belt between the villages of Burnside and Silver Lane, for which a charter was granted some years ago.

Pocatello Traction & Interurban Railway, Pocatello, Idaho.—Final arrangements and settlements for the right-of-way to and through Arbon Valley are being made by this company, and surveys will be made as soon as the weather permits. Plans and specifications will also be made for the 8 miles of railway within the city limits of Pocatello. Bids will soon be advertised for the construction of the first 3½ miles within the city limits and an extension to the Fales-Houston Packing Company's plant. Clark Gibson, Pocatello, secretary. [Dec. 18, '15.]

Peoria & Chillicothe Electric Railway, Peoria, Ill.—The following officers have been elected for this company: A. C. Mitchell, Chillicothe, president; John F. Lynch, Chillicothe, vice-president, and A. C. Black, Peoria, secretary. Charles W. Robinson and A. C. Black were re-elected directors for three years. [Jan. 1, '16.]

Evansville & New Harmony Traction Company, Evansville, Ind.—It is reported that construction will be begun next spring on this company's proposed line from Evansville to New Harmony. The line will tap Poseyville, Cynthiana and Owensville. C. J. Seibert, Evansville, general manager. [Sept. 11, '15.]

Keokuk (Iowa) Electric Railway.—This company plans to extend its tracks up the hill into the east portion of Warsaw, Ill. Several routes are being considered, the Fourth Street route being favored by the citizens of Warsaw, even if a deep cut is necessary at the top of hill, near Polk Street.

Boston (Mass.) Elevated Railway.—Bids will be received until Jan. 31 by Edward Mahler, purchasing agent of the Boston Elevated Railway, for building foundations for Mystic River bridge and viaduct and reconstruction of Malden bridge. The main work consists of building seventeen masonry piers of concrete on pile foundation, faced with granite above low water and thirty-eight small concrete foundations for the viaduct.

Worcester (Mass.) Consolidated Street Railway.—Plans are being contemplated by this company for double-track extensions on Pleasant Street from Moreland Street to Mill Street, on Hamilton Street from Grafton Square to Puritan Avenue and on Grafton Street from Rice Square to Turnout No. 43.

Twin City Rapid Transit Company, Minneapolis, Minn.—Extensions of two car lines in the western part of the city are asked in ordinances introduced in the Council by Commissioner Keller. One calls for the extension of the Randolph Street line from the present terminus on Snelling Avenue to Montrose Street, and the other for the extension of the St. Clair Street line from the present terminus at Oxford Street to Josephine Street. P. J. Metzdorf, representing the Twin City Rapid Transit Company, told the Council that the extensions would be built if it could be shown the situation demands them.

***Morristown, N. J.**—Property owners between Whippany and Caldwell are endeavoring to bring about the electrification of the Morristown & Erie Railroad and through an agreement with the Public Service Railway Company to have through cars run from Newark to Morristown via Montclair, Caldwell and Essex Fells. From Caldwell, the present terminal of the Bloomfield Avenue line of the Public Service Railway, to the eastern terminal of the Morristown & Erie Railroad at Essex Fells three routes are under consideration. The entire distance is about 12 miles.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has approved the award by the New York Municipal Railway Corporation of the contract for the construction of the East New York additional tracks and reconstruction of the East New York Yard, to the Crenshaw Engineering & Construction Company, Inc., the lowest bidder, for $1,237,229.91. The work at East New York includes the alterations and additions to the existing elevated structures, the installation of tracks and special work, the removal and relocation of wires and cables, the construction of three new elevated stations, and the maintenance of existing station facilities during construction. The company provides all the materials for the work, which must be completed within two years from the date of the contract.

Interborough Rapid Transit Company, New York, N. Y.—The contract for the construction of the tube connecting Manhattan and Brooklyn in the Fourteenth Street-Eastern District subway has been awarded by the Public Service Commission for the First District of New York to Booth & Flinn, Inc., for $6,639,023.50. Under the agreement the tunnell will be constructed in twenty-seven months instead of thirty-four months, as was first agreed upon.

Niagara Gorge Railroad, Niagara Falls, N. Y.—This company has placed a contract with the General Electric Company for the installation of forty 16-in. projectors with 500-watt General Electric tungsten lamps for illuminating the gorge.

***Prattsburg, N. Y.**—Plans are being considered for an electric railway from Prattsburg to Kanona, with possible extensions to Stanley or Branchport. John Kimmel, Wayland, has an option on the Kanona & Prattsburg Railroad, and the Council at a special meeting granted him a franchise to operate such a line and furnish light and power for Prattsburg.

***Marion, Ohio.**—It is reported that plans are being considered to build an electric line from Marion to Mount Gilead. George D. Copeland, Marion, is interested.

Henryetta, Oklahoma & Western Railway, Henryetta, Okla.—The electrical contractors for this company, which is building a line from Henryetta to Kusa, via Dewar, are A. L. Mitchell Company, 406 Patterson Building, Oklahoma City, Okla. The company plans to build a bridge 400 ft. long. W. T. Croslen, president. [Dec. 18, '15.]

Guthrie-Edmond Electric Railway, Oklahoma City, Okla.—Bids will be opened this month by this company for the 16-mile extension of the Oklahoma Electric Railway from Edmond to Guthrie. Guy B. Treat, Oklahoma City, chief engineer. [Jan. 1, '16.]

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—The application of this company to the Dominion Parliament for an extension of time to construct a line authorized in 1899 from a point on the Niagara River at or near Fort Erie, and an extension to Toronto via Hamilton will be opposed by the Board of Control.

Toronto, Niagara & Western Railway, Toronto, Ont.—The Board of Control has decided to oppose the application of this company to the Dominion Parliament for an extension of time to construct a line authorized in 1914 to extend from Toronto to Hamilton. The company was incorporated in 1903 as the Toronto & Hamilton Railway.

Lancaster & Berks Electric Railway, Lancaster, Pa.—Final survey is now being made for this company's proposed railway from Womelsdorf to Kleinfeltersville. The road will be 6 miles long and will connect at Womelsdorf with the Reading Transit Company's line and at Kleinfelltersville with the Ephrata & Lebanon Traction Company. It is expected that it will be completed and ready for operation in the spring. The line will be built by the Philadelphia Construction Company, which is now in the market for 15,000 railroad ties and 1000 35-ft. chestnut poles, to be delivered along the proposed route. [Feb. 6, '15.]

Nashville & Eastern Electric Railway, Smithville, Tenn.—Surveys are now being made for this company's proposed line between Lebanon and Smithville, 25 miles. The line will connect with the Nashville, Chattanooga & St. Louis Railway at Lebanon. C. T. Edwards, Smithville, is interested. [Nov. 20, '15.]

Brownsville (Tex.) Street Railway.—Operation has been resumed by this company on its 3-mile line in Brownsville, upon which service was suspended last spring.

Ogden, Logan & Idaho Railway, Ogden, Utah.—During 1916 this company plans to spend about $1,000,000 for extensions and improvements to its system. Right-of-way has been purchased for a line from Hot Springs to Brigham City and it is expected that construction will begin soon.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—This company plans to double-track its line between Centerville and Wilcox, about 3 miles.

Norfolk & Western Railway, Norfolk, Va.—It is reported that this company is considering the electrification of its entire Pocahontas division.

SHOPS AND BUILDINGS

Electric Short Line, Minneapolis, Minn.—A fire of unknown origin completely detroyed the repair shops, blacksmith shop, oil house, coal dock and chute of the Electric Short Line Railway on Jan. 15. A store room containing a large amount of stock was also a complete loss, as well as one gas-electric motor car, 12,000 gal. of motor spirits and a considerable amount of lubricating oil. The loss is estimated at approximately $100,000.

International Railway, Buffalo, N. Y.—The Broadway carhouse of this company caught fire on Jan. 14, in which one car was destroyed with the exception of the motor and trucks, and three others badly scorched. The damage is estimated at $5,000.

Ogden, Logan & Idaho Electric Railway, Ogden, Utah.—The following equipment to be installed at its new shops at Ogden will be purchased by this company within the next thirty or sixty days, for delivery about April: New machine tools, such as 36-in. radial drill, 1¼-in. double-head bolt cutter, 24-in. shaper, 24-in. lathe, 14-in. lathe, heavy-duty car-wheel lathe, 36-in. planer, car-wheel boring machine, shears, wood lathe, wood-working machinery, grinders, power-driven hacksaws and all miscellaneous small tools necessary to make the installation complete. All machine tools will be operated by individual motors. The equipment of the shop buildings includes Kinnear steel rolling doors and Kewanee boilers for the heating plant. The three car hoists, which are independently driven by GE-67 railway motors with regular street railway type of controller, are being manufactured locally.

Salt Lake City, Utah.—Excavating has been begun by the Salt Lake Terminal Company on the site of the joint terminal station to be erected at the intersection of South Temple and West Temple Streets for the interurban electric lines centering in Salt Lake City.

POWER HOUSES AND SUBSTATIONS

Rochester Railway & Light Company, Rochester, N. Y.—Plans have been completed by this company for the erection of a new substation between Atlantic Avenue and Leighton Avenue, near the Culver Road. The station will be equipped with two 1400-hp. rotary converters to supply energy for the railway system and 7500 kva. in stationary transformers to furnish electricity for lamps and motors. New equipment, including a 3000-hp. rotary converter, will be installed at No. 6 substation on South Water Street and a 2000-hp. rotary converter in No. 5 substation.

Southeastern Ohio Railway, Zanesville, Ohio.—This company, which has been organized to take over the property of the Southeastern Ohio Railway, Light & Power Company, is considering the construction of an additional power plant.

Montreal Tramways & Power Company, Montreal, Que.—A decision has been made by the Montreal Tramways & Power Company to increase its Notre Dame steam generating plant from 10,000 hp. to 50,000 hp. The first new unit of 17,000 hp. will be installed at once. The total expenditure to be made on the plant will be between $2,000,000 and $3,000,000. The Montreal Public Service Corporation, a subsidiary of the Montreal Tramways & Power Company, is also having plans prepared for a steam generating station of an ultimate capacity of 60,000 hp., the first unit of 15,000 hp. to be installed as soon as possible, and the remaining units as rapidly as called for by the demand for power.

Manufactures and Supplies

ROLLING STOCK

Seattle (Wash.) Municipal Railway expects to purchase two flat cars during 1916.

New York State Railways, Rochester, N. Y., have sent out inquiries for forty new cars.

West Penn Traction Company, Pittsburgh, Pa., is in the market for thirteen double-truck cars.

Morris County Traction Company, Morristown, N. J., is considering the purchase of five new cars.

Electric Short Line, Minneapolis, Minn., in a fire on Jan. 15, which destroyed its repair shops, lost a gas-electric car.

Scranton & Binghamton Railroad, Scranton, Pa., expects to purchase during 1916 three milk and express cars, one work car and three closed passenger motor cars.

Northern Ohio Traction & Light Company, Akron, Ohio, has ordered ten 53-ft. all-steel interurban cars from the Jewett Car Company, and fifteen 50-ft. semi-steel city cars from the St. Louis Car Company.

New York Municipal Railway Corporation, Brooklyn, N. Y., has ordered 200 additional subway cars from the American Car & Foundry Company. This order was announced in the general news department of last week's issue.

Chautauqua Traction Company, Jamestown, N. Y., has ordered four 62-ft. center-entrance type, all-steel interurban cars from the St. Louis (Mo.) Car Company. Three of these will be combination passenger and smoking compartment cars and the fourth will be arranged with an observation end. This order was placed through the Wendell & MacDuffie Company, New York.

Salt Lake & Ogden Railway, Ogden, Utah, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1915, as having ordered six open steel trail cars from the Jewett Car Company, has specified the following dimensions for these cars: length over all, 61 ft. 6¾ in.; length over body corner posts, 50 ft. 4¾ in.; length between bolster centers, 39 ft. 2 in.; width over all, 9 ft. 6 in. These cars are of the one-compartment, passenger type, for trailer excursion service, and will run at a maximum speed of about 60 m.p.h. The general design of these cars is similar to that of the motor cars previously ordered. The underframe is all-steel. The posts are of composite construction, with T-irons and wood fillers. The letterboards will be of steel. The roof is wood, covered with canvas. The floor is of wood, double thickness. Seats are to be Hale & Kilburn walkover with steel oval pedestal base. Curtains are to be made of B. B. striped duck, as manufactured by the Curtain Supply Company. Vestibules will be arranged for through passage for train operation. with swinging door in the center at each end. Wired screens will be installed on each side of the car to protect passengers. Each end will have a Janney radial M. C. B. coupler. Each end of the car is also fitted with a cast-steel spring buffer.

TRADE NOTES

Terry Steam Turbine Company, Hartford, Conn., has appointed Maynard D. Church as chief engineer.

General Railway Signal Company Rochester, N. Y., has appointed W. S. Henry as acting resident manager of the company's New York office.

Woodmansee & Davidson, Chicago, Ill., consulting engineers, have changed their address from 1048 First National Bank Building to 784 Continental and Commercial Bank Building.

Buda Company, Chicago, Ill., has appointed R. B. Fisher, chief engineer, also to the position of sales manager of the frog and switch department, succeeding H. S. Evans, resigned.

Western Electric Company, New York City, has received orders to equip with standard train dispatching telephonic equipment the stations on five of the large Eastern divisions of the Pennsylvania Railroad.

Morgan Crucible Company, Ltd., New York City, announces the appointment of Harry De Steese to its staff as sales engineer. Mr. De Steese has for twenty years been identified with the electric railway and lighting fields.

Curtain Supply Company, Chicago, Ill., has received an order to equip with its Ring No. 88 fixtures and Rex rollers the twenty-five trail cars which were recently ordered by the Long Island Railroad from the Standard Steel Car Company.

American Car & Foundry Company, Chicago, Ill., will appoint James M. Buick, second vice-president, as first vice-president of the company, succeeding Edward S. Carry, recently resigned. Herbert W. Wolff, assistant to Mr. Buick, has been made vice-president in charge of the Chicago sales department.

Duntley Products Sales Company, Chicago, Ill., has organized with headquarters in the Fisher Building. The company will manufacture and sell the Duntley electric cleaners and sweepers, paying particular attention to the apparatus for cleaning and disinfecting passenger coaches. The following are officers of the company: Vice-president, Crawford A. Duntley; secretary-treasurer, William W. Bishop; sales manager, Reuben C. Hallett; manager of the railroad department, W. S. Caspers.

Hywatt Battery & Electric Company, Cleveland, Ohio, is putting on the market a flat cell type of storage battery which has the following unusual features: the battery consists of two to eight cells, inclusive. The two-cell battery measures 4½ in. x 6½ in. x 2⅝ in. The eight-cell battery has the same face measurements, but is 8⅝ in. in length. There are only two binding posts, irrespective of the number of cells. Each cell has a capacity of 60 amp. as against 30 amp. of the round-cell type at 1½ volts. The batteries are said to be absolutely waterproof, tests having been made during which the batteries were for days totally submerged in water, and were not damaged in the least.

Standard Underground Cable Company, Pittsburgh, Pa., announces the following promotions and rearrangements in its general office and factory staffs: In the general offices P. H. W. Smith, formerly vice-president, with duties of general sales manager, becomes vice-president and assistant general manager under President and General Manager J. W. Marsh, and as such will have general supervision of manufacturing and sales activities of the company. His headquarters will be in Pittsburgh, as formerly. Mr. Smith has been connected with the company since 1893. Charles W. Davis, formerly manager of the central sales department, general superintendent of construction and manager of the accessories department, becomes vice-president and general sales manager. Mr. Davis' connection with the company dates from 1900. Arthur A. Anderson, also for many years connected with the company's sales organization at Pittsburgh, has been made manager of the central sales department in the Pittsburgh district. A. F. Hovey has been made manager of the construction department and J. H. Lytle, manager of the accessories department. In the factory organization C. C. Baldwin, formerly superintendent of the wire and rod mill and weatherproof and magnet wire departments, and of the brass and tubing departments at Perth Amboy, N. J., has been made a vice-president of the company and general manager of the Perth Amboy plant. H. W. Fisher continues as chief electrical engineer and now becomes, in addition, manager of the lead cable works and rubber wire and cable factories, under the assistant general manager and president; he is also made an officer of the company by virtue of his appointment as assistant secretary, but will be located at Perth Amboy, as heretofore. Other advancements at the Perth Amboy plant are: Tracy D. Waring, to be assistant manager of the lead cable works and of the rubber wire factory; Albert C. Meyers, to be superintendent of the rubber wire factory, and E. J. Waring to be assistant purchasing agent, in addition to his former duties as business manager at the plant. At the Pittsburgh factory Charles Barbour is given the title of manager of the factory and also of the plant of the Standard Underground Cable Company of Canada, Ltd., at Hamilton, Ont., the duties of which positions he has performed for some time. At the Oakland, Cal., factory, H. H. Gribbon continues as superintendent. The above changes, in practically all cases, are enlargements of previous duties, resulting from the death on Dec. 6, 1915, of W. A. Conner, late vice-president, in charge of the company's manufacturing activities.

ADVERTISING LITERATURE

Joseph Dixon Crucible Company, Jersey City, N. J., has issued a bulletin describing its various graphite products, including flake graphite, heavy graphite machine grease, waterproof graphite grease, graphite cup grease, boiler graphite, pipe joint compounds, solid belt dressing, axle grease and silica-graphite paint.

Westinghouse, Church, Kerr & Company, New York City, have issued an artistically designed folder announcing their service as specialists in concrete construction. As this company also specializes in consulting engineering, electrical engineering, hydraulic engineering, railroad engineering, factory designs and every form of construction in addition to concrete, its single organization with one responsibility enables it to offer at once all of the services which may be involved in a building enterprise.

Ohmer Fare Register Company, Dayton, Ohio, has issued a bulletin entitled "Better Business and Better Methods." The bulletin states that seventy companies whose contracts for Ohmer service expired during 1915 have renewed those contracts for another term of years. The bulletin also contains a special announcement of its new No. 49 type register, which is similar to its No. 39 type, and which is adapted to city service, except that it has a much greater capacity and is designed to meet the requirements of interurban lines where a large number of different denominations of cash and ticket amounts must be considered.

C. A. Wood-Preserver Company, Inc., St. Louis, Mo., has issued a catalog entitled "Conservation by Preservation" which deals with its high boiling wood-preserver oil for treating transmission poles, cross-arms, ties and wood-block floors of carhouses. The catalog contains directions for applying the preservative and shows instances of successful treatment with this material by the Asheville (N. C.) Street Railway, Los Angeles (Cal.) Railway Corporation, Ohio Electric Railway, Galveston (Tex.) Electric Company, Minneapolis (Minn.) Street Railway, Greenville (S. C.) Traction Company and Denver (Col.) City Tramway. The catalog also contains a reprint from the ELECTRIC RAILWAY JOURNAL of Oct. 23, 1915, of a report presented at the St. Louis meeting of the American Institute of Electrical Engineers in which it was pointed out that no appreciable loss by evaporation occurred in a case of poles treated with oil distilling above 250 deg.

NEW PUBLICATION

Official Index to State Legislation. Law Reporting Company, New York. Buckram.

This 1915 index furnishes a ready reference to all State legislation. The arrangement is (a) by subjects, alphabetically; (b) under each subject, by States, alphabetically; (c) under each State, the Senate first and then the Assembly or House; and (d) under each house, the bills first and then the resolutions, numerically, by introduction numbers. The entry for each bill and resolution gives, (1) the bill number, (2) the date of introduction, (3) the name of the member introducing the bill, (4) the subject, (5) the effect of the proposed legislation or the "short title" of the bill, and (6) the position or status of the bill, on the date shown at the head of the column.

In 1916, until June 1, the index will be cumulated and published weekly, and each new issue will contain everything that previous issues have contained, with changes in position of bills and new bills introduced subsequent to the previous issue. Weekly supplements will be issued from June 1 until the publication of the complete annual number, about Aug. 1, in which will be shown the status of bills when the legislatures adjourned. After the issue of the complete annual number, weekly cumulative supplements will be issued when any legislature is in regular or special session.

The subscription to all the weekly numbers and the annual number and supplements, for 1916, will be $100, and subscribers for 1916 will be furnished the final 1915 number for $10 additional.

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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WHY NOT INVESTIGATE THE INVESTIGATORS?

A sequel to the investigation which has been conducted by the Public Service Commission of New York, First District, by the Thompson legislative committee is the charge that the committee has maintained at least an indifferent guard against the squandering of public money appropriated for its use. Whether guilty or not, the committee has created in the public mind a presumption of its guilt by its attitude in regard to the statements which have appeared in the daily press. For instance, the plea has been offered that a "petty disagreement" over a hotel bill should not be allowed to obscure the main issue of uncovering graft, and that an investigation of the expenditures made by other legislative committees would show infinitely greater abuses than in the present case. If this is true, we believe that it is high time that the system of accounting conducted by the State be changed, and that a committee be appointed to investigate the expenditures of the investigating committees, of which many have been appointed by the Legislature during the last few years.

DEATH OF JOHN A. HILL

One of the striking features in the industrial development of this country during the past two decades is typified in the improvement in character and the extension of influence of the trade and technical press. John A. Hill, who died this week in New York, was one of the foremost leaders in this advancement. He was always a strong advocate of high ideals in technical journalism and constantly practised what he preached. He was a believer in the maintenance of the editorial standards of his publications. To him the primary obligation of a class paper is to its readers, and he believed that its advertisers benefit in direct ratio to the respect in which a publication is held by its subscribers. He was one of the first to insist that the advertiser had the right to know the exact paid circulation of every periodical in which he was asked to spend his money. It is not many years ago that the subscription list of numerous class journals was practically a sealed book to its advertisers and was more or less surrounded by mystery. Now practically every periodical not only solicits inspection of its subscription list and subscription methods but publishes in each issue a statement of the exact circulation. Another direction in which Mr. Hill's influence on trade publications was beneficial was in his insisting in his own papers upon greater attention to better typographical and mechanical execution. Originally a printer and mechanic, this side of journalism appealed to him with great force. He never hesitated to change methods where improvements could be made, and the improved condition of all American technical papers of the present day has been in a large measure due to his efforts in this direction. The business press of the country will long remember and respect the methods, the strong personality, the high ideals and the sterling honesty of John A. Hill.

PROPOSED CHANGES IN THE CONSTITUTION

The correspondence between the committee appointed to consider the recommendations of Past-President Allen and the executive committee of the Manufacturers' Association has been printed by the latter and is being sent this week to all of the members of the Manufacturers' Association. It is published on another page of this issue with the resolution adopted by the Manufacturers' special committee and indorsed by the Manufacturers' executive committee disapproving the plan of one association. We also print this week a letter from Mr. Brady, chairman of the American committee making the recommendations, a statement setting forth the reasons, in his opinion, which favor a single association. Our readers have, therefore, before them both viewpoints. The entire subject is to be considered at the mid-year meeting of the association at Chicago, when it is to be hoped a satisfactory conclusion will be reached. There is no doubt, as Mr. Brady says, that the questions now before the industry are very much larger than they were ten or fifteen years ago, and that the proper solution of these problems is of equal importance to electric railway owners and operators and to electric railway manufacturers. If any proof was needed of the necessity of such action, it is given by the statistics in our issue of Jan. 1, which showed a far smaller increase in miles of track built and cars ordered by city and interurban railway companies than during any similar period for many years past. In some important States there was practically no construction, as in Massachusetts, which reported only 1.09 miles of new track, and New Jersey, which reported only 1.97 miles of new track. Anyone who is acquainted with the conditions of the industry, however, does not require statistics to be convinced of the seriousness of the situation from the standpoint of both the manufacturer and operator. There are many ways in which the manufacturers can be of help if they will take a more active participation in the counsels of the association. According to Mr. Brady's letter, the proposed amendments to the constitution are not perfect, and it may be that some better plan of securing the result hoped for may be found. We are strongly convinced of the importance of a greater co-operation between the manufacturing and operating sides of electric railways and that the more real this co-operation and spirit of mutual service are, the better it will be for the industry. Whatever plan is adopted the standard set should be united effort in a program that appeals to all.

WHAT IS GOOD SERVICE?

In the criticisms which appear in the daily press on electric railways, the charge is sometimes made that such and such a company is not giving "good service." But before the public can validly charge an electric railway with not giving "good service," it must define in words more clear than generalities what it means by the phrase.

For instance, to one person the words "good service" may mean a condition that during rush hours, as well as at other times, every passenger should have a seat, or it may mean that when he gets to a corner and wants to take a car the car is ready there for him. If taxicab service is what the public expects from the electric railway, it is obviously impossible to satisfy this expectation. There are many kinds of transportation service, and different agencies are organized to furnish the different varieties. Each may be said to give "good service" so far as it meets the requirements of its specialty.

Good taxicab service consists in having comfortable cabs available for instant call by any prospective passengers anywhere in the territory served; in providing skilled drivers who can safely and expeditiously deliver the passengers to their destinations, and in doing this at a rate of fare commensurate with the expense involved. To expect an approximation to taxicab service at a 5-cent fare is so ridiculous as to be unthinkable, and yet there is a tendency on the part of the public to consider the service which is desired regardless of the rate of fare charged.

Good electric railway service may involve occasional standing in the car, walking 100 yd. along the car line to the nearest stopping point, waiting five minutes for a car at certain hours of the day, even if an important business engagement has to be met, and other slight inconveniences incidental to railway operation under practical conditions. On the other hand, when the public understands that seats for all cannot be furnished at all hours of the day and night, that the location of stopping points a reasonable distance apart conduces to good schedule speed, that the headway has to be adjusted to the density of traffic, which varies from hour to hour, etc., then the complaints will be less frequent, and "boosting" as well as "knocking" will be heard in the land.

It might be well, in the advertising which electric railways do, to devote considerable space to definitions of "good service," so far as electric railways are concerned. Explanations on this point may lead to a clearer understanding on the part of the thinking public as to what "good service" as given by an electric railway really means.

ULTRA-HIGH STEAM PRESSURES

The commencement of work on the new high-pressure steam power station of the Public Service Company of Northern Illinois, as outlined on another page, marks an important step in steam-generating methods. Higher steam pressures of late have been the subject of a great deal of discussion, and plans have been made in several cases to prepare for them when they arrive, but aside from this, remarkably little evidence of a change in practice has been noticeable for a long time. During the past five years, in fact, attention has been devoted almost exclusively to the elaboration of high-capacity operation for steam boilers with incidental consideration to increasing the physical size of boiler units. With the Northern Illinois plant, however, comes a combination of all of the most modern ideas in central station design, not the least noticeable of which is a 350-lb. working steam pressure.

This is, of course, by no means an ultra-radical innovation, even though the highest pressures for stationary plants have remained at about 200 lb. for a couple of decades. In marine practice higher pressures have not been unusual, and at one time even steam locomotive practice evidenced a distinct tendency to go beyond this figure. In the latter case, however, there was a reaction in the advance that possesses at least indirect interest in connection with the present move toward higher pressures in stationary installations. This reaction came about through the enormous increase in maintenance costs that was caused apparently by the relatively small rise in pressure from 200 lb. to, say, 225 lb. It was demonstrated, in fact, that the gain in economy accompanying the higher pressure was far more than offset by decreased reliability and much more costly repairs. In consequence many engines were built for the lower steam pressure, and to-day it is extremely unusual to find a new locomotive which is designed for a pressure of more than 200 lb., while 180 lb. is very common.

Of course, the flat sheets and exposed tube ends of the locomotive boiler impose upon it limitations that do not exist in the case of stationary installations. Nevertheless, it is likely that the general principle of increased repairs with increased pressure will apply to some extent in every instance, and therefore, not all of the economy of the greater temperature range for the prime mover made possible by the higher pressure is going to be net profit. However, there is no doubt that the high-pressure steam will be profitable, and in view of the fact that there is nothing really experimental about its use to the extent involved in the plant in question, satisfactory results from it may be said to be a foregone conclusion. Whether this installation is to be followed by others with still higher pressures until a figure of 600 lb. or 700 lb. is reached is by no means so certain. These pressures have been proposed periodically since Thurston explained their promise of economy in the late nineties, but it must not be forgotten that the temperatures of steam at such pressures plus enough superheat to make it suitable for most advantageous use in all the stages of a turbine bring the initial temperature to a point approximating red heat and may well involve more expense for its control than can be gained from the increased temperature range.

CAUSES OF RAIL CORRUGATION

The cause of rail corrugation is a subject so old that it becomes perennially new, and that there is just as much interest as well as mystery as ever about the cause of this peculiar wear is shown by the number of letters which we have published on the subject within the last three weeks. In the current issue one prominent engineer gives his reasons for believing that the cause of rail corrugation is the character of wheels used rather than the shape of the rail. He cites the interesting fact that one division of his line was free from corrugation when cast-iron wheels were being employed, but with the introduction of the steel wheel, the other conditions remaining the same, corrugation immediately appeared. Later the same thing happened on another division of his lines. On the other hand, the engineer of maintenance of way on another very large property, in a letter also in this issue, agrees with the first writer only in rejecting the theory that the shape of the rail determines the extent of corrugation. He gives reasons for attributing this peculiar wear to the hardness of the modern rail.

The electric railways in this country are not the only ones on which rail corrugation has been noted. It has attracted as much, or even more, attention abroad, or had before the commencement of the war. The Germans, especially, had made a study of the subject through their own association as well as through a special committee of the International Street & Interurban Railway Association. The war has naturally interrupted these studies, but according to one of the last reports of the International committee, the rigidity of the rail support has a great deal to do with the production of corrugation, and among the remedial measures tried one went even to a slotting of the web to give a more flexible support. Another theory advanced abroad, and which had a number of supporters, was that the primary cause lay in the chattering of the rolls when the rails were in the mill, that a careful examination would even disclose evidences of minute corrugations in new rails before they were laid, and that the operation of the cars served simply to develop and accentuate these incipient waves and crests on the rail surface.

In view of the wide interest in this matter and its importance to railway companies, we believe, as we said in the issue of Dec. 25, that the subject is one which could very profitably receive careful consideration by the committee on way matters of the American Electric Railway Engineering Association. All of the theories which have been advanced to explain the cause of rail corrugation cannot be true. But perhaps one reason for their large number is that it is about as difficult to prove any of these theories to be wrong as to prove them to be right.

FARE INCREASES AND A REASONABLE RATE OF RETURN

An electric railway which has secured permission from the proper regulating tribunal to raise its rates after a hard struggle to make both ends meet has by no means always before it a clear-cut road to prosperity. Its future then becomes a business question. Since the public must in the long run pay the cost of the service which it uses, the people at large must meet every authorized fare increase without any serious diminution of patronage.

There are economic limitations of rates beyond which no regulative authority can act, and they are set by the value of the service to the public. The fact that a commission declares itself in favor of a reasonable return by no means insures such a return, and the United States Supreme Court itself cannot guarantee the business success of a public service corporation by setting forth its recognition of the right of honestly-invested capital to its reasonable compensation. External controlling influences must come into play upon utility finances before the reasonable return can be received by the investor, and among the factors which have to be considered in the free establishment of rates are the existence or prospect of competition; development of private means of transportation, purchasing power of the individual, necessity for the service, possibility of reducing expenses, proportion of revenue devoted to taxation, and other items.

On the operating side, certainly running expenses, bond and note interest and depreciation must be covered by the rates if an enterprise is to exist on the barest economic margin. Failing, such rates, or revenue rather, a receivership looms near, unless outside support can be had. There may be cases occasionally where the economic need of a utility was not sufficient to justify its construction and where competition or other conditions will not permit rates sufficient to meet the interest charges, and on such roads a receivership is inevitable. On other roads not so badly situated, after a fair trial of the increased rates, the only possible course is to wait for the gradual development of the territory, keeping expenses as low as is feasible, cultivating every vestige of latent traffic, and seeking so far as possible to ease some of the burdens of taxation, accident cost, assessments for local improvements and reconstruction of road and equipment.

Not for a single moment do we desire to belittle the immense importance of securing authority after clear demonstration of the need to make rate increases, but we do wish to point out that some of the considerations above outlined explain the hesitation of many able managers from applying to their respective commissions for permission to establish higher fares on a scale which arithmetically provides the 6, 7 or 8 per cent return which they look upon as reasonable for their properties. Rate increases are needed by numerous roads, but if anyone thinks that with a higher fare unit the financial worries of all railway men will disappear, he is risking a good deal of disappointment.

Bay State Carhouse at Lowell

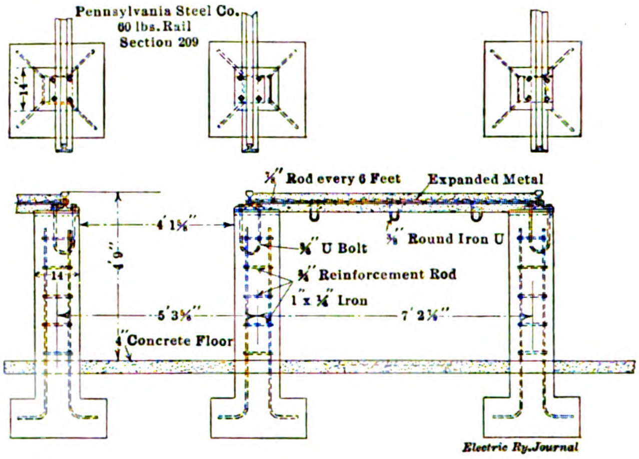
Main Features and Detailed Costs of One of the Most Modern Carhouses on the Bay State Street Railway's System—It was Built to Accommodate Eighty 40-Ft. Cars at a Total Investment of Less Than $1,000 per Car, Exclusive of Real Estate

ONE of the latest carhouses of the Bay State Street Railway is located on Middlesex Street, Lowell, Mass., adjacent to the company's local power plant and additional to an existing carhouse and shops. The building has a capacity of eighty 40-ft. cars, with ample room for extension when it becomes necessary. It is a combination of brick construction with concrete floors and foundations, and was designed by the equipment department of the company. The cost was $77,110 exclusive of real estate, and the building contains a small shop for light repairs and inspection service in addition to quarters for the local line and track departments, a stock room and a sand-handling plant.

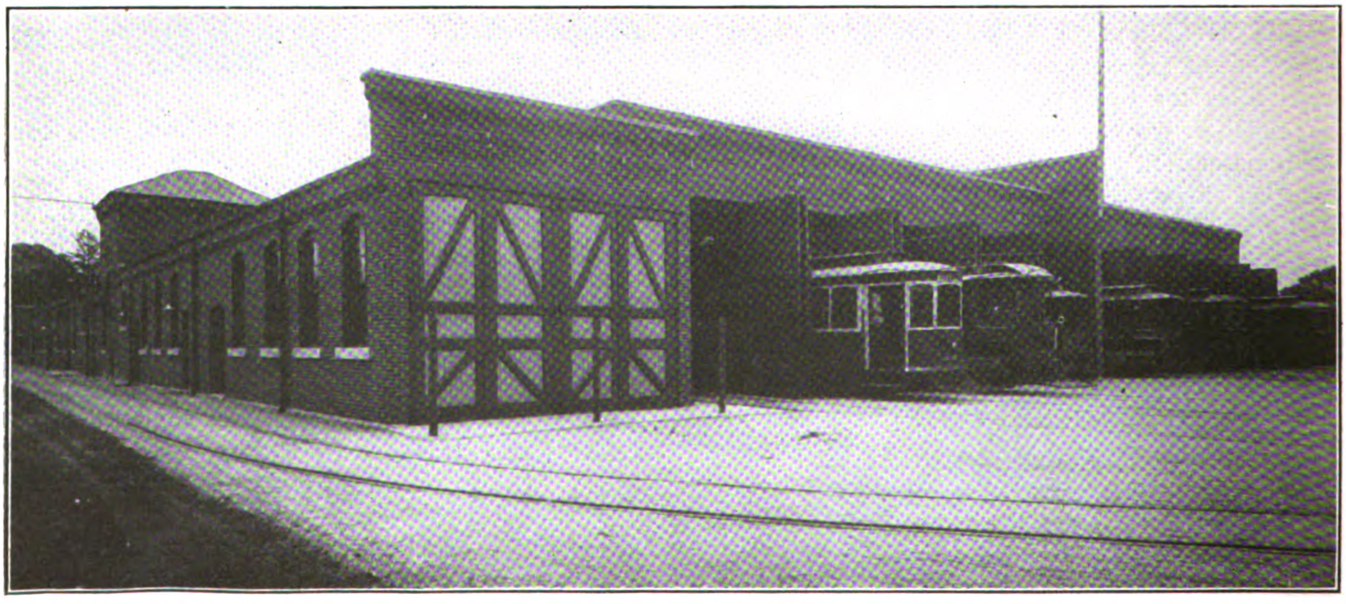
Over all the building is 280 ft. 6 in. x 145 ft. It contains ten parallel tracks, seven being provided with pits, and is divided into three sections separated by brick fire walls 12 in. thick. It is one story in height, there being no basement except a compartment containing a Gurney hot water heater and coal bin. The area under the floor between pits is open to a depth of 4 ft. 9 in. The piers are of reinforced concrete, and the floor of the pit section is 4 in. thick, the main floor of the carhouse being 6 in. thick and reinforced with expanded metal. The roof is of six-ply tar and gravel on timber supports, and is provided with the usual extension fire walls, these being carried from 5 ft. to 6 ft. 6 in. above the roof and about 5 ft. beyond the end.

All pits are 200 ft. long and about 4 ft. wide between piers, with drainage toward a central duct system discharging into a brook near the building. The house tracks are of 60-lb. T-rail carried on cast-iron plates at the piers and clamped to the plates by ¾-in. U-bolts as illustrated. The piers are 7 ft. apart on centers, and located opposite each other, being 12 in. x 14 in. in section. The outside walls are 16 in. thick, and wooden swinging doors are provided at the end of each track. The yard tracks are connected with the double-track main line by four spurs, and two additional tracks are located outside and parallel to the building from front to rear. The yard tracks are laid in rock ballast and the yard is 190 ft. long from the street to the carhouse, providing ample space for switching and temporary storage.

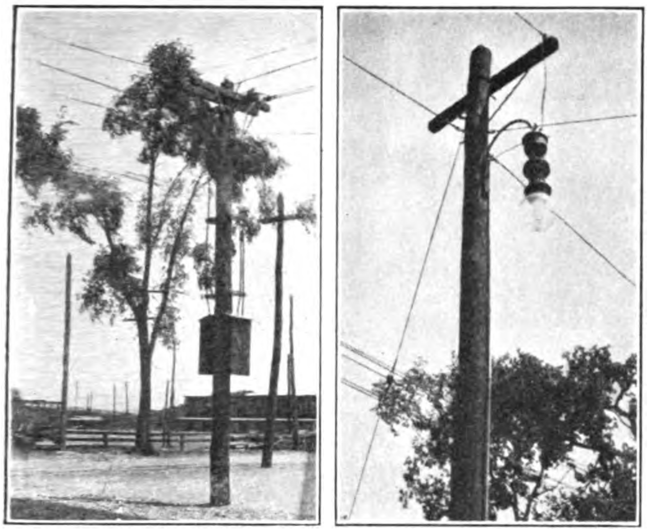
Span construction is used throughout the yard except over the two outside tracks, where bracket suspension is employed. The outside track on the east side of the building borders a roadway convenient when handling supplies by teams, and rapid deliveries can be made at any of the subdivided quarters above outlined, which are 20 ft. wide and extend from end to end of the carhouse. There is clearance of 5 ft. between the inside rail and the building wall to facilitate the loading and discharge of service cars on the side track. The yard is lighted by five inclosed arc lamps run in series off the trolley circuit. The lamps are suspended by iron hooks 16 ft. above the ground, and the last lamp of the circuit is grounded to the rail by a lead with drip loop, carried through a ¾-in. pipe to the rail. Both the yard lighting



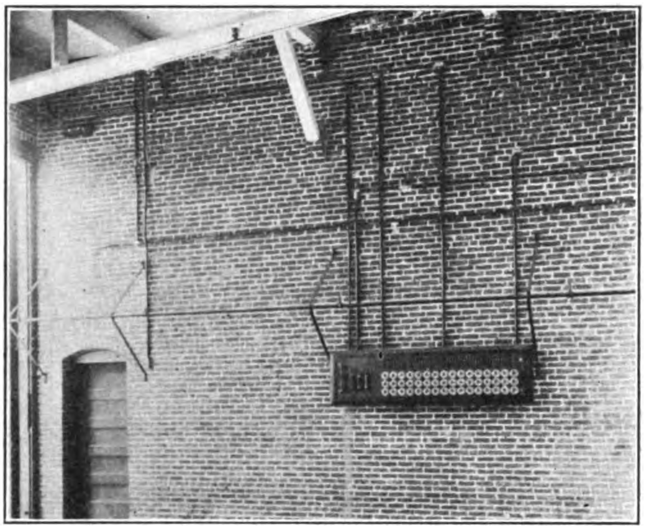
BAY STATE CARHOUSE—DETAILS OF PIT CONSTRUCTION



BAY STATE CARHOUSE—GENERAL VIEW SHOWING TOWER WAGON GARAGE AND SAND TOWER AT LEFT-HAND SIDE OF CARHOUSE



BAY STATE CARHOUSE—FEEDER SWITCH POLE BOX; GROUNDED ARC LAMP AT END OF YARD CIRCUIT



BAY STATE CARHOUSE—POWER AND LIGHTING CONDUIT AND WALL SPRINKLERS

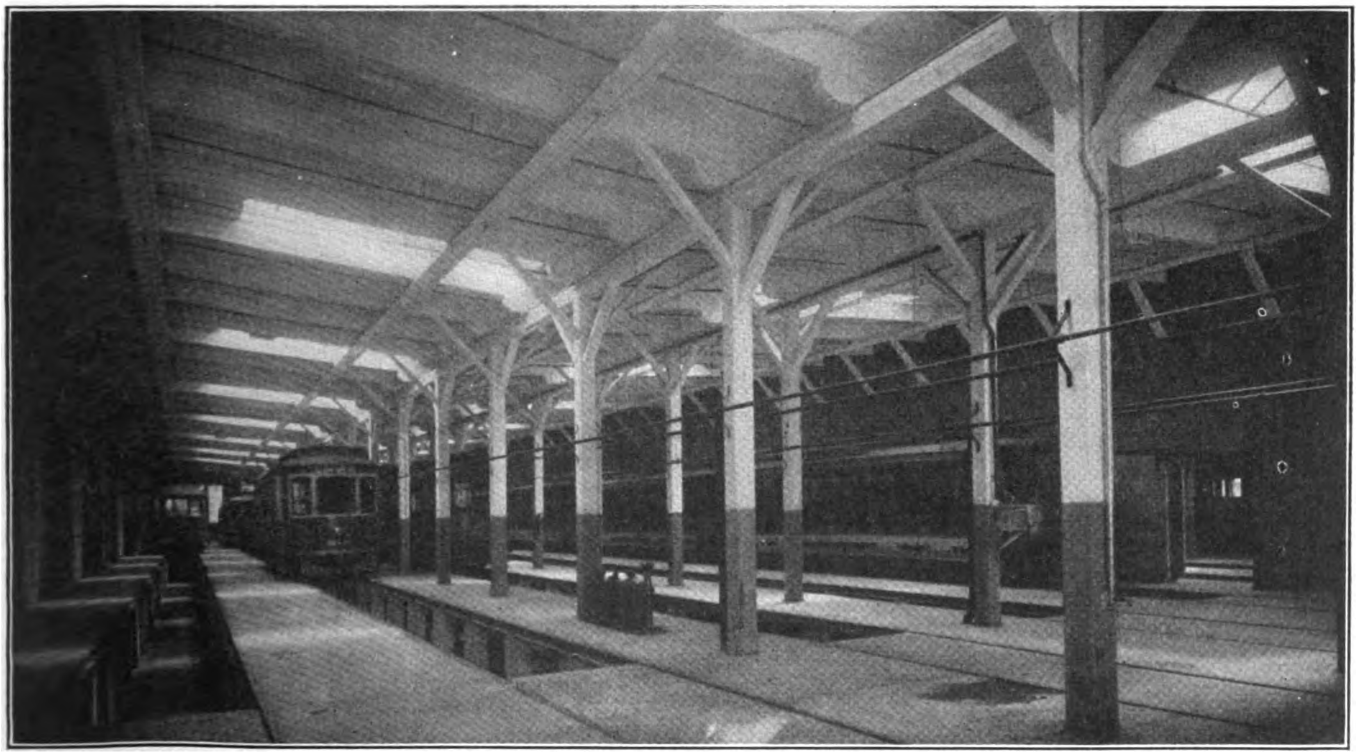
and carhouse power supply are controlled by knife switches mounted in pole boxes outside the building.

CARHOUSE AND SHOP EQUIPMENT

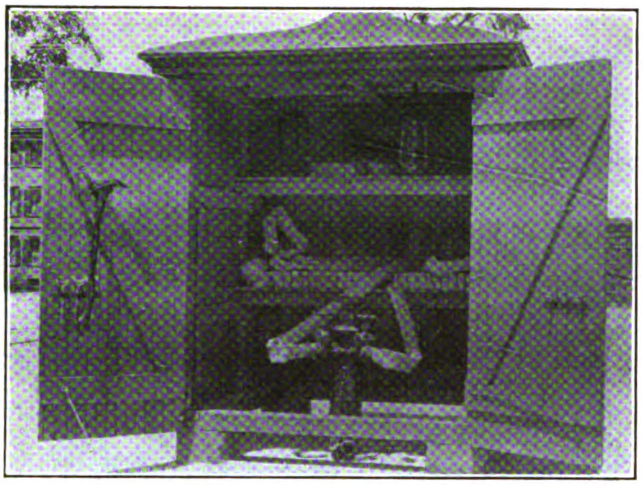
The building is equipped with Rockwood sprinklers throughout, there being 535 ceiling heads, 426 aisle heads and about fifty heads in the easterly section of the establishment. The dry-pipe system is installed, with four dry valves located in a compartment near the small repair shop. Air is supplied by a 6-hp. "National" motor-driven compressor mounted in one corner of the shop, and the water supply is taken from an 8-in. main leading from the power plant, where a fire pump supplements the city pressure.

Aisle sprinkler heads in general are staggered and mounted 8 ft. apart longitudinally in each line, the adjacent lines being 30 in. apart and from 8 ft. 6 in. to 8 ft. 9 in. above the rail. Two air tanks, each 6 ft. long and 30 in. in diameter, are provided. Along the interior brick walls the sprinkler distributing pipes are carried by 3/8-in. x 1 3/8-in. iron brace rods as illustrated, with a 25-in. clearance from the wall to the head. A 6-in. connection with the street main supplements the line to the power plant. Twenty-three wired-glass monitors are provided on the roof and each is equipped with two sprinkler heads, five being provided in a tower above the sand pit. A ventilator surmounts each monitor at one end of the latter.

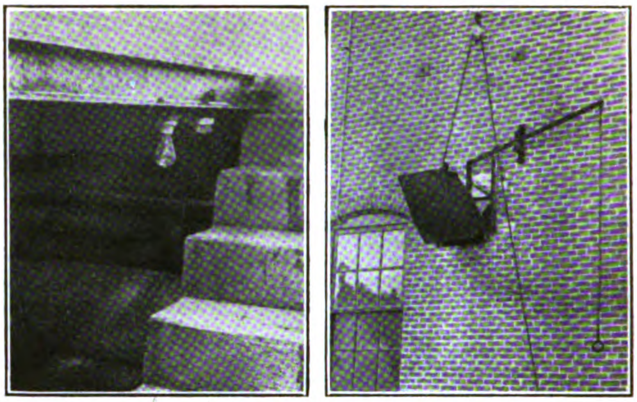
Drainage arrangements are provided so that cars can be washed in any part of the carhouse. The interior illumination is provided by the monitors, supplemented by 56-watt incandescent lamps in the pits and along the walls. Near the entrance the main feed for both lighting and power service is carried through an inclosed fuse to a distributing board equipped with main lighting and power switches and forty-eight snap switches for local lighting circuits, each being provided with a 5-amp. inclosed fuse and mounted on a slate panel 7 ft. long and 18 in. wide. The snap switches are of the Hart indicating type and control the circuits lead-



BAY STATE CARHOUSE—INTERIOR VIEW, SHOWING SPRINKLER LOCATION



BAY STATE CARHOUSE—HYDRANT HOUSE IN YARD

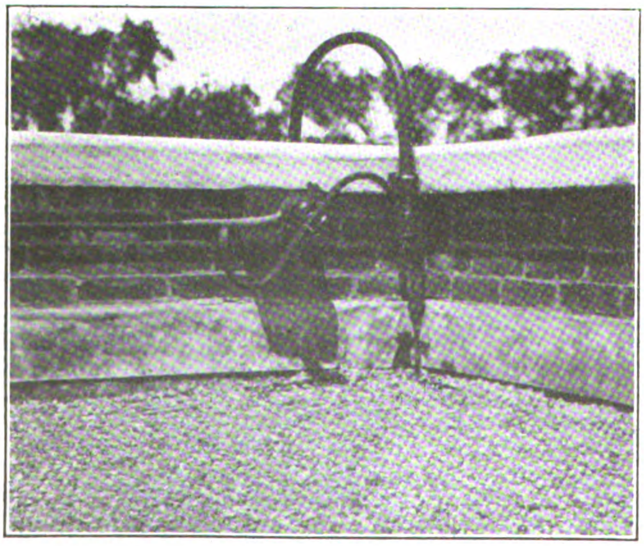


BAY STATE CARHOUSE—PIT LAMP; HINGED SAND SPOUT

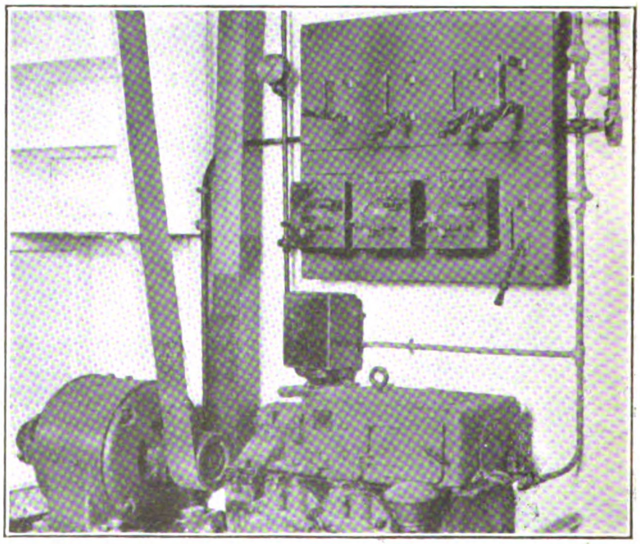
ing to the pits, offices, shop and other portions of the building. The panel is bolted to curved iron straps, which are in turn bolted into the wall and concealed behind the panel itself, the clearance being 7 in. between the panel and the wall. The bottom row of switches is 5 ft. 6 in. above the floor, in the interests of accessibility. A 23-watt lamp is installed over the track number at each door. In the pits 64-watt carbon incandescents are used, with four circuits for each pit, controlled by snap switches at either end. One lamp is mounted on the bottom of the rail behind each pier, the lamps in parallel rows being placed opposite one another and 3 ft. 6 in. above the floor. All interior wiring is in conduit, with the obvious exception of the trolley, which is carried under a trough at a height of from 16 ft. to 18 ft. above the rail. Five compressed-air outlets are provided in each pit. Wall lamps are mounted 14 ft. apart and 12 ft. above the floor.

Sand is discharged from the company's cars through the outer windows of a 20-ft. x 26-ft. sand compartment and thence elevated by a bucket conveyor driven by a 7½-hp. motor to a bin of 600 cu. yd. capacity. From here it is carried downward through ducts, either to a sand drier located directly below the bin or to two spouts, one of which discharges into a car within the building and the other outside. The spouts are each provided with a 12-in. x 24-in. opening controlled by a slide valve operated by hand lever, the spout being hinged and drawn out of the way by a rope when not in use. After passing through the drier, which is equipped with hot-water coils, the sand is ordinarily delivered to the motormen in buckets. The conveyor buckets are inclined and chain-driven, 12 in. long and 12 in. wide and from 1 in. to 5½ in. deep, tapering from front to rear. They are spaced 12 in. apart on centers and are easily inspected, either at the receiving room or through a hatchway at the top of the sand tower, which is illuminated by two 23-watt lamps. The coal bin of the heater room has a capacity of 50 tons, and a 5-hp. sump pump is provided to discharge accumulated water in the room into the sewer.

The repair shop contains a 24-in. Snyder drill, a grindstone and two emery wheels, group driven by a 7½-hp. motor. This motor, the air compressor, the conveyor motor and the pump motor are controlled from a small switchboard in the shop equipped with the usual knife and automatic release switches and rheostats, all motors being of the 600-volt, direct-current type. Tools are illuminated by two groups of five 23-watt lamps each, mounted in white-enameled reflectors about 9 ft. above the floor. The power panel is 36 in. x 39 in. in size and is carried by 1½-in. x ½-in. strap iron bolted into the wall. Two benches, two blacksmith's hand forges and a number of stock bins are also provided. At the front of the building a garage 21 ft. x 18 ft. in dimensions is provided for tower wagon equipment, with a panel carrying a positive and negative switch for battery charging in case an electrically propelled wagon is employed. These switches are separated by a wooden barrier 1 in. thick and 5½ in. deep, stud terminals being provided at the bottom of the panel for



BAY STATE CARHOUSE—LOCATION OF FEEDER CONNECTION ON ROOF



BAY STATE CARHOUSE—SHOP MOTOR, COMPRESSOR AND SWITCHBOARD

DETAILED COST OF MIDDLESEX STREET CARHOUSE—BAY STATE STREET RAILWAY

	Quantity		Unit Price	Total
Excavation	3,565	cu. yd.	$0.50	$1,782
Trenching	500	cu. yd.	.60	300
Fill	1,264	cu. yd.	.25	316
Concrete—plain foundation	908	cu. yd.	5.75	5,221
Concrete catch basins	3.6	cu. yd.	..	29
Concrete, 4-in. floor	40,998	sq. ft.	.12	4,920
Concrete, 4-in. sidewalk	56	sq. ft.	.18	10
Concrete coping, 13-in. wall	11	cu. yd.	12.00	132
Concrete steps	21	cu. ft.	.33	7
Concrete, reinforced coal bin	3.3	cu. yd.	10.00	33
Concrete sills	271	cu. ft.	.45	122
Concrete steps	23	cu. yd.	12.00	276
Concrete piers	10,295	cu. ft.	.30	3,088
Concrete, 6-in. floor	7,672	sq. ft.	.35	2,685
Tile coping, 13-in. wall	292	lin. ft.	.20	58
Brick chimney	4,000		16.00	64
Brick walls	671,000		15.00	10,065
Brick pilasters	19,000		16.00	304
Brick corbels	12,000		17.00	204
Timber—framing	53,000	bd. ft.	45.00	2,385
Timber—roof sheathing	79,000	bd. ft.	50.00	3,950
Timber—wall sheathing D & M	4,000	bd. ft.	55.00	220
Timber—shiplap	200	bd. ft.	50.00	10
Timber—miscellaneous	..		..	166
Roofing—tar and gravel	39,085	sq. ft.	..	2,900
Roofing—slate	550	sq. ft.	.10	55
Millwork—doors	582	sq. ft.	..	398
Millwork—windows	2,758	sq. ft.	..	1,863
Carhouse doors	1,495	sq. ft.	..	748
Skylights	2,352	sq. ft.	..	2,117
Cast iron	23,430	lb.	.03	703
Catch basins	6		7.50	45
Manhole—30-in. light weight	1		8.00	8
Manhole—29-in. heavy weight	1		10.00	10
Floor lights	22	sq. ft.	1.00	22
Steel—old rails	9,500	lb.	.02	190
Steel—stairways, etc.	7,149	lb.	.06	429
Steel—structural	1,569	lb.	.04	63
Drains	..		..	602
Heating	..		..	5,451
Electric lighting	..		..	2,601
Plumbing	..		..	1,039
Painting	9,819	sq. yd.	.18	1,767
Varnishing	561	sq. yd.	.25	140
Sprinklers	..		..	8,752
Fence—wood	..		..	1,095
Total				$67,345
Engineering, interest, insurance, contingencies, 11 per cent				7,408
Taxes and organization (during construction), 3.5 per cent				2,357
Grand total				$77,110

the attachment of charging leads, and each switch is in circuit with a 75-amp. inclosed fuse. The panel is of 1-in. slate, 16 in. x 18 in. in size, and is carried 6 in. from the wall.

The carhouse is equipped with three hydrant and hose houses located in the yard, and has nine stations equipped with Eco watchman's clock service. Each hose house is 6 ft. square and 6 ft. 6 in. high, containing one two-way hydrant and 225 ft. of hose in three lengths, with lantern, axe and wrenches. Each house is set on four concrete piers 12 in. square and 8 in. high, with a concrete base below. The houses are open under the roof and below the bottom, giving excellent air circulation.

CONSTRUCTION COSTS

The detailed cost of the carhouse, as compiled by the company's engineers, is shown in the accompanying table. The total given therein does not include the cost of three hydrant houses in the carhouse yard, which amounted to a total of $143 in addition.

The entire Pennsylvania Railroad System, whose 26,000 miles of track serve more than half the people of the United States, completed on Dec. 31 two years without one of the 361,572,114 passengers carried in that period being killed in a train accident. Figures for November and December were necessarily estimated. This record of two years means the safe operation of no less than 2,400,000 passenger trains, while at the same time approximately as many more freight trains were being cared for. A New Year's greeting to employees of the Pennsylvania Railroad from S. C. Long, general manager—posted on bulletin boards all over the railroad—congratulates them on the road's freedom from accident.

Power for Massachusetts Railways

Public Service Commission Gives Power Costs and Energy Consumption for Electric Railways

THE third annual report of the Public Service Commission of Massachusetts, covering the year ending June 30, 1915, contains the results of an investigation of the power plant conditions upon the various electric railways in the commonwealth, this having been considered necessary in connection with the investigation of proposed increases in the rates of fare. The information was requested from the various railway companies by circular letters, and the data which were developed from the replies appear in part in the accompanying table, the figures applying to the year ended June 30, 1914.

In all cases the figures are given for power measured as it leaves the power house or substation in direct-current form. The costs shown in the first column of the table include all power plant expense for fuel water, wages and maintenance, and the figures given in the second column show these generating costs plus 11 per cent on the power plant investment for interest and depreciation. In the third column the costs per kilowatt hour apply only to power that is purchased, and in this case no interest on plant investment is included, the cost being simply the rate paid to the company which supplies the power to the railway. In some cases the street railways which purchase all or a large portion of their power have idle stations which are kept in reserve, and although interest on the cost of these stations should properly be added to the amount paid for power, it was not possible to determine what this investment is in all cases, so that it has not been included in the figures of the third column.

TABLE SHOWING POWER COSTS IN CENTS PER KILOWATT HOUR ON MASSACHUSETTS ELECTRIC RAILWAYS

	Generating Cost per Kw.-hr.	Cost Plus 11 Per Cent Int. and Depr'n	Cost of Purchased Power	Kw.-hr. per Car-Mile	Total Car-Miles, Thousands
Bay State	0.77	1.36	....	3.40	30,612
Boston Elevated	.58	1.28	0.71	3.60	59,200
Worcester Consolidated	1.22	...	0.45	3.87	8,997
Springfield	.77	...	1.00	4.05	7,947
Berkshire	.89	1.71	0.55	3.92	3,726
Middlesex & Boston	1.41	...	0.75	2.85	3,756
Massachusetts Northeastern	...	...	1.40	3.54	2,545
Boston & Worcester	.99	1.80	...	3.82	2,122
Holyoke	1.03	1.56	...	3.39	2,134
Union	.84	1.32	1.20	2.74	2,788
Northern Massachusetts	2.85	3.65	1.80	3.15	877
Connecticut Valley	1.41	1.75	1.40	3.37	961
Milford & Uxbridge	1.62	2.34	1.20	3.57	765
New Bedford & Onset	1.67	2.52	2.00	2.86	520
Fitchburg & Leominster (water)	.58	.82	...	3.98	1,129
Fitchburg & Leominster (steam)	1.07	1.49	...		
Milford, Attleboro & Woonsocket	1.30	...	2.50	3.55	477
Northampton	.92	1.44	...	3.74	747
Interstate Consolidated	...	...	...	...	788
Brockton & Plymouth	1.08	2.43	2.00	2.59	456
Norfolk & Bristol	1.34	1.88	...	2.60	463
Norton & Taunton	1.97	2.90	...	2.12	368
Warren, Brookfield & Spencer	2.02	2.58	...	2.06	274
Blue Hill	1.36	2.34	2.82	2.45	375
Concord, Maynard & Hudson	1.75	2.78	...	2.79	286
Taunton & Pawtucket	2.38	3.26	...	2.66	251

A considerable variation in the cost of coal at the power house is found on the various railways. For the first five companies in the list, the average cost of coal per ton of 2240 lb. is as follows: Bay State, $4; Boston Elevated, $3.56; Worcester Consolidated, $4.15; Springfield, $4.17; Berkshire, $3.76. The maximum price paid for coal by any one of the companies is $5.50 per long ton in the case of the Connecticut Valley Railway, the lowest price being that applying in the case of the Boston Elevated Railway, owing to the proximity of its generating stations to tidewater.

Manufacturers' Night at Boston

New England Street Railway Club Hears Address by Cornell S. Hawley on Relations Between Electric Railway Men and Manufacturers

NEARLY 400 members and guests of the New England Street Railway Club celebrated the first "Manufacturers' Night" in the history of the organization at the American House, Boston, on Jan. 25. The speaker of the evening was Cornell S. Hawley, president of the Laconia Car Company, Boston, and a past-president of the American Electric Railway Manufacturers' Association, his subject being the "Relation Between Electric Railway Men and the Manufacturers." At the close of the address, extracts from which are given below, an entertainment program consisting of a strenuous amateur minstrel show staged by club members was enjoyed by all present.

Mr. Hawley spoke in part as follows:

"The electric railways are operating, in many cases, under exacting regulations and facing serious wage demands. They cannot without permission from some commission or organization increase fares or reduce service or wages. It is, however, to be hoped that future railway laws in all States will be those well designated as the 'wisest laws,' laws that will 'lay down general principles and standards and give to the administrative body ample discretionary executive powers.'

"We all realize that any efforts by the manufacturers to create a better feeling on the part of the public towards the railways are helpful not only to the railways but to the manufacturers themselves. The prosperity of the manufacturers is dependent upon that of the railway companies.

"Probably in no line of business are the relations between the purchasers and the manufacturers more cordial than in the electric railway field. The railway man assists the manufacturer in pointing out to him new fields for his devices or inventions and improvements which can be made in his present apparatus. And the manufacturer is equally ready and willing to show the railway man where economies or improvements can be made in the railway equipment or construction. This mutual interest inspired the organization of the present Manufacturers' Association, which was formed at the Saratoga convention in 1903. Its purpose, as stated in the by-laws, was not alone the advancement of the interest of its members, but also the advancement of the interests of the Railway Association and its affiliated bodies. The membership roll of the Manufacturers' Association has increased very rapidly, the scope of its work broadened, and I believe it has fully met the expectations of its organizers. The Railway and the Manufacturers' associations have worked in the utmost harmony. It was, however, at the recent convention suggested by the retiring president of the American Electric Railway Association that a still closer relationship would be advisable, and the executive committee of the Railway Association, acting upon this suggestion, has recommended a change in its by-laws to provide for an affiliated association consisting either of the present association or a new one.

"If such a closer relationship can be established and the manufacturers retain their organization and perform the same functions as at present, this will undoubtedly meet with the hearty approval of the manufacturers. Some fears, however, have been expressed that the closer relationship suggested may mean the practical absorption of the Manufacturers' Association.

"We have recently read with great pleasure that 'the swing of the pendulum is toward constructive policies. For the first time in some years the annual message of the President is not punctuated with sharp shafts aimed at the railways, the industries, the corporations, the banks and the possessors and creators of wealth.' 'The people now realize their delusions. They discovered that when big business was crippled, little business suffered; that when the initiative was taken from industry, not only the capital invested suffered, but that every workman suffered with his employer.'

"And what James J. Hill, that great railroad builder, has said concerning the steam railroads, applies also to the electric railways. That is, 'The railroad is the sap of the industrial tree. It is the speed indicator of industry. It is the thermometer of credit. Its stability, its prosperity, its ability to confront with confidence a totally new era in the capitalistic and credit conditions of the world, must be protected and assured. No duty devolving upon those who sit in the watch-tower of the world can take precedence of this."

John A. Hill Dies

Had Done a Great Deal to Advance the Interests of Technical Journalism

JOHN A. HILL, president of the Hill Publishing Company of New York, died suddenly from heart disease on Jan. 24 while traveling to his office from his residence in New Jersey. His company publishes *Engineering and Mining Journal, Engineering News, Power, Coal Age* and *American Machinist.*

JOHN A. HILL

Mr. Hill was born in Vermont, and at the time of his death was fifty-seven years old. His early life was spent in Central Wisconsin, and at fourteen years of age he entered a rural printing office.

After putting in a few years gaining practical experience there he purchased a half interest in a machine shop, but, in 1878, he moved to Colorado. Here, for a time, he operated a locomotive on the Denver & Rio Grande Railroad, but his bent toward journalism induced him to found in 1885 the *Daily Press* at Pueblo, Col., of which he was editor for several years, and to write articles on locomotive and machine shop engineering for the technical press. A number of his technical articles written during this time were published in *Locomotive Engineering* of New York and led to an invitation to him in 1888 to take charge of the paper. Seeing its possibilities, Mr. Hill associated himself with Angus Sinclair and purchased the publication, whose subscription list grew rapidly. After eight years with *Locomotive Engineering* Mr. Hill, in 1896, sold his interest in that paper to Mr. Sinclair and purchased the *American Machinist.* Later, *Power, Engineering and Mining Journal,* and *Engineering News* were purchased. *Coal Age* was established in 1911.

To house these different publications the Hill Building was erected at Thirty-sixth Street and Tenth Avenue, New York. It is thirteen stories in height and occupied largely by the several publications of the Hill Publishing Company and by the printing plant operated in connection with them. Many special devices for expediting the work and safeguarding the employees are installed in this building.

Construction and Operating Details of Philadelphia Electrification*

The Author Describes the Service Supplied by the Suburban Electrification, Explaining the Reasons for Choice of the A.C. System and Outlining the Methods Used in the Design and Construction of the Overhead Wiring

By GEORGE GIBBS
Gibbs & Hill, Consulting Engineers, New York City

THE recently-inaugurated electric train service between Philadelphia and Paoli on the Pennsylvania Railroad is wholly suburban, neither through passenger nor freight service having been electrified. To provide for these latter services electric locomotives would have been required, together with the establishment of outlying yards and extensive engine terminals for the interchange of power, and these would have introduced complicated problems in the way of rearrangement of engine runs, special freight switching and the delay to passenger service incident to the additional power interchange. Also, electric operation for through trains would not have assisted in the solution of the problem of congestion at Broad Street Station, the primary reason for the installation, and it was not, therefore, considered in connection with the recent electrification.

The electrified suburban service includes all of the Philadelphia-Paoli locals and expresses, consisting of seventy-eight trains a day operated regularly at half-hourly intervals with additional trains in the morning and evening rush hours. The half-hourly trains make all stops, while the extra rush-hour trains, five each way per day, omit stops for about one-fourth of the run in the outskirts of Philadelphia. There are nineteen intermediate stations on the line, making the average distance about 1 mile between stations. The running time, under steam conditions, was fifty minutes for east-bound local trains and fifty-seven minutes for west-bound local trains, owing to the 0.7 per cent average grade existing for the first 10 miles of route outside of Philadelphia. Under electric operation, the equipment was laid out to operate on a forty-seven-minute east-bound schedule and a fifty-minute west-bound schedule.

At present, as initial operation, the runs are made in forty-nine minutes and fifty-two minutes respectively, this being equivalent to an average speed, including stops, of practically 25 m.p.h. The maximum power required during acceleration is about 850 hp. per car, and for the present electric schedule the demand for power during short-time peaks is about 20,000 kw., and the average hourly demand during the rush-hour is about 6000 kw. The average load for the day is only about 2000 kw.

To meet the schedule requirements two of the most powerful electric motors which could be placed upon one truck without raising the car floor or weakening the underframe were installed, these being of 225 hp. with forced ventilation, and, to make the schedule independent of the number of the cars in the train, all cars were equipped with motors.

CHOICE OF ELECTRIC SYSTEM

The choice of electric system for the Philadelphia installation was made after a careful analysis of all systems available, not only for the present work and its probable extension in and around Philadelphia, but for possible future application of electric traction to long-distance hauls on the main line of the railroad. Because of the fact that the railroad company had an important and successful third-rail direct-current electric installation at its New York terminal, it was naturally predisposed to adopt the same system in Philadelphia, provided that this was found suitable for long-distance extension in the future for all kinds of traffic. However, the character of the New York installation was fixed by local conditions in an underground terminal and by the state of the art at the time it was decided on, nearly ten years ago. Therefore, the presence of this system, while it was, of course, considered, was not allowed to handicap future extensions there and elsewhere, especially because a new and better system had been since developed and could be made to operate harmoniously with the existing system.

It was concluded that an overhead contact wire, conveying high-tension alternating current, was the most suitable system for long-distance traction with heavy and relatively infrequent train units, and presented also the fewest objectionable features for the equipment of large and complicated yards. In addition, an extremely simple and efficient appliance, the mercury-arc rectifier, had fortunately been developed, so that it had become possible to operate direct-current or alternating-current motors interchangeably on either an alternating-current line or a direct-current line. This development was the last step needed to unify the operations of the two prominent electric systems, and the company was thus enabled to adopt the alternating-current system in Philadelphia with the assurance that if Philadelphia and New York were electrically connected in the future, the two systems would work together to make a complete operating division.

CATENARY CONSTRUCTION

The overhead contact wire from which the high-tension alternating current is collected has been designed, in this installation, to be supported on a catenary system without any provision for changes in height due to temperature variations. In foreign installations the contact line has been frequently divided into sections a half mile long with the wire anchored at the middle of each section, and the two ends provided with tension weights running over pulleys. But complications are introduced in carrying out consistently any automatic tension scheme, and the writer believes that, for the present at least, it is inadvisable to complicate overhead structures with such devices in advance of positive knowledge that they will be needed.

On the Philadelphia electrification the result of not using automatic tension has been that there is a maximum vertical movement of trolley wire of about 12 in. on tangents for each 100 deg. of temperature range, and on curves this movement may be as much as 30 in. with a 20-in. horizontal movement.

Throughout the installation insulation of the very best kind has been used. On portions of the line subject to frequent hard usage, at least double insulation has been provided, and on sections of the line subjected to the most uncertainty or abuse triple insulation to ground has been installed. The material for the insulators also was made the subject of a very careful study. The writer was much impressed with the beautiful appearance of foreign-made porcelain insulators, especially the German, and obtained representative samples for tests. Upon investigation, however, it did not appear that these were entirely desirable for American conditions, chiefly because of their excessive brittleness. It was finally decided to adopt American porcelain insulators made by the wet process, special care being taken to produce mixtures which would withstand sudden changes in temperature. In general the problem of obtaining perfect insulators seems to reside chiefly in getting a proper mixture free from impurities, and in molding it without voids and firing it at the proper temperature. If the insulator is over-fired it will be very brittle, and if under-fired it will be too porous, so that moisture will be absorbed and will cause an electrical failure.

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*Abstract of a paper presented before the Philadelphia branch of the American Society of Civil Engineers, Jan. 3, 1916.

Suspension-type catenary insulators were used for all of the overhead construction. These consist of three porcelain disks in series, each 8 in. in diameter and cemented into a malleable iron cap. The porcelain and the metal part are put together at a temperature of 120 deg. Fahr., so that in cooling they will not produce bursting strains on the porcelain by differential contraction. Electrical tests were made both wet and dry, and under the worst conditions these were required to show in the completed unit a factor of safety of ten in the wet tests and of twenty in the dry tests. Mechanically, the breaking strength of these insulators is about 18,000 lbs., while the maximum working load is 5500 lb.

CONSTRUCTION METHODS

In connection with the erection of the overhead construction the first important operations were in the designing offices, where the plans for all structures were made in detail. It was especially important to avoid, as far as possible, all cutting and fitting of wires, hangers, etc., in the field, and in consequence, elaborate and complete plans were made in the designing office to determine the position which the trolley wires would assume at each point over the line with certain predetermined sags, the location of messengers in reference to the tracks, etc. The calculations established the length of all trolley wire hangers which were furnished from the plant to the field cut to length and fitted with their attachments. When put into position it was found that the trolley hung in its proper plane and position with but little field adjustment. While this process involved a large amount of designing, it was considered that it was amply justified by the resulting saving in cost and time during the construction period.

Excavation for about 412 bridge foundations was required for the catenary supports, and the soil for the most part was of clay which was stiff enough to require no shoring when the excavation was followed closely by the concreting. The aggregates for foundation concrete were distributed by a work train in approximately the required quantity adjacent to each foundation, and all concrete was hand-mixed on boards and was poured very wet, so that it was not necessary to do a great deal of tamping. As far as practicable, excavations for the ground ends of the anchors were made at the same time as those for the pole foundations, and the concrete slabs at the bottom of the anchors were poured at the same time as the main foundation.

In the erection of bridge structures the poles were unloaded near their respective locations and then lifted into place on their foundations by a derrick car. The anchor and signal bridges were erected in position by a derrick car directly from the freight cars on which they were received. Following this, the cross-catenary spans, consisting of top and bottom wires with their connecting links, all previously fitted together at the construction yards, were hung in place from work trains, and the whole catenary pole span was then completed by putting on the guy rods and making final adjustments for tension.

ERECTION OF LONGITUDINAL WIRES

When enough structures and bridges were in place and the insulators suspended from them, wire-stringing work trains were organized. These were usually made up of one or two flat cars to carry the reels of wire, one or two tower cars and a box car used as a material and tool car. The steel messenger wire was fed out from the top of the tower car and strung from anchor bridge to anchor bridge and adjusted to the proper unloaded tensions, which were furnished by the office force. Until final adjustments were made this messenger wire was supported on pulley blocks suspended from the insulators, thus allowing it free play longitudinally. These blocks were removed later and regular supporting castings were substituted.

While supporting its own weight only, the cable was given such a tension as would be necessary to insure proper sag when fully loaded. This tension was computed and furnished to the field forces by means of curves showing the relation between temperature and tension for each stretch between anchor bridges. The proper tension was obtained by means of a dynamometer, and the cable was allowed to stand for a time and adjust itself approximately to uniform tension throughout its length, and then was finally socketed and anchored at both ends.

Following the erection of the messenger wire, a train made up of several tower cars marked the proper location of the hangers on the messenger in accordance with the drawings, and then fastened in position the hangers which had previously been cut to length and fitted with castings. The next operation was to string the auxiliary and main trolley wires from anchor bridge to anchor bridge, holding the wires temporarily at the bottom of the hangers by means of iron straps which could readily and quickly be applied.

The final operation, which was carried out by a train of tower cars, was to adjust the trolleys to their proper tension and to clip them in. Where cross-overs, section breaks, etc., occurred, the fittings were put in as a last operation, because only one or two tower cars were required to accommodate the number of workmen that could be employed to advantage in the short lengths involved.

For all of this overhead construction, ten flat cars were equipped with towers, the working platforms of which could be readily raised and lowered by means of chain blocks. When in the lowest position these towers had a height of 18 ft. 6 in. above the rail, with a possible raise of 4 ft. The number of men employed in the construction work varied from 200 to 685, and were variously divided into gangs at different stages of the work, consisting of laborers on excavation and concrete, iron workers on the erection of structures, linemen for stringing the wires, bonding gangs on track bonding, carpenters on form work, and miscellaneous workmen and wiremen on the equipment of substations.

Foundations for catenary bridges were completed at the average rate of about two per day, reaching a maximum of six per day. With the derrick car twenty-five poles could be picked up and set in place per day, the tubular bridges being erected and completed at the rate of two per day. The erection of longitudinal wiring, including messenger and trolleys, clipping in and adjusting, etc., was completed at the rate of 3.1 track-miles per day for straightaway work. The wire train, stringing four wires at once, could run out 8 miles per day, but in complicated yard work the progress, of course, was much slower. The equipment of one train at work for about twenty-six weeks was required to string and clip in the trolleys and to make the section breaks, cross-overs, etc., complete. Track bonds were applied at the rate of about 250 bonds per day.

New Franchise Adopted in Des Moines

Digest Covers Main Points of Rehabilitation, Safety and Service Regulations, Supervisors, Arbitration, and Fares and Transfers

THE Des Moines (Iowa) City Railway, after ten years of franchise controversy and negotiations, recently secured what is considered by its owners to be a workable franchise, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 4, page 1137. In view of the extended negotiations carried on before reaching the final results, the general publicity given to the case and the importance of the company, it is felt that a résumé of the main provisions of the franchise may now be of interest to electric railway operators.

PROVISIONS FOR REHABILITATION AND NEW CONSTRUCTION

The franchise extends for twenty-five years from the date of the final acceptance by the company after the approval by the electors. Within three years after the passage of the ordinance the company is required to follow a program of reconstruction, rehabilitation and new construction involving an expenditure of $1,500,000. Within this time it must remove from the streets all its present unused track, make certain specified extensions, reconstruct at least 20 miles of the existing tracks with new rails of the most modern and improved type, increase its present power plant by adding the necessary equipment for efficient and continuous operation, place in service within nine months after the approval of the ordinance at least twenty-five new double-truck cars of up-to-date design (said cars to be equipped with four motors and with both hand and power brakes), and make certain property transfers with the Inter-Urban Railway.

The franchise contains various detailed specifications in regard to the construction and spacing of tracks, rails, bonding, special work, poles and wires, feeder and transmission wires, conduits and conductors. In the matter of extensions, it is provided that a majority of the adult residents of any district may, in writing, petition the City Council for an extension, and this body may order the extension made, provided the territory contain a sufficient population for the company to receive a revenue equal to the cost of operating the cars (including ordinary track, car and overhead maintenance expenses), together with a reasonable depreciation upon the cost of the extension and the equipment used.

SAFETY AND SERVICE REGULATIONS

The company is required to operate on all its lines cars of modern design and equipment, and all its new cars must be equal in efficiency to the type previously described, and be furnished with such improvements and appliances as are deemed by the supervisors necessary and proper for the safety, convenience and comfort of the passengers, the employees and the public. It is the intent of the ordinance that the construction, machinery and equipment as a whole be kept abreast of the progress of invention and be at all times equal in quality to that in use on the best managed and equipped street railways in cities of the same size and class.

It is expressly agreed in the ordinance that no dividends on the outstanding stock are to be considered or allowed in determining the quality or quantity of service the company is obligated to furnish. Subject to the payment of all costs of operation, including taxes and interest at not to exceed 5 per cent on the company's bonded indebtedness and not to exceed 6 per cent on its other indebtedness, and also subject to the setting aside of a depreciation fund after the three-year period, the city is entitled to have and the company is bound to render first-class service.

Unless otherwise provided by statute the company, except for snow and ice, is not required to sweep, clean or sprinkle any street save in places where by reason of sand or other causes it is itself responsible for the condition. Even snow and ice need not be removed from unpaved streets or from paved streets in the outlying districts, unless in the judgment of the City Council the snow and ice removed from the tracks to the other portion of the street constitute a serious impediment to public traffic. The company is responsible for the improvement and maintenance of streets and pavement between its tracks and 1 ft. outside, and on bridges for the space of 3½ ft. each way from the center line between the rails.

The company is allowed to use either overhead or underground trolley construction and any motive power except steam locomotives, but any power other than electricity may be utilized only with the consent of the city. In the case of electric motive power, each motor passenger car must be in the control of a motorman and a conductor who have had at least ten days' instruction under an experienced motorman or conductor in service for at least one year immediately prior to such instruction.

APPOINTMENT OF SUPERVISORS

The ordinance provides that two supervisors shall be chosen to have control over the quantity and the quality of service, schedules, routes and terminals, the character and equipment of cars, and the stopping points for cars. One supervisor, representing the city and holding office at the pleasure of the City Council, is supposed to act as a technical adviser to this body in all matters affecting the interpretation or application of the ordinance. The other supervisor is to act in behalf of the company and represent it in all transactions with the city arising out of operation under the ordinance. The company may at any time, upon notice to the city, have the duties of the company supervisor performed by a designated executive office to the same effect as if the former were acting. The company must furnish the city supervisor with a furnished room and necessary clerical help, the latter now to cost not to exceed $100 per month. This allowance, however, is to be increased hereafter in the same ratio as the gross receipts of the company increase. The salary of the city supervisor must be paid by the company at the rate of one-fourth of 1 per cent of the gross annual earnings, but not to exceed $5,000 per annum. The company must furnish the city supervisor monthly reports of car mileage, earnings and expenses of operation, investments in renewals, betterments and additions, and such other reports as are requested by him or the City Council, and must give him free access to inspect and audit the books.

The ordinance provides for arbitration of questions upon which the supervisors fail to reach an agreement, and of differences between the company and its employees in matters not excluded from arbitration or covered by some other method of settlement under law or contract. Each of the parties must appoint one arbitrator within five days after written notice. If the two arbitrators fail to decide within fifteen days after the notice for the appointment of the arbitrators is given, or such additional time not exceeding thirty days as the arbitrators unanimously agree upon, the parties must within five days after notice thereof appoint a third arbitrator. In the case of failure to do so, the two arbitrators already appointed are to select the third one. In case this is impossible the Supreme Court of Iowa is to appoint the third arbitrator. Moreover, in case either party fails to appoint its arbitrator at first, this court, upon the application of the party not in default, may appoint the arbitrator for the other one.

RATES OF FARE AND TRANSFERS

The maximum rate of fare for a single continuous ride within the limits of the city in one direction is fixed at 5 cents, but the company in at least twenty-five convenient places must sell to any person applying therefore six tickets for 25 cents, each as good as a 5-cent fare. The fare for children under twelve years of age is 2.5 cents, the payment of a 5-cent cash fare entitling a child to a ticket which will be accepted as fare for another ride. Children under six years of age, when accompanied by an adult paying fare, may ride free. High school pupils on their way to and from school on actual school days, between 7.30 a. m. and 4.30 p. m. are to be carried on non-transferable tickets sold in books at the rate of twenty for 50 cents. These tickets must be kept on sale in all high schools by persons furnished without charge by the principals thereof. The charge for owl service may be double the maximum rate.

Transfers must be issued for lines that cross or come within what the supervisors consider a reasonable distance of the line on which the rider first took passage, but the payment of a single fare will not entitle the passenger to reverse his general direction of travel. Transfers will be issued upon transfers without additional charge, under reasonable regulations for the prevention of fraud. The use of a transfer by other than the one to whom originally issued is a misdemeanor, punishable by a fine not to exceed $25.

MISCELLANEOUS REQUIREMENTS

The ordinance contains other clauses relating to the use of the company's tracks for interurban and freight traffic, the necessity of city approval in locating new lines and abandoning old ones, and the joint use of poles by the city without compensation. It also provides that the company must advise the city of the terms of all security sales, and that the proceeds must be used for refunding purposes or for additions, betterments and improvements.

After the expiration of the three-year rehabilitation period the company is required to set up a sufficient depreciation fund to cover "replacement, renewals, new equipment and installations necessary to maintain the entire system and preserve the property of the company, including power plants, overhead car lines, transmission lines, feeder lines, track and car equipment in an efficient operating condition and in modern first-class condition suitable for carrying on the company's business."

The company agrees to give the city the right, during the term of the franchise, upon at least six months' previous notice in writing, to purchase the entire street railway system. For this purpose it was agreed that the value of the property, as of Aug. 1, 1915, was $5,000,000. Provision is also made that a default in observing the ordinance for three months (unless due to strikes, court action or other unavoidable causes) constitutes a forfeiture of the grant. The company must remain an Iowa corporation, with principal office in Des Moines.

The company may pay salaries according to those of enterprises of similar magnitude and general character for like services, but the city by written notice may object to any specified salaries, and in the event of a disagreement, the determination of a proper amount must be submitted to arbitration.

High-Pressure Steam Station in Illinois

A Steam Pressure of 350 Lb. Will Be Generated in 10,000 Sq. Ft. Boilers

WORK has been started on the new power station of the Public Service Company of Northern Illinois on the Desplaines River 1 mile south of Joliet, Ill. This installation will embody the latest ideas in high-pressure steam generation. The three Babcock & Wilcox boilers to be installed will be of the cross-drum type with a heating surface of 10,000 sq. ft. and will produce steam at 350 lb. pressure with 225 deg. Fahr. superheat. Superimposed on each boiler there will be a Babcock & Wilcox all-steel economizer with 6700 sq. ft. of heating surface. Each boiler with its economizer will comprise a complete unit which will be incased in a steel shell to prevent air leakage. Two of these units will supply enough steam to operate one 12,000-kva. turbogenerator. The third boiler will be held in reserve.

Two Babcock & Wilcox chain-grate stokers placed side by side in a single furnace will serve each boiler. The stokers will each measure 8 ft. wide x 14.5 ft. long, giving a grate area of 232 sq. ft. per boiler. The ratio of grate area to heating surface will be 1 to 42.5. This is one of the highest ratios used by any power house in the Middle West. Induced draft will be supplied by motor-driven blowers. An individual self-supporting steel stack will be installed for each boiler. The only steam-driven auxiliaries in the plant will be the boiler-feed pumps, which are to be of the multi-stage, turbine-driven type. A bucket elevator will be used to convey the coal from the cars to overhead bunkers, and the ashes will be handled entirely by conveyors from the furnace until deposited in outgoing gondola cars. The fuel used will be screenings from the Illinois mines.

For the present one turbine of the Curtis horizontal type with an exciter on the same shaft will be installed. It will be rated at 12,500 kva. or 10,000 kw. at 80 per cent power factor, and will produce energy at 12,000 volts, three-phase, 60 cycles. The turbine is designed for a working pressure of 300 lb. In the steel and masonry building which will be erected space will be provided for a future unit which will probably have a rating of 20,000 kw.

The Westinghouse surface condenser into which the turbine will exhaust will contain 20,000 sq. ft. of cooling surface and will be designed for a back pressure of 0.77 in. absolute. With the turbine operating at full load the condenser will take 18,000 gal. of circulating water a minute. The condenser auxiliaries, including the Leblanc air pump, are all to be motor-driven.

The station is being designed by Sargent & Lundy, consulting engineers, Chicago, assisted by Von Holst & Fyfe, architects. It will be operated by the Public Service Company of Northern Illinois, of which Samuel Insull is president, F. J. Baker is vice-president in charge of operation and construction, G. H. Lukes general superintendent, and J. L. Hecht mechanical engineer.

Illinois Association Meets

The Principal Paper Presented Was on Expanded Steel Truss Poles, Whose Method of Manufacture and Performance in Service Were Described—There Was Also a Discussion on the Safety Code, and Officers for the Ensuing Year Were Elected

SIXTY members of the Illinois Electric Railways Association attended the annual meeting in Chicago on Jan. 21. New officers were elected, and a stereopticon lecture on steel poles was delivered by A. J. Bates of the Bates Expanded Steel Truss Company, Chicago. The present status of the proposed safety code rules of the Bureau of Standards, Department of Commerce, was detailed by John Leisenring, chairman of the engineering committee of the Illinois association.

L. C. Haynes, East St. Louis & Suburban Railway, called the meeting to order, as President F. E. Fisher was delayed by floods in the Illinois River valley.

PROPOSED SAFETY CODE RULES

Mr. Leisenring, Illinois Traction System, spoke of the need for close attention on the part of all railway members to the proposed safety code of rules. The president of the association had sent out a request for a written discussion of the rules, but the lack of answers indicated that the importance of the rules had not been realized. The rules were prepared by the Bureau of Standards about two years ago. Since that time the bureau has held numerous open meetings, and a large number of changes in the rules have been made as a result of work of the committees of the American Electric Railway Association and other associations. The present code, he said, was much less radical than that originally proposed, but there were still some points that needed revision. It is understood that after the rules have been finally approved and sent to the State commissions the bureau will recommend their adoption for a trial period of one year. Then the necessary revisions will be made, and the rules will finally be adopted for all properties. Much weight should be attached to these rules, because they will be promulgated by a government body.

Mr. Leisenring said that probably a final meeting would be held at Washington during the next two or three months to secure the ratification of the code as it now stands. A letter from S. W. Stratton, director of the Bureau of Standards, was read. This letter outlined the course of procedure which would be followed in obtaining final ratification of the code.

The chair, at the request of Mr. Leisenring, called upon E. J. Blair, Chicago Elevated Railways, to say a word regarding the proposed safety code rules. Mr. Blair said it was his desire to try out all of the rules that applied to his property and thus learn by actual experience which rules might be objectionable. After the trial he would be able to turn in valid objections, not objections to little things like the installation of rubber mats and minor safety improvements that would total but a few hundred dollars. Mr. Blair recited the work which has been done by the American Electric Railway Association toward the revision of this code, and he recommended that the Illinois Association instruct its engineering committee to study the code during the coming year so that it might prepare a strong discussion of the code later on.

Mr. Leisenring then described the year's work as planned for the engineering committee of the Illinois Association. He said that the studies had been confined to the subject of power economy, subdivided into three parts: (1) Distribution; (2) on the car; (3) return circuit. Papers had been read at previous meetings of the association on the subject of oxy-acetylene welding and on the proper location of feeder taps. These were part of Subjects 1 and 3. The paper of the day on the subject of steel poles was a part of Subject 1. Later a paper would be presented on the power economies to be obtained on the car. Mr. Leisenring then introduced A. J. Bates as the inventor and manufacturer of "a remarkable new expanded steel truss pole which was meeting with success in the electric railway electric lighting and telephone fields."

THE EXPANDED STEEL TRUSS POLE

Mr. Bates described and illustrated with the help of a lantern, the development and the commercial manufacture of his light-weight one-piece steel truss pole intended for general use on electric railways as a substitute for heavier steel poles and wooden poles.

An article describing this type of pole appeared on page 370 of the issue of this paper for Aug. 28, 1915.

The author said that the truss type of structure was fundamentally correct for poles because its design was such as to obtain maximum strength in proportion to weight, and that this strength could be applied in the direction in which it was needed. Fabricated poles were too costly to compete with wood except under special conditions, but a very light-weight expanded steel truss with the strength across the line and flexibility along the line made possible the use of steel poles in direct competition with wood. By means of his process of shearing an I-beam longitudinally and expanding it into a pole, he obtained a truss structure from one piece of steel and eliminated all excess material such as that required for lapping and riveting in a fabricated pole. He presented a comparison of a latticed pole 22 ft. long which he said, due to punching for riveting. had had its effective strength reduced by ½ in. of its width and also contained 107 lb. of useless material. There were fifty-one pieces of steel to be assembled at a high cost for labor, and the total weight was 377 lb.

The Bates pole made of one piece of the same length and strength weighed but 270 lb., contained no excess metal, had no joints, was easy to paint and had been manufactured at a comparatively low labor cost. The surface of all the material in this type of pole was exposed so that it could readily be painted. There were no closed air pockets, as in a tubular pole, to accelerate the formation of moisture and hasten rusting in inaccessible places. By reason of the design of this pole, as compared with the tubular steel pole, it is possible on account of the ease of manufacture and the full utilization of the metal to sell two expanded poles for the price of one tubular pole.

The author pointed out that the time to calculate the strength of a pole was not when it was first installed but after five or six years of life. He then showed a picture of an Archbold-Brady 72-ft. A-frame flexible transmission line structure that had been twisted under test. He said that many miles of transmission line had been built of these structures and that they were very satisfactory in service. He called attention to the fact that while these structures had comparatively low strength along the line, they were exceptionally strong across the line. Mr. Bates pointed out that this was a design of structure which, if followed for transmission service, would give excellent results. He believed that designers in the past had called for too great strength along the line, even going so far as to demand an intermediate structure, which in case of broken wires would serve as a dead-end structure.

The speaker then showed with lantern slides how the poles were made in his company's steel plant at East Chicago, Ind. Specially rolled I-beams are passed under a rotary shear 30 ft. in diameter which cuts the web of the beam and provides for the expansion which is done later. This shear has a capacity of one pole every half minute. After the shearing process the beams are charged into a furnace and then taken to an expanding machine which grips the two flanges and pulls them apart forming a truss from the sheared parts of the web. The beam is now a pole, and it is passed onto a cooling and straightening bed and later, at a temperature of 200 deg., is dipped into hot paint. This painting process with steam coils in the paint tank serves to coat the steel in an exceptionally thorough manner, because the hot liquid is so thin that it gets under the scale and penetrates any oxide that may be covering the metal.

The capacity of the manufacturing plant is now 450 poles a day. Slides were displayed showing the line of special malleable-iron fittings which had been designed to provide for a convenient attachment of cross-arms, span wires, etc. Other slides showed poles erected along the lines of several steam and electric railways. One installation made by the Aurora, Elgin & Chicago Railroad at St. Charles had 30-ft. poles on one side of the street and 35-ft. poles on the opposite side. The pairs carried the span wires and the longer poles carried cross-arms supporting the wires of the Chicago Telephone Company. One view showed an installation of a 300-ft. high-tension line span carried on 60-ft. poles. These 60-ft. poles had been made by combining two 35-ft. poles for the base and adding a 25-ft. pole for the top, the three poles being riveted together. The total cost for the 60-ft. pole was about $1 a foot.

Mr. Bates also described the design, manufacture and use of expanded steel trusses for fence posts, car sills, car-truck side frames and for use in the Bates reinforced concrete tie. He said that the tie consumption by the American railways was more than 750 ties a minute. A very strong, durable tie is obtained by the use of a pair of Bates expanded steel trusses as reinforcement and concrete made extremely dense by mounting the molds on a jigger. Thus the compressive strength is increased from 1600 lb. to 3200 lb. per square inch.

ELECTION OF OFFICERS

After the transaction of usual business the following officers were elected to serve during the coming year:

President, J. R. Blackhall, general manager Chicago & Joliet Electric Railway.

Vice-president, C. F. Handshy, assistant general manager Illinois Traction System, Springfield, Ill.

Second vice-president, D. E. Parsons, general manager East St. Louis & Suburban Railway.

Executive committee: F. E. Fisher, general superintendent Chicago, Ottawa & Peoria Railway, Joliet, Ill.; B. I. Budd, president Chicago Elevated Railways; H. E. Chubbuck, vice-president executive Illinois Traction System, Peoria, Ill.; Joseph F. Porter, president Tri-City Railway & Light Company, Davenport, Iowa; E. C. Faber, general manager Aurora, Elgin & Chicago Railroad, Aurora, Ill.; Frank J. Baker, Middle West Utilities Company, Chicago, Ill.

At the close of the meeting John Benham, International Register Company, Chicago, announced the summer boat trip meeting of the Central Electric Railway Association, which has chartered a large passenger steamer for a tour from Toledo up the Great Lakes to the Soo and down to Benton Harbor and Chicago.

Wood Preservers' Association Proceedings

Chicago Convention Disapproves of the Proposed Specifications for Wood-Block Paving and Preservatives

AT the Chicago convention of the American Wood Preservers' Association, referred to in last week's issue when abstracts were published of the papers interesting to electric railways, discussion centered on the subject of wood-block paving. A special report which was read on wood-block preservative specifications by S. R. Church produced considerable opposition, owing to the fact that the proposed specification was a broad one and would let in nearly every kind of oil derived from coal, gas or coke-oven tar. It was contended, however, that practically all oils gave equally good protection against decay, so that there was no necessity to quibble over the oil specifications when the real difficulty lay in getting a proper treatment. The manufacturers of water gas considered that provision should be made for their oil and presented a long brief in support of this contention, but the committee members answered that as yet they had not become acquainted with sufficient records to warrant advocating its use. By a close vote the proposal to adopt the specification as a standard for the society was defeated, but the report was received as information and referred to the standing committee on preservatives. Following this the report of the committee on wood-block paving which was printed in last week's issue was subjected to so many suggested changes from the floor that it was referred back to the committee for the ensuing year.

During the course of the business session of the association which followed the technical meetings the publication of a manual of suggested practice was urged. This plan was provided for last year, but it has not yet been carried out. Also, President Waterman suggested that a research committee be formed to investigate all new methods, whether patented or not. A new constitution was adopted providing for probate membership instead of junior membership, the probate members being eligible for corporate membership within five years. The time of the annual meeting was changed to the fourth Tuesday in January to avoid the conflict with the meeting of the American Society of Civil Engineers, and a letter ballot for the election of officers was adopted.

The secretary of the association reported a membership of 276, a gain of eleven over the previous year, and stated that the quarterly magazine, *Wood Preserving*, had cost the association about $390 net. A conference committee was authorized to work in co-operation with other organizations, with the idea of cutting down the number of requests sent out each year to various companies and engineers. New York City was chosen as the place for the next annual convention.

The officers selected for the ensuing year are as follows: President, Carl G. Crawford, general manager American Creosoting Company; first vice-president, John Foley, chief forester Pennsylvania Railroad; second vice-president, Morris A. Trumbull, vice-president National Lumber & Creosoting Company; secretary-treasurer, F. J. Angier, superintendent of timber preservation Baltimore & Ohio Railroad; members of executive Committee, F. F. Pooler and A. R. Joyce.

Carhouse Design and Construction*

The Author Outlines Considerations Affecting Location, Architecture and Equipment of Modern Carhouses

BY C. F. BEDWELL
Assistant Engineer Public Service Railway of New Jersey.

THE selection of the site for a carhouse is an entirely different proposition from that of determining the location of a power house, repair shop or general maintenance of way headquarters. For a broad example, in the building of a new electric railway line tentative schedules are made and the number of cars necessary to operate that schedule for the time being is determined and an estimate made for the probable number of cars that will be required to take care of the increase in traffic and line extensions for twenty or thirty years. Thus having determined as nearly as possible the traffic and car requirements, a location for the carhouse is selected. This location first must be such that the non-revenue car mileage will be reduced to a minimum, so that when the car starts out on its run it will soon begin to earn money by picking up passengers and will not require expenditure of money for power and platform expenses due to dead mileage. The same holds true when the time comes to pull the car in.

Generally, for city and suburban service, it is found best to locate the carhouse at or near the end of the line, or at the first terminal point, and if the trolley line runs from one town to another the carhouse might be located to advantage midway between the towns or at a point where traffic is light.

When the location for the carhouse is determined upon, the actual site should be investigated carefully as to its physical condition, the nature of the soil, what means there are or what means can be provided for drainage, what provision can be made for adequate water supply for fire protection, how the property grades and investigation should be made as to possibilities of obtaining franchises for track connections from the municipal officials. But, of course, the selection of a site is more or less determined by the value of the real estate and available property in the desired neighborhood. Sometimes it appears to be more economical to buy a comparatively poor piece of property for a lesser sum, and, with a nominal expenditure for grading and drainage, it can often be made of equivalent value for carhouse purposes as another piece of property of higher cost; that is, high and dry. It certainly is not desirable to pick out a site for a carhouse in a swamp or on the side of a mountain, or where an excess of rock will be encountered in excavation.

The physical layout of the property and track arrangements have a great deal to do with the design of the carhouse. In fact, the operation of cars and track layout has always been given first consideration, and the design is made to meet the ideal layout as far as possible. At an operating carhouse a saving of time is of the utmost importance, and the track layout should be designed with that point in view. The planning of the track should be such that there will be no interference between incoming and outgoing cars, the loop operation being, naturally, the most convenient, and the installation of "Y" tracks, where the entrance and exit from the carhouse connects with the main line, provides for most flexible operation. The connections from the carhouse to the main operating line should be, of course, as few as possible in order to minimize special work in the operating tracks. Great care should be taken in the design of track work and building so that ample clearance is allowed between cars and all nearest points, so as to minimize the possibility of accidents. Another primary condition to be kept in mind in the design of a carhouse is that of providing for proper drainage. The grade of the tracks in the building and yard should be such that ample drainage can be provided so as to prevent any possibility of storm water entering the building.

The older carhouses on a great many properties throughout the country are very beautiful examples of architecture, but are laid out with no regard at all for satisfactory and economical operation. In fact, I know of one, only recently built in the Middle West, that is completely covered, even to the special work leading into the building. In this arrangement there is only one narrow opening controlling the carhouse, which is exceedingly bad for operation and worse from a fire hazard standpoint. It is a most uneconomical design, as there is certainly no need of inclosing a lot of special work upon which cars cannot be stored.

At the Hilton carhouse of the Public Service Railway the building covers only such an area as can be occupied by cars, and all the special work, entrance tracks, etc., are outside of the building. This gives also an excellent example of economical operation, the cars pulling in at one end and leaving at the other. Thus little or no time is lost in switching. But, even since this carhouse was built, there has been a great deal of discussion among railway men as to the advisability of housing all the cars in a building or storing them in an open yard, and it is now generally conceded that the housing of all the cars is not necessary. Most cars are on the street or road the greater part of the day, and as the buildings are costly and the insurance on cars in a carhouse is more than in an open yard, the saving in deterioration of the car, by having it under cover one-fourth of the time, is not enough to offset the carrying cost of the building and additional insurance. As a consequence, the most recent layouts provide an administration building fully equipped for all comforts, conveniences and entertainment for the trainmen, and also ample shop facilities and a number of inspection pits, all under cover, closed in and heated, but no storage. Consequently a car may be run in the shop bay to have inspection and minor repairs made and is then run out and stored in the open, or perhaps not stored at all but put immediately on the streets.

The equipment for fire protection of a carhouse is most important. The value of the building is insignificant compared with the value of the cars stored therein, so that certain rules have been laid down by the insurance authorities limiting the number of cars to be stored in any one bay. There has also been considerable discussion as to insurance rates for buildings equipped with automatic sprinklers and various types of roofs. It has been conceded that carhouses with mill-constructed roofs, or with steel trusses incased in concrete, should have roof sprinklers as well as aisle sprinklers. With reinforced concrete roofs it has been conceded by the insurance authorities that the roof sprinklers may be omitted without involving a higher rate of insurance than that of a mill type of construction.

The cost of a building to house 100 cars with mill-constructed roof should be $150,000; the cost to house 100 cars with reinforced concrete roof should be $180,000. By adding $25,000 for the cost of both roof and aisle sprinklers to a mill-constructed carhouse the cost would become, say, $175,000. By adding $15,000 for the cost of aisle sprinklers alone to a reinforced concrete building, the cost would become $195,000. Therefore it seems that, except from a point of permanency, a building with reinforced concrete roof has no special value over one with a mill roof.

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*Abstract of a paper read before the Public Service Company Section of the American Electric Railway Association, on Jan. 20, 1915.

At all carhouses, whether equipped with an automatic sprinkler system or not, it is necessary to provide adequate standpipes and connections for fire hose; also plenty of water buckets, sand pails and fire extinguishers and a fire alarm system, as it is generally possible to put out a fire with the local fire squad, organized among the carhouse employees, before it gains sufficient headway to operate automatic sprinklers. At each carhouse and shop are held periodical and systematic fire drills, so that each employee has a certain routine to follow in case of fire. Some men are designated to station themselves at the fire hydrants, others to start the pumps where pumps are necessary, others to handle the sand pails and hand extinguishers, and other men to run the cars free from the building in a systematic manner. The Public Service Railway has been fortunate in having very few fires, all of which is, no doubt, due to the care which is taken to keep the buildings clean and free from rubbish, with the provision of fireproof oil houses and the use of fireproof receptacles to contain rubbish, oily waste and other inflammable materials, along with the general fireproof construction of the buildings.

A most excellent set of rules has been prepared by the American Electric Railway Association and adopted as recommended practice for fire protection in carhouses. These rules have had the approval of the National Board of Fire Underwriters and the National Fire Protection Association, and have been adopted by the Public Service Railway and followed out on all of our properties. If these rules were strictly adhered to in every respect, I doubt whether we would ever have a fire on our properties.

C. E. T. A. Statistics

Annual Report of Chairman of Central Electric Traffic Association Shows a Busy Year

At the annual meeting of the Central Electric Traffic Association on Jan. 18, Chairman A. L. Neereamer presented a statement of its activities for the year ended Dec. 31, 1915. Some of the more interesting of the figures follow:

In accordance with the new constitution, adopted at Fort Wayne on April 20, 1915, only five meetings were held during the year, instead of ten as formerly. The membership now consists of forty-six lines, representing 3574 miles. This is a decrease of one line and 52 miles from last year. Forty-three lines participate in the joint and local baggage tariff and thirty lines in the joint passenger tariff, including the interchangeable mileage ticket. Up to date, 33,100 interchangeable mileage tickets have been issued, and of this number 5100 were issued during the year that has just passed.

Official classification No. 42 was filed by the chairman for thirty-nine lines, and twenty-three supplements were issued to this classification. By the filing of this publication through the chairman's office, it was only necessary for eight applications for special permission to be filed with the various commissions. If this publication had been filed by individual lines, 312 applications would have been necessary.

Official classification No. 43 was issued on Nov. 22, 1915, and became effective on Jan. 1, 1916, in all States except Indiana. It will probably be made effective in that State by the Public Service Commission when it makes the steam railroad classification effective. Other schedules issued during the year by the association were: Official Interurban Railway Equipment Register No. 3; Joint Freight Tariff No. 11 and one supplement to the latter, effective in Indiana only, and two supplements to the Joint Passenger Tariff No. 14.

Revisions on the official interurban map have been completed, and it is now in the hands of the member companies.

Railway Accidents for 1915

A Summary of the Casualties to Persons on Electric Railways Is Published, Together with the Causes of Accidents

The Interstate Commerce Commission in its recently-published Accident Bulletin No. 56 has compiled a record of accidents due to collisions, derailments and other causes resulting in injuries to persons which arose from the operation of all railways used for interstate commerce during the year ended June 30, 1915. A summary showing the casualties to persons on electric railways appears in the accompanying table. This gives a total number of persons killed and injured for the year that is materially less than the corresponding figures for 1914, although the reduction from the totals of 1913 is small.

During the year the number of major accidents due to collisions on electric railways covered by the investigations of the Interstate Commerce Commission was 136, while the number of derailments was seventy-three. On the other hand, the steam railways of the country for the same period experienced a total of 3538 collisions and 6849 derailments, there being about twice as many derailments as collisions. Some of these accidents were investigated by the commission, the results in the most important cases being summarized in the bulletin. The summary shows that out of a total of sixty-seven investigations, no less than eleven accidents were due to disregard of superior trains. Two were due to neglect of orders by train crews and three to dispatchers' failures. Five were caused by disregard of flagging rules and two by disregard of fixed signals. Among the other causes were three accidents due to excessive speed, three to broken rails, thirteen to other track failures, six to unknown causes, eight to equipment failures, six to maliciousness and five to miscellaneous causes.

ACCIDENTS ON ELECTRIC RAILWAYS, YEAR ENDED JUNE 30, 1915

Causes	Number of Accidents	Passengers		Employees on Duty		Other Persons Not Trespassing		Trespassers	
		Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
Train Accidents:									
Collisions	136	9	596	6	79	1	20	...	...
Derailments	73	..	169	3	31	...	9	...	...
Other accidents to trains	2	..	4	..	1	...	...	...	...
Total	211	9	769	9	111	1	29	...	...
Other Than Train Accidents:									
Coupling or uncoupling cars	..	..	...	..	14	...	...	...	...
Doing other work about trains	..	..	...	3	187	...	...	...	...
Coming in contact, while riding on cars, with fixed structure	..	..	21	..	21	...	...	...	...
Falling from cars or engines	..	10	64	7	65	1	3	2	5
Getting on or off cars or engines	..	14	1127	..	69	...	22	1	11
Other accidents on or around trains	..	..	388	1	14	1	33	..	6
Being run over at stations or yards	..	2	4	1	6	10	30	8	7
Being run over at highway grade crossings	..	..	...	..	...	120	669	...	2
Being run over at other places	..	..	5	3	8	56	330	85	68
Other causes	..	..	87	..	6	5	27	7	7
Industrial accidents to employees	..	..	...	16	932	...	...	...	...
Grand total	...	35	2465	40	1433	191	1118	103	106

ASSOCIATION NEWS

Meetings of the Committees on Way Matters, Equipment, Schedules and Time-Tables, Training Transportation Employees and Valuations Are Reported—The American and Manufacturers' Associations Jointly Issue Circular on Proposed Changes in Constitution

Activities of the Committees

WAY MATTERS

A meeting of the committee on way matters was held at the association headquarters in New York on Jan. 20 and 21. All members were in attendance except W. F. Graves, who was ill. Special work manufacturers had found some objections to the specifications that were submitted by the 1915 committee for adoption as standard. Victor Angerer, William Wharton, Jr., & Company; G. A. Peabody, Cleveland Frog & Crossing Company; F. M. Stockwell, Barbour-Stockwell Company; W. G. Nichols, The Edgar Allen Manganese Steel Company, and B. L. Weaver and G. S. Vickery, Pennsylvania Steel Company, attended the meeting and presented some changes for consideration. The size of the coupon in connection with the solid manganese steel specification, and the time of the coupon heat treatment were the points at issue. After considerable discussion the changes suggested by the manufacturers were accepted by the committee. This specification was also amended to the effect that the wind or warp in the bearing surfaces of solid manganese steel special work should not exceed 1/8 in. in 5 ft. Provision was also made for solid manganese steel special work installed on steel ties or steel supporting structures. In this connection it was recommended that special care should be taken to obtain truer bearing surfaces than were necessary for layouts placed on wooden ties.

The revision of the recommended design of 7-in. and 9-in. joint plates, with special reference to the sizes of bolt holes and fits, was assigned to a sub-committee for report. Further consideration of recommended symbols for recording surveys was assigned to E. M. Haas, Chicago, Ill. In connection with designs for layouts of switches, mates and frogs, the committee decided to prepare standard spirals for 80-ft., 100-ft., 200-ft., 300-ft., 350-ft. and 400-ft. radius curves. Under this subject the question of the over-all lengths of switches, mates and frogs is to be investigated so that standard lengths may be submitted for adoption.

L. A. Mitchell, Anderson, Ind., will consider and report on ballast for suburban and interurban track. B. J. Fallon, Chicago, Ill., will investigate and report on the use of rolled manganese and other alloy steel rails. C. H. Clark, Cleveland, Ohio, with the assistance of other committee members, will investigate the use of high elastic limit steel machine bolts, and he will have some special tests made to determine their value as compared with ordinary track bolts. Specifications covering the manufacture and installation of various types of pavements were assigned to A. E. Harvey, Kansas City, Mo. Specifications for preservatives and treatment of woods for inclusion in the engineering manual were assigned to E. M. Haas. The preparation of specifications with definitions for sundry track materials was reassigned to C. W. Gennett, Jr., of the 1915 committee, who has been considering this subject in connection with a report being prepared by the American Society for Testing Materials. The subject of efficient types of hand track tools was divided into those employed in excavation, ballasting, track laying and paving, and it was assigned to different committee members.

Mr. Schreiber reported on the progress of the sub-committee on bibliography. The work has all been compiled, and the pamphlet on this subject is ready to print. The committee decided to print at the present time 1000 copies and to hold the type for six months, and possibly longer, to see what demand develops. The committee decided to recommend that the association provide each company with one copy and a price of 50 cents each should be set for all copies sold.

EQUIPMENT

The mid-winter meeting of the committee on equipment was held in New York on Jan. 26, there being present W. G. Gove, chairman; L. M. Clark, vice-chairman; H. A. Johnson, E. W. Holst, R. H. Dalgleish, W. E. Johnson, J. S. McWhirter and W. W. Brown. By invitation, Messrs. Storer and Broomall of the Westinghouse Electric & Manufacturing Company, Priest of the General Electric Company and Trist of the Carnegie Steel Company were in attendance during part of the session. The meeting was devoted primarily to progress reports of the various sub-committees to which had been assigned the different subjects to be taken up in the committee report, so that an opportunity could be provided for a discussion of the work of each sub-committee by the committee as a whole.

The subject of axle design, which had been assigned to Messrs. W. E. Johnson and Holst, resulted in an extended discussion which centered largely on the advisability of retaining a keyway in the present standard drawing, owing to the decrease in popularity of the split gear, and on this point it was decided that provision for the needs of those who wished to retain split gears could be best made by a note covering the matter, thus eliminating the keyway in accordance with the most approved practice. It was decided also to incorporate in the present designs a smaller size of axle to meet the requirements of light-weight cars and small motors. With regard to the question of motor ratings for axles, it was the consensus of opinion that this could well be eliminated from the present standard specification.

In regard to the standardization rules of the American Institute of Electrical Engineers, W. W. Brown raised the question of a possible change in the test voltage that was specified owing to the fact that manufacturers were using a much higher voltage at present. He also cited the need for two grades for stranded flexible cables because of the different requirements for permanent cables and for those subject to movement such as motor leads and jumpers. Mr. Brown also reported tentatively upon standard sizes for carbon brushes, but in this connection it was the consensus of opinion of the committee that the gain to be accomplished by standardizing brush sizes was insufficient to overcome the difficulties in design that would follow the use of arbitrary dimensions. In consequence the subject was dropped.

In the matter of wheel tread and flange contour design, Mr. Dalgleish submitted tentative drawings covering changes in the present standard and adding a ⅝-in. flange for use only in low-speed city service, this being considered important because, in general, electric railways were buying about as many wheels with ⅝-in. flanges as with the standard ¾-in. flange. An extended discussion took place on this matter as well as upon the desirability of making the flange less blunt and giving the tread less slope, or cone, to provide a longer contact line for new wheels on the rails. It was decided finally, inasmuch as the subject was of such vital importance to track engineers, that the sub-committee should confer with the committee on way matters and report at the next meeting. Messrs. W. E. Johnson and Holst then reported the results of a sub-committee meeting held on Jan. 25 with the manufacturers' representatives on the subject of brakeshoe design. A number of changes in the present standard design were proposed, as well as the addition of two new designs, one for 28-in. and 26-in. wheels and one for diameters of 24 in. and smaller.

Following this Mr. McWhirter made a tentative report on the influence of rolled-steel wheels on rail corrugation, citing results of an investigation in which he had found that in Pittsburgh, the home of steel wheels, no trouble from corrugation had been experienced, but that in Baltimore, where all wheels were of cast iron, corrugation had been extremely bad. Mr. Dalgleish reported progress on the preparation of a standard limit-of-wear gage, and Mr. Holst outlined his plans for a report on car ventilation. In regard to the subject of street car lighting, Mr. Clark proposed to confine his report to direct lighting methods, as indirect lighting appeared to be impracticable, and commented also upon the superior maintenance of high-capacity lamps with large filaments. He reported also upon a revision of the standard journal brass design, submitting drawings for a semicircular brass which was interchangeable with the present standard brass and box. The subject of car painting, which was being handled by H. A. Johnson, was then discussed at length, and an outline for the procedure to be followed in covering the matter in the committee's report was decided on. This was followed by a discussion of the tentative code of safety rules that had been submitted by the National Bureau of Standards, the consideration of which had been assigned to Mr. Brown, and at its conclusion the committee adjourned, the date and place of the next meeting being left subject to the decision of the chairman.

SCHEDULES AND TIME-TABLES

At the meeting of the committee on construction of schedules and time-tables, which was held in New York on Jan. 27, there were present Edward Dana, chairman; H. P. Fritch, J. P. Kineon and A. E. Hicks. The committee went over the past reports that had been made in order to draw up a tentative outline of information which, it was believed, should be secured before definitely studying the subjects assigned. A data sheet was then drawn up to be sent to member companies for the purpose of obtaining information necessary to the committee's work. The subject of running time was assigned to Mr. Kineon, who is to collect the data that are returned to the secretary's office in order to make definite progress at the next meeting. The study of traffic regulations was assigned to Mr. Hicks and the revision of the interurban time-table was assigned to Mr. Fritch. The subject of relation of stops to schedule speed was assigned to Mr. Dana.

TRAINING TRANSPORTATION EMPLOYEES

On Jan. 27 a meeting of the committee on training transportation employees was held in New York, N. W. Bolen, chairman, and C. B. Buchanan being present. The meeting was devoted largely to a discussion of the subjects that have been assigned to the committee and to the best method of co-ordinating the work that has been done by past committees. It was decided to assign the work of preparing data sheets and collating the information received in the replies on the subjects of watch-inspection methods and on eyesight tests and examinations to sub-committees. The appointments to these sub-committees will be made later by Mr. Bolen.

COMMITTEE ON VALUATION

A meeting of the committee on valuation of the American Association was held in New York on Jan. 25. All of the members of the committee were present with the exception of H. H. Crowell and B. E. Tilton. The preparation of a paper on unit costs and overhead charges was discussed, and P. J. Kealy, Kansas City, Mo., agreed to prepare a synopsis for a paper on this subject.

Circular on Changes in Constitution

CIRCULAR OF MANUFACTURERS' ASSOCIATION

The American Electric Railway Manufacturers' Association is sending this week to its members a statement of the correspondence on the proposed changes in the Manufacturers' Association and the action of its executive committee on the plan. The statement follows:

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION

NEW YORK, Jan. 18, 1916.

PLEASE READ CAREFULLY—MOST IMPORTANT

To All Members:

At the meeting of the American Electric Railway Association held in San Francisco, Cal., on Oct. 4 to 8, inclusive, 1915, retiring President Allen recommended that the Manufacturers' Association become an affiliated instead of an allied association, reporting to and under the jurisdiction of the American Electric Railway Association.

The American Electric Railway Association appointed a special committee to take up the recommendations made by Mr. Allen, and representatives of the Manufacturers' Association were invited to be present at a meeting of this committee held on Dec. 15, 1915, to present their views on the subject.

The committee representing the Railway Association and the Manufacturers' Association met on Dec. 15, 1915. Subsequent to this joint meeting the following letter was received from Secretary E. B. Burritt of the American Electric Railway Association:

MR. H. G. MCCONNAUGHY, *Secretary.*
American Electric Railway Manufacturers' Association,
New York, N. Y.

DEAR MR. MCCONNAUGHY:

I beg to advise you that at the meeting of the Executive Committee, held here on Dec. 16, last, the special committee appointed to consider recommendations contained in the President's address made its report as per copy enclosed.

Following the approval of this report, a resolution was adopted calling a special meeting of the Association, to be held at the Congress Hotel, Chicago, Ill., on Feb. 4, 1916, beginning at 10.00 a. m., for the purpose of acting upon amendments to the Constitution and By-Laws of the Association, as recommended by the special committee. Accordingly, a notice, copy of which I am enclosing herewith, was sent to all of our Company Members calling the meeting. I am sending you under separate cover, a sufficient number of copies of this special notice for distribution among your Member Companies should you so desire.

In this connection I would call your attention to the fact that all of the features of the proposed plan will be subject to amendment at the Midyear Meeting. It may be adopted in its entirety, or it may be rejected, or modifications of the plan may be adopted.

Briefly expressed, our Officers and others favoring the proposition feel that the Association should carefully consider all the features of the proposed amendments and if they are adopted, to adopt them in such form as will give a united organization, carrying the strength and influence resulting from such unity and bringing forth an organization in which both Manufacturers and Railway men may work together as one body for the general prosperity of the organization and for the advancement of the industry in which they are all equally interested.

Yours very truly,
(*Signed*) E. B. BURRITT, *Secretary.*

The following is a copy of the report of the special committee from the Railway Association of which Arthur W. Brady is chairman:

To the Executive Committee of the
American Electric Railway Association.

GENTLEMEN:

The Committee appointed to consider the recommendations made by President Allen at the recent Convention in San Francisco, begs to report as follows:

We have carefully considered the recommendations favoring an affiliation of the American Electric Railway Manufacturers' Association with the American Electric Railway Association as are the Engineering and other affiliated associations, and in that connection have conferred with representatives of the Manufacturers' Association as well as with Officers and others of the American Electric Railway Association.

In our judgment, it is very desirable that there be a closer relationship than has heretofore existed between those who manufacture and sell the apparatus and material necessary to electric railway operation and the American Electric Railway Association for the purpose of creating a clearer recognition of and of advancing the common interests of both. We do not believe that such closer relationship can be secured in the fullest degree so long as the American Electric Railway Association and the American Electric Railway Manufacturers' Association continue to be, as they now are, wholly separate and independent organizations, but we regard it as necessary that the two associations be brought together into a common organization.

We therefore recommend that the Constitution and By-Laws be so amended that the membership of the Association be composed of Companies, firms and individuals engaged in the manufacturing or sale of electric railway material and apparatus as well as of electric railway companies, the membership of both to be upon a basis of equality; and that a scale of dues for manufacturers and dealers be established upon such an equitable basis as may be approved by the Executive Committee; and that there be formed an affiliated association consisting either of the present American Electric Railway Manufacturers' Association or of a new association, as may seem best, with which those connected with the manufacturing and selling interests of the industry may affiliate, if they so desire, without, however, diminishing the right of affiliation, if preferred, with any other of the affiliated associations as now.

Respectfully submitted,
(*Signed*) ARTHUR W. BRADY, *Chairman.*

Dec. 16, 1915.

The following is a copy of notice issued by the American Electric Railway Association under date of Dec. 31, 1915:

NOTICE OF SPECIAL MEETING

To Company Members:

In accordance with a resolution adopted by its Executive Committee at a meeting held in New York on Dec. 16, 1915, a special meeting of the American Electric Railway Association is hereby called to convene at the Congress Hotel and Annex, Chicago, Ill., on Feb. 4, 1916, at 10.00 a. m., for the purpose of considering and acting upon the amendments to the Constitution and By-Laws of the Association as recommended by the special committee to consider recommendations made by the President at the San Francisco Convention.

The amendments having received the required approval of the Executive Committee, are, in accordance with Article IV of the Constitution and Article XIX of the By-Laws, herewith submitted for your consideration, the changes being indicated in italics.

Amend Article III of the Constitution as follows:

In the first line of the first paragraph, strike out the word "three" and substitute therefor the words "the following."

Amend Section (*a*) by adding after the word "sections" in the third line, the following: "and of companies, firms or individuals engaged in the business of manufacturing or selling apparatus equipment or supplies used in electric railway operation," so that the first paragraph and Section (*a*) of Article III shall read as follows:

"III. The membership of this Association shall consist of *the following* classes:

"(*a*) Company members, consisting of American urban and interurban railway companies, or lessees, or individual owners of urban and interurban railways, or steam railways having electrified sections, *and of companies, firms or individuals engaged in the business of manufacturing or selling apparatus, equipment or supplies used in electric railway operation.* Each member company shall be entitled to one vote, which shall be cast by the properly accredited delegate."

Amend Article XIV of the By-Laws so far as said article relates to fees of company members, by striking out the word "active" in the first line and substituting therefor the word "company," and by inserting after the word operation in the third line the following: "or from the business of manufacturing or selling apparatus, equipment or supplies used in electric railway operation," and by striking out the word "companies" in the fourth line and substituting therefor the word "members" so that the first paragraph of Article XIV shall read as follows:

"XIV. *Company* members shall pay an admission fee of Ten Dollars ($10.00) and annual dues payable in advance based on gross earnings from electric railway operation, *or from the business of manufacturing or selling apparatus, equipment or supplies used in electric railway operation* during the preceding fiscal year of the respective *members* as follows:

Gross Receipts.				*Annual Dues*
Under	$50,000			$25
Between	50,000	and	$100,000	50
Between	100,000	and	250,000	75
Between	250,000	and	500,000	125
Between	500,000	and	1,000,000	175
Between	1,000,000	and	2,000,000	225
Between	2,000,000	and	3,000,000	275
Between	3,000,000	and	4,000,000	325
Between	4,000,000	and	5,000,000	375
Between	5,000,000	and	6,000,000	425
Between	6,000,000	and	7,000,000	475
Between	7,000,000	and	8,000,000	525
Between	8,000,000	and	9,000,000	575
Between	9,000,000	and	10,000,000	650
	10,000,000	and	over	750

Respectfully submitted,
E. B. BURRITT, *Secretary.*

Dec. 31, 1915.

REPORT OF SPECIAL COMMITTEE OF MANUFACTURERS' ASSOCIATION

The committee acting for the Manufacturers' Association, as appointed by President Finigan and composed of: Charles C. Peirce, vice-president in charge of Relations; B. A. Hegeman, Jr., *Joseph R. Ellicott, *W. L. Conwell, *William H. Heulings, Jr., *Cornell S. Hawley, *Edwin H. Baker, rendered the following report covering their position as taken at the joint meeting held Dec. 15, 1915:

**Past President*

NEW YORK, Jan. 18, 1916.

MR. THOMAS FINIGAN, *President*,
American Electric Railway Manufacturers' Association.

DEAR SIR:

The Committee undersigned appointed by virtue of your call under date of Nov. 27, 1915, desires to render the following report:

"Pursuant to the invitation extended by the Committee of the American Electric Railway Association, your Committee met in conference with the Committee from the said American Electric Railway Association, on Dec. 15, 1915.

"The advantages pro and con of a closer relationship between the two Associations were discussed from every possible angle. The advantages as represented by the honor conveyed to our Association and its individual members received hearty expressions of appreciation.

"We would as individuals heartily welcome a Charter under the Parent Association and the privilege of a voice on the Executive Committee of the American Electric Railway Association, indicating our anxiety to work in harmony with and to the best interests of the Parent Association.

"We contended, however, that the finances of the Manufacturers' Association remain intact and independent of theirs and the dues of and assessments on our members should be collected for the sole purpose of meeting the expenses of our Manufacturers' Association as they now appear.

"The disadvantages were many and manifest, and your Committee, therefore, unhesitatingly recommended that at the present time the disadvantages far outweigh the advantages, and we are reluctantly compelled to report adversely to the plan as a whole.

Very truly yours,
(*Signed*) CHAS. C. PEIRCE, *Chairman*."

The Executive Committee of the Manufacturers' Association met and approved the report of the special committee from the Manufacturers' Association, which was done in the belief that this action would represent the sentiment of the entire membership of the Manufacturers' Association.

We feel that it is the duty of the Executive Committee to bring all these matters before the Member Companies of the Manufacturers' Association for their information and with the thought that if they care to do so they can have their representatives present at the meeting of the American Electric Railway Association to which they have been invited and which meeting will be held at the Congress Hotel and Annex, Chicago, Ill., at 10 a. m. on Friday, Feb. 4, 1916, for the purpose of expressing their views on this subject.

A supplementary report will be rendered to each member company should further action be taken in these premises.

Respectfully submitted,
EXECUTIVE COMMITTEE,
American Electric Railway Manufacturers' Association,
H. G. MCCONNAUGHY, Secretary.

CAPITAL TRACTION SECTION

At the organization meeting of company section No. 8, which was reported in last week's issue, R. H. Dalgleish, electrical engineer of the company, was elected president and John Fleming, purchasing agent, was elected secretary. The following information relates to the careers of these men, and portraits of them are reproduced herewith.

Mr. Dalgleish, who is forty years of age, has always been a resident of Washington. He attended the public schools of that city, and also the Corcoran Scientific School, later joining the mechanical department of the Eckington & Soldiers' Home Electric Railway, which he left to enter the electrical department of the Capital Traction Company. He acted as electrical engineer of this company since 1906, but was officially appointed to the position this month. Mr. Dalgleish is a member of the Washington Society of Engineers, the Washington Traffic Club and the equipment committee of the American Electric Railway Engineering Association, and he is also chairman of the Washington section of the American Institute of Electrical Engineers.

Mr. Fleming is one year younger than Mr. Dalgleish. He attended the public schools in Philadelphia and Washington, leaving school to enter the machine shop of the Washington & Georgetown Railroad, which later became the Capital Traction Company. This he did in 1893, transferring a year later to the general offices of the company as stenographer and clerk, afterward becoming private secretary to the general manager. In 1909 he was made storekeeper of the company and last year was appointed purchasing agent.

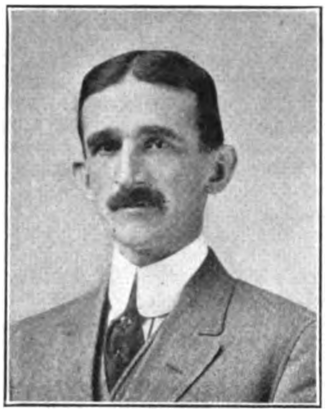
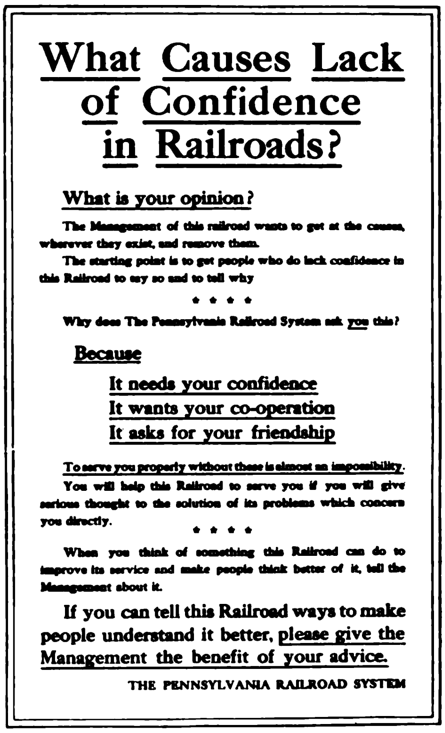


Photo by Clinedinst, Washington
R. H. DALGLEISH
President Capital Traction Company Section

Photo by Bachrach, Washington
JOHN FLEMING
Secretary Capital Traction Company Section

Asking the Public for Advice

PUBLIC relations is a broad subject, and one to which utilities are to-day constantly devoting more study. The problems arising in this connection from steam railroad operation are to a large degree similar to those coming up in electric railway operation, and it is worth while for each set of carriers to see what the other is doing in the way of establishing better public relations. Along this line it may be noted that the Pennsylvania Railroad, which has long occupied one of the foremost places in steam railroad publicity, is now displaying in all the public places of its system large white posters, printed in red and black ink, which, as shown herewith, invite the public's advice and criticism and seek its confidence. It is undoubtedly a sensible idea, thus to take patrons into partnership and endeavor to secure their co-operation, but the question arises as to whether or not they will be sensible enough to make intelligent and practical suggestions. At any rate, the matter is put squarely up to them, and the effort of the railroad deserves to meet with better results than mere skepticism.



What Causes Lack of Confidence in Railroads?

What is your opinion?

The Management of this railroad wants to get at the causes, wherever they exist, and remove them.

The starting point is to get people who do lack confidence in this Railroad to say so and to tell why

* * * *

Why does The Pennsylvania Railroad System ask you this?

Because

It needs your confidence
It wants your co-operation
It asks for your friendship

To serve you properly without these is almost an impossibility.

You will help this Railroad to serve you if you will give serious thought to the solution of its problems which concern you directly.

* * * *

When you think of something this Railroad can do to improve its service and make people think better of it, tell the Management about it.

If you can tell this Railroad ways to make people understand it better, please give the Management the benefit of your advice.

THE PENNSYLVANIA RAILROAD SYSTEM

POSTER ISSUED BY THE PENNSYLVANIA RAILROAD ASKING THE PUBLIC FOR ADVICE

COMMUNICATIONS

Proposed Changes in the Constitution

ANDERSON, IND., Jan. 25, 1916.

To the Editors:

At the special meeting of the American Electric Railway Association to be held in Chicago on Feb. 4, a vote will be taken on proposed amendments to the constitution and by-laws of the association so as to admit to membership companies, firms or individuals engaged in manufacturing or selling apparatus, equipment or supplies used in electric railway operation. It seems proper at this time to state briefly the reasons which caused the committee appointed to consider the recommendations made in retiring President Allen's address at the San Francisco convention to recommend those amendments to the executive committee.

The controlling reason is found in the conviction that the time has arrived for full recognition of the fact that the fundamental interests of those owning or operating electric railway properties and those engaged in manufacturing or selling the apparatus and other things essential to electric railway existence and operation are identical, and that the protection and advancement of those interests require the harmonious efforts of owners, operators, manufacturers and dealers through and as one organization.

There can be no question as to the soundness of the first proposition. The prosperity of electric railway properties and the prosperity of electric railway manufacturers and supply men rise or fall together. Real prosperity of the one class necessarily means prosperity of the other.

The only serious question is, therefore, how can these common interests best be guarded and forwarded? Shall it be through one organization, of which all in interest are members, or, as now, by two organizations, calling themselves allied but separated as to offices, committees, headquarters, treasuries and meetings?

The committee, which conferred at length with the representatives of manufacturers and supply men, as well as of the electric railway companies, believes that the argument favors the recognition in organization of the identity in interest which exists in fact, and that the American Electric Railway Association should so broaden its requirements for membership that all in the classes mentioned should be admissible as members on a basis of substantial equality.

No criticism of the American Electric Railway Manufacturers' Association is involved in reaching this conclusion. That association has done valuable work to further the interests of the electric railway industry, and the relations between it and the American Electric Railway Association have been as harmonious and mutually helpful as could be the case where two independent organizations are concerned. The field of the American Electric Railway Association has, however, wonderfully broadened in the past decade. Ten or fifteen years ago the problems of construction, maintenance and operation absorbed practically all the energies and activities of the association. The trend of the times has, in the meanwhile, compelled the association to devote its labors and attention largely to other questions, going to the very existence of the industry. Grave problems affecting the relations between the public and the electric railways confront us and must be solved whether we like the task or not. It is of equal importance to electric railway owners and operators and to electric railway manufacturers and dealers that these problems be solved right. The strength of the industry cannot be fully exercised to bring about a correct solution when the possessors of that strength occupy different houses and only from time to time confer together to ascertain what shall be done or attempted, and how. It is in unity that there is strength.

The suspicion doubtless exists on the part of some manufacturers and supply men that the purpose behind the proposed amendments is merely to secure for the American Electric Railway Association the financial aid of those who now constitute the Manufacturers' Association. That suspicion is without basis. There are unquestionably matters—notably that connected with payments for convention location—that can be better handled by one association than by two. In respect to others there should be little difference in the use to which any money contributed is devoted save with respect to the result of the expenditure, which should in almost every case be greater. The fact that one dollar expended by the common organization will go farther than two half dollars expended by two organizations is a good reason for the consolidation of expenditures.

The amendments proposed are not presented as perfect. The committee worked under pressure, and it was necessary to prepare something quickly in order that the amendments might be sent out in time for consideration at the mid-year meeting, in accordance with the constitution and by-laws. At the meeting the amendments as proposed will doubtless be fully discussed, and will be modified, if deemed best, as the members present may determine.

The matter of a unification of the organized efforts of the electric railway industry, considering that industry broadly, is one of very great importance. There is no disposition on the part of anyone to reach a hasty or arbitrary decision. It is the expectation of the committee that at the Chicago meeting the matter will be discussed thoroughly and dispassionately, that self-interest will be laid aside, and that the action taken will reflect the best judgment of those present as to the course which should be pursued.

ARTHUR W. BRADY, Chairman,
Committee on Recommendations in President's Address.

Maintenance of Coasting Recorders

INTERBOROUGH RAPID TRANSIT COMPANY
NEW YORK, Jan. 23, 1916.

To the Editors:

The annual cost of keeping our coasting recorder records, per motorman, is $11.455 for clerical labor and $1.222 for stationery, and the annual maintenance cost of recorders themselves is $6.756 per recorder.

In the subway, the use of these recorders caused a reduction in power of 16.8 per cent, and on the Manhattan elevated, of 10.4 per cent. The total amount of money which may be considered to have been saved depends upon whether the figures are based on the cost of coal and water alone, or on the total investment for power. It is, of course, the cost of the water and coal alone which would show in the actual yearly accounts. On this basis, the saving in the subway was $174,000 per year and on the Manhattan elevated $67,000 per year. Assuming that any reduction in the amount of power used would indirectly affect the total investment, the saving for the subway was $622,000 per year, and for the elevated, $239,000. The increase in coasting time brought about the use of these recorders is caused not only by the shorter time during which power is used but also by the shorter period during which the brakes are being applied, and this adds materially to the life of the brakeshoes. We estimate this saving as more than 40 per cent, or a total of $36,000 for the subway and $16,000 for the elevated.

The total expense in connection with the recorders, including both the maintenance of the recorders and the keeping of the records, amount to somewhat less than 2 per cent of the saving effected. J. S. DOYLE,
Superintendent of Car Equipment.

Causes of Rail Corrugation

THIRD AVENUE RAILWAY

NEW YORK, Jan. 21, 1916.

To the Editors:

I have noted with much interest the articles in your issues of Dec. 25, 1915, and Jan. 8, 1916, in regard to rail corrugation, but I do not agree with the conclusions drawn, so far as the primary cause of corrugations is concerned.

From my own observations I am of the opinion that rail corrugations are the result of a combination of things, such as rapid acceleration, high speed, severe braking, in conjunction with the use of steel wheels.

Corrugations on surface roads were practically unknown ten or twelve years ago. At least, there was very little trouble that could be ascribed to them. About this period rolled-steel wheels or steel-tired wheels were generally introduced on surface roads. Since then they have been used very extensively. By their use flat wheels, which were so common with the chilled cast wheel, have been largely eliminated, but it seems to me that we have transferred the flats from the wheels to the rails.

My reason for forming this opinion is that up to 1908 there were no noticeable rail corrugations on the Third Avenue system on Manhattan Island. It was about this time that steel wheels were introduced, and shortly thereafter corrugations began to appear and developed very rapidly, becoming so serious and noisy that we received numerous complaints and found it necessary to file or grind them out.

On 125th Street the rails became so badly corrugated that, on the advice of steel experts and as the only means of preventing corrugations, we installed a new and heavier rail weighing 125 lb. per yard. But after this rail had been in service a few weeks it became as badly corrugated as the old. This rail is carried on a 6-in. x 6-in. longitudinal wooden stringer for its entire length.

After the cars on our Manhattan lines had been equipped throughout with steel wheels, the cars on our Bronx lines were similarly equipped. Corrugations appeared almost immediately, although up to that time the Bronx lines had been in operation about fifteen years without developing corrugations. Therefore it seems to me that if cars of approximately the same weight and speed are operated with chilled cast wheels for fifteen years without noticeable corrugations, and corrugations appear when steel wheels are substituted for the cast wheels, the trouble is not in the rails but in the wheels.

I am also of the opinion that double-truck cars with cast pony wheels and steel driving wheels make corrugations faster than any other type, as practically all of the braking is done on the driving wheels. Furthermore, corrugations may be encouraged by the nosing due to short wheelbase.

It is held, too, by some engineers that corrugation is due, at least in part, to the chattering of rolls at the mills. In other words, the new rail has incipient corrugations. Whether this is true or not, the chattering of the tools used to turn a steel wheel certainly does form on the tread very perceptible incipient corrugations. Therefore, if the steel wheel is ground after turning, at least one possible cause of corrugation would be removed.

Concerning the suggestion in the letter in your issue of Jan. 8 that modern track construction is responsible for corrugations, I would point out that some of our worst examples of corrugations are on tracks of the older type of construction which have been in service twelve to fourteen years. I have particularly in mind one stretch of corrugated track twelve years old consisting of 107-lb. rails, laid on wood ties, on dirt foundation, in granite pavement. This shows how impartially corrugations appear on the older as well as on the later types of track construction.

T. F. MULLANEY, Chief Engineer.

High-Carbon Steel and Rail Corrugation

THE CONNECTICUT COMPANY

NEW HAVEN, CONN., Jan. 7, 1916.

To the Editors:

The writer has read with much interest the paper on curved heads for girder rails and their bearing on rail corrugation, written by R. C. Cram and published in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 25, 1915.

It appears, from the information given in the article, that possibly the rapid corrugation noted might be due to the high carbon content of the rails investigated. To quote Mr. Cram's first conclusion: "1. Rail corrugation has become so general that it is being accepted with more or less complacency, and the rapid improvement in rail-grinding apparatus has made the removal of corrugations quite an easy matter, which has tended temporarily to divert attention from the study of its causes," and to his further statement, "of a case of very rapid corrugation which developed in a period of about five months," the rail referred to being high carbon steel, "treated with an alloy."

Again I quote: "Inasmuch as the development of corrugation to an equal degree had usually required from one to two years."

If the corrugation of a rail, standard as to section but differing in chemical properties and being high carbon, should appear in from 5/12 to 5/24 of the time that it did in a rail of the same section not as high in carbon, are we not "temporarily diverting our attention from the cause of corrugation" by looking elsewhere than to the increased hardness of the rail or the composition of the steel for its cause? And is not this borne out by the statement that it (corrugation) now "has become so general"? Since when has it "become so general"? Is it not since the introduction of harder steel? In other words, are we not paying more for harder steel so it will resist wear longer, and then, grinding out the corrugations formed, with special tools and skilled labor, in from 5/12 to 5/24 of the time formerly required?

It seems to me that Mr. Cram's paper shows that we are not gaining by the use of more costly steel, but are increasing the costs of both construction and maintenance.

We have recently made an inspection of corrugated rail on this company's lines, and find that it is confined mostly to rails 7 in. to 9 in. in height, in most cases of open-hearth steel with fairly high carbon content. It would appear that we are following a false lead in our efforts to cut down maintenance costs by using these higher-priced steels, which are perhaps not as fully suited to our needs. This would appear to be true if corrugations are now "accepted with complacency;" if now we are wearing out our rails with "expensive and wasteful grinding;" if now we are losing "0.001 in. per month," or 0.012 in. of head per year.

If I am not greatly mistaken, the old assumed head loss by wear was approximately ⅛ in. or 0.125 in. per five years, or 0.025 in. per year (Mr. Cram gives figures which show an average of about 1/16 in. for five years on standard LS-105-433), but this wear was all done under service, without the purchase of tools or equipment to wear out our rails for us.

The following proposition is undoubtedly true: If the extra cost of special steel, plus the extra cost of equipment for grinding, plus the labor cost of reducing corrugations in the special steel rail for a term of years representing the life of the old standard rail, is less than the cost of renewing the old standard rail at the end of that life, the new special steel is a paying proposition.

I doubt, however, that it is a paying proposition, for with noted and assumed wear as above for new and old composition steel rails, improved steel rails, under the most favorable conditions, would wear but twice as long as the older standard. I believe, moreover, that rail after grinding wears faster than rail not ground, and further, as most rails are renewed not because of "head wear" but from joint trouble, a rail otherwise with a life of twenty years would not remain in service for that period.

L. S. Sec. 105-433, mentioned in the article, shows a depth of groove to provide for 9/16-in. wear with ⅝-in. flange. This gives a life of nearly forty-nine years, from the rate of wear given, viz., 0.001 in. per month. Can we assume this rail would not be renewed for causes other than loss of section before this time had elapsed, and is it reasonable to assume that a rail wearing twice as fast would not be as economical? Either rail would doubtless be renewed before its life was gone, and then the cheaper rail would have as great a scrap value.

The author states that "corrugations appear on new grooved girder rails of the hardest composition." Do they also appear on softer rails? Yes, for he states that "corrugations also appear rather suddenly on old girder rails after they have been in service a number of years, etc.," and he gives as a reason for this sudden appearance "the old rails grow harder due to cold rolling." In other words, he states that we can get corrugations at once in new rails by making them as hard, or harder, than old rails cold rolled and we then have to grind them out.

It seems to me we are following too closely the practice of the steam roads which, due to increased speeds and wheel loads, need heavier and harder rails than formerly. Owing to increased weights and desired hardness of their sections, a better grade of steel is needed, in order that accidents from broken rails may not accompany the increases in speed and load. These reasons do not obtain for street railway needs. Our speeds have not increased, and our loads are in many instances lighter than formerly. We do not need a better grade of steel for, while a harder rail breaks more easily, we are not increasing the tendency to breakage and the occurrence of a broken rail in a paved street does not mean disaster. From this it appears that in following the action of the railroads without their necessity, we have brought evils to ourselves, in higher cost of steel and more rapid corrugation, both making higher maintenance costs without accompanying benefits.

For a comparison, I have made figures for cost of track and its maintenance, with the following assumptions:

Rail LS-105-433 old standard composition, not high in carbon, at $40 per ton, which is assumed to be the rail Mr. Cram states would corrugate in from one to two years. Again, assuming the same section, but increasing the carbon to give a much harder rail, at $42 per ton, to compare with the rail which corrugated in five months, as stated by Mr. Cram:

Term of years in track, ten.
Depth of wheel flange, ⅝ in.
Headway of cars, sixty per hour, eighteen hours per day.

Corrugations in low-carbon rail require complete grinding of track every two years.

The same operation will be required with high-carbon rail every six months. As the article states that the corrugations were equal in these two periods, this is a fair comparison.

Rail grinding can only be done six hours per day, as car headway is so frequent. For this period of grinding I have a price of 24 cents per foot of rail from rail actually ground.

Ordinary maintenance, 2½ cents per car-mile.

	Old Standard Rail	High Carbon Rail
165 tons of rail at $40	$6,600	......
165 tons of rail at $42	......	$6,930
Grinding every two years for eight years	12,672	......
Grinding every six months for nine years and six months	......	48,254
Cost of rail and grinding	$19,272	$55,184
Ten years' maintenance at 2½ cents per car-mile	91,880	91,880
Cost to renew rails and pavement, 1 mile at $5.75 per foot	30,360	......
	$141,512	$147,064
Credit by scrap	1,500	......
Total cost at end of ten years	$140,012	$147,064

With the old standard rail at the end of the period we have a reconstructed track and pavement and $7,000 saving as against the high-carbon rail, still in service with old track structure and pavement.

Let us assume again that, with the ⅝-in. flange, this rail section has a life of twenty years and is not renewed until then. At the end of this twenty-year period our old standard rail has cost us for grinding, maintenance and entire renewal of track and pavement, less scrap value of rail, giving us a reconstructed track and pavement, $244,564. The high-carbon rail has cost us $289,734 for the same period and is still in the track.

The high-carbon rail then has cost us $45,170 more than the old standard rail without the advantage of a complete renewal of track structure at the end of twenty years. This is approximately an annual expense of $2,250 more for the high-carbon rail.

The conclusions reached after reading Mr. Cram's comprehensive paper bear out what the writer has had in mind for some time, namely, that rails extremely high in carbon are not suitable for general street railway use, from the very causes that this paper brings out, viz.: rapid corrugation and its attendant effects on the pavement from the added vibration in the rails; expensive and increased grinding, and higher first cost of material.

The higher first cost would not be so great a factor, providing that it was accompanied by a longer life, but Mr. Cram conclusively proves that it does not.

This is the first paper I have seen which so clearly indicates a possible connection between corrugations and extreme rail hardness, giving information which shows the additional expense entailed by using steel of the specifications given.

Before changing our wheel treads and rail heads we should get information enough to satisfy ourselves that we will not bring into action still further tendencies toward higher maintenance and first costs. This information should also include any effect on tractive and braking efficiency, and should cover car operation as well as rail wear and corrugations.

As a matter of history, the writer has a report on what he believes to be the first rail corrugation in the country. This occurred in 1897 on what is now a part of the Rhode Island Company's lines. The rail was 9 in., 90 lb. tram girder, rolled by the Cambria Company and purchased through William Wharton, Jr. Out of about 10 miles of track laid between 1893 and 1896, one 30-ft. rail was found badly corrugated in 1897. Mr. Howe, then vice-president of the Wharton Company, was greatly interested, and as the writer was at that time in the engineering department of the Rhode Island Company he was familiar with the location and greatly interested also.

The rail was tested chemically and mechanically. Opinions were obtained from Messrs. Connett, Nichols, Lichter, Pratt, Weston and Bowen, and from the Pennsylvania Steel Company's experts. No test showed any difference in the steel in any part of the rail. Chipping, filing and drilling showed the rail to be the same as the average run of rails furnished, and the various fractures made to examine the texture showed a uniform quality of steel.

Chemical analysis of the steel taken from crest and hollow of corrugations showed as follows:

	Crest	Hollow
Si, per cent	0.045	0.046
Mn, per cent	0.816	0.823
P, per cent	0.077	0.076
C, per cent	0.411	0.412

The headway of cars over this rail was one and one-half minutes, one-way traffic. The opposite rail showed no corrugations. The paving was of granite block, not on concrete foundations, with sanded joints. The average speed was 6 m.p.h. W. R. Dunham, Jr.,

Engineer, Maintenance of Way.

Car Operation Efficiency

General Electric Company

Schenectady, N. Y., Jan. 22, 1916.

To the Editors:

I have read with much interest C. C. Chappelle's article in the issue of the Electric Railway Journal for Jan. 15, on the "Fundamental Principles of Car Operation Efficiency." I quite agree with his argument in favor of the maximum percentage of coasting practicable as an effective method of minimizing the power required for a given run, and that a record of the percentage coasting is a desirable and effective means of determining the relative operating efficiency of different motormen. The percentage values as illustrated by the curves are subject to variation due to condition of track and rolling stock, and I doubt whether results in practice will actually conform with his figures, as a coasting friction of 10 lb. per ton is lower than usually considered for service of the character illustrated, although modifications on this account would not detract from the general conclusions of the article.

Economy in power, however, is only one of the factors of successful operation. Attempting to secure minimum power possible through maximum obtainable coasting, with acceleration and braking to the limit of adhesion on the rail, would obviously be undesirable as causing discomfort to passengers and increased maintenance by reason of greater wear and tear. There are limits beyond which it will be found undesirable to reduce the power consumption, and it does not follow that the motorman showing the lowest power consumption is necessarily the best operator. Under such circumstances excessive acceleration and braking become as undesirable as the failure to profit by coasting is unnecessary. A proper application of the principles advocated by Mr. Chappelle should result in a marked reduction in the power used by unskillful motormen without in any way causing discomfort to passengers, or adding to maintenance of the equipment.

W. B. Potter,

Engineer Railway and Traction Department.

Motor Buses in London

Croydon Corporation Tramways

Thornton Heath, Surrey, Jan. 7, 1916.

To the Editors:

I have read with interest what you have published in regard to the jitney bus business and am pleased to have noticed in your journal, from time to time, that in many of the cities where the jitneys are being operated the authorities have passed regulatory ordinances. Neither the tramways in this country nor the street railways in America need have any fear of competition from the jitneys if the latter have to assume the same obligations as the former. But when this is not the case conditions are grossly unfair.

I am inclosing two statements which have a very great bearing on the unsatisfactory results of tramways operated in London and brought about by the now largely developed motor bus services. As will be seen, the figures relate to results for the financial year ended March 31, 1914. I did not compile similar statements for the year ended March last, as obviously, owing to the war conditions and the great shortage of tramway labor for several months during that year, all the London tramway systems were, more or less, adversely affected from these latter causes.

Table I—Statement Showing Details of Surplus or Deficit for the Year Ended March 31, 1914, of the Metropolitan Municipal Tramways Undertakings

Undertakings	Surplus	Per Cent to Capital	Deficit	Per Cent to Capital
Barking	....	....	£ 6,753	8.64
Bexley	....	....	911	0.92
Croydon	£1,361	0.48	....	....
East Ham	....	....	5,665	2.95
Erith	....	....	1,672	1.89
Ilford	....	....	3,567	2.4
Leyton	....	....	5,461	1.89
L.C.C	....	....	88,525	0.68
Walthamstow	....	....	7,735	4.10
West Ham	....	....	14,422	2.59
Totals	£1,361	....	£134,711	....

From Table I you will observe that nine out of the ten systems showed a total loss of £134,711, while one system only, that of Croyden, was able to show a small surplus. These unsatisfactory results were entirely due to the aggressive competition mentioned.

Table II—Statement Showing Capital Expenditure; Rates and Taxes; Permanent Way Repairs; for the Year Ended March 31, 1914, Metropolitan Municipal Tramways Undertakings

			Permanent Way Repairs				
Undertakings	Total Capital Expenditure	Rates and Taxes	From Reserve and Renewals Fund	From Revenue	Revenue Total	Reserve Fund Total	Per Cent to Capital
Barking	£78,140	£165	......	£946	£1,111	......	....
Bexley	98,408	502	£274	2,003	2,505	£942	0.96
Croydon	284,846	2,574	910	6,019	8,593	42,352	14.89
East Ham	191,654	2,467	......	4,798	7,265	3,452	1.80
Erith	88,083	334	......	1,465	1,799	......	....
Ilford	149,573	710	603	1,332	2,042	2,294	1.5
Leyton	295,275	3,251	907	3,866	7,117	2,654	0.9
L.C.C	13,028,199	106,483	96,063	101,918	208,401	190,596	1.45
Walthamstow	188,192	611	......	3,573	4,184	4,697	2.49
West Ham	566,878	7,073	4,532	17,503	24,576	32,740	5.89
Totals	£14,959,248	£124,170	£103,289	£143,423	£267,593	£279,618	1.87

Table II is equally interesting, for it shows the expenditure by the various systems in respect of rates and taxes—and here I might say that of the total of £106,483 paid by the London County Council, no less than £86,345 was in respect to rates on their tracks. No similar payment is made by the motor bus operators, nor do they pay anything toward the great wear and tear of the roads used and which such vehicles so largely damage—in comparison with the payments made by the tramways.

The conditions are unfair in the extreme, and you express the matter very clearly when you say "that the jitney is a common carrier and as such should be subject to the obligations which other common carriers have to assume."

T. B. GOODYER,
Tramways Manager.

Delivery of Cars During 1916

THE NILES CAR & MANUFACTURING COMPANY
NILES, OHIO, Jan. 20, 1916.

To the Editors:

The car situation at present can be covered in the fewest possible words by the statement that any railways or manufacturers who are depending on *steel from the mills* for their cars probably will not receive them this year.

We are figuring 1 cent per pound premium for quick delivery on all steel wanted for cars to be used this summer, and the situation is getting worse. Any railways needing cars for summer service probably will be compelled to follow the same plan, namely: offer a bonus or premium for early delivery.

J. A. HANNA,
Sales Manager.

Express Cars in City Service

The Author Describes a Special Car Service that Has Been Inaugurated to Minimize the Peak Traffic from Large Factories

BY W. S. HAMILTON

Superintendent of Transportation Schenectady (N. Y.) Railway

IN the city of Schenectady a considerable part of the rush-hour traffic originates from the large plants of the General Electric Company and the American Locomotive Company, which are located not far from the center of the town. Almost all of the traffic is thrown upon the street railway within a few minutes after the closing hour of each plant, and in consequence a very difficult peak-load condition exists. However, the difficulties incident to this suddenly-applied load have been relieved to a large extent by the introduction of a limited or express service designed solely to take care of the factory workers whose homes are in the outlying sections of the city, and thus to relieve the congestion that would be inevitable under ordinary methods of operation. This innovation has been thoroughly successful in Schenectady, and it has met with very great popular approval since its introduction several months ago.

Under the scheme of operation of the limited service, one or two cars—depending upon the extent of the traffic—are assigned as express cars on each of the ten city lines and on each of the three interurban lines operated by the Schenectady Railway. These express cars are so placed in the schedule that they are the first cars to leave the loops at the factory entrances after the works close for the day. They are moved over a special route, used principally for the rush-hour service, between the factories and the part of the city where distribution of the cars to the various lines may be accomplished, and they are then run without stops to the outlying districts. As far as possible, these limited cars avoid the congested section of the city, and most of those on the various city lines make no stops at all until reaching outlying sections. On the interurban divisions they make their first stops usually at the city line. Runs of from 2 miles to 3 miles are made without stopping, and many of the factory employees are thus enabled to reach their homes in suburbs ten minutes, or more, sooner than they would under the old method of operation.

For its successful operation the whole scheme depends on the ability of all cars to run closely to schedule, expresses having the right-of-way. Prior to the rush hour the average headway of the normal service on the different lines is from ten minutes to fifteen minutes, but during the rush the headway for the regular cars is decreased by overlapping regular runs, thus reducing the intervals between cars to approximately five minutes on a number of the lines. This regular service at five-minute headway is operated from the factories for the balance of the rush hour after the express cars have been run out of the factory terminals, the twenty-five or more express cars being dispatched all at once and as closely together as is physically possible and the safety of operation will warrant.

The express service assists materially in relieving street congestion during the peak, and it has had a marked effect in eliminating the extreme crowding that originally occurred in the first cars to be run out of the factory terminus. The reason for this crowding was that, in accordance with the universal habit of the public, everyone attempted to get into the first car standing in line on the factory loop. With the express cars in operation, only those people who intend to ride to the outlying sections of the town board the first cars, which are in the limited service, and the consequent division of the crowd makes for a better distribution of the load in the different cars, thus simplifying the handling of the traffic.

The necessary gaps ahead of the express cars are automatically provided for by the fact that the service that exists before the rush hour begins is based upon a ten-minute or fifteen-minute headway. As the express cars are expected to make up about ten minutes in time, no extra long spacing of cars is required either before or behind the limited cars, these being followed promptly by local cars as soon as they leave the factory terminus. No difficulty whatever has been experienced in connection with the introduction of this limited-stop service. In fact, the express cars have been placed in operation on a number of the city lines at the request of patrons who had observed the saving in time that was effected on other lines where the service had been inaugurated.

Toledo Safety Committees Visit Out-of-Town Properties

Frank R. Coates, president of the Toledo Railway & Light Company, in his desire to broaden the work of the safety-first organization of his property, recently arranged four committees made up of trainmen to visit other properties and study safety-first methods. Four groups of four men each were chosen by popular vote among the men at the four carhouses on this road. From these sixteen men four committees were made up, each committee visiting one other city, and spending some time with the local officials and employees in studying safety first. F. C. Brown, the safety director of the Toledo Railway & Light Company, accompanied the committee which visited Indianapolis. On the return of the committee to Toledo reports of observations made were submitted to Mr. Coates.

The United States Department of Agriculture has issued a reprint of a discussion entitled "Wood Paving in the United States" by C. L. Hill, forest statistician. This paper discusses at some length the various problems of wood paving and shows the advantages of this type when treated with preservatives.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices
in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Portable Trolley-Wire Reel Holder

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco

The usual way to string out trolley wire where it cannot be done by a tower car is to use two wagons. The leading one carries the reel with its shaft mounted on supports and provided with a brake to regulate the rate of paying out the conductor. The following wagon, a tower wagon, carries the linemen who attach the trolley wire to the span by loose ties, etc.

The method in use on the United Railroads of San Francisco, where the standard is No. 00 round wire, eliminates the leading wagon altogether by drawing the trolley off the reel by the tower wagon. The reel is mounted on the portable reel holder shown in the illustrations. This device is provided with a brake and pole for use when it is trailed behind the tower wagon and for attaching it to any convenient anchorage when the location of the work is reached. If the location of the work is very far from the storeyard or up some steep grades, this loaded reel holder may be taken to and from the job on a flat car, the use of horses being thus avoided and the work expedited.

In the device shown, the shaft on which the reel is mounted is fixed in hinged clamps held by swing bolts provided with wing nuts, and is set slightly eccentric with the centers of the large wheels on which the device rolls. The result of this is that no special exertion is necessary in mounting a new reel of wire on the holder other than swinging the pole through an arc of 90 deg. The 46 to 1 leverage, provided by the 11.5-ft. pole as the long arm and the 3 in. of eccentricity of the reel shaft as the short arm of the lever, is such that one man can take out an empty reel and install a full one on the holder, although, as in handling the "one-man" automobile top, several men are better.

The compound lever foot-brake of the holder is arranged to impinge on the periphery of one reel flange, and is provided with means of adjusting it to different diameters of reels. The chains and split hooks holding the reel-shaft ends are for the preliminary lift of the reel from the ground to a timber to permit of easy application of grooved-shaft ends to corresponding thrust-bearing clamp surfaces. The pipe collars under the chains and the washers are to maintain the reel flange in exact line with the brakeshoe.

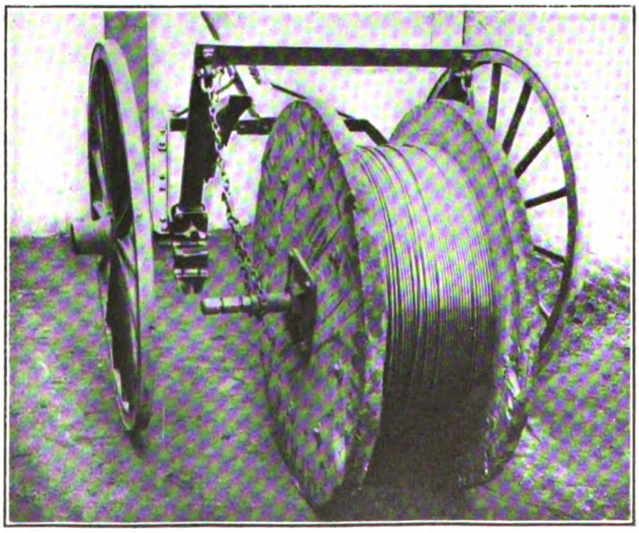
When the loaded reel holder reaches the site of the work it is fastened to a convenient side pole at the edge of the sidewalk by the ring in the end of its wagon pole, the trolley wire is put through a single-sheave pulley suspended from the first span wire so as to clear passing vehicles, the end is sent up to the linemen on the tower wagon and made fast, and the trolley stringing is ready to proceed down the street parallel with the track and as near as the passing cars will permit, the trolley wire being readily pulled out through the loose tie wires on the spans and through the rubber hose at crossings over or under other trolley wires.

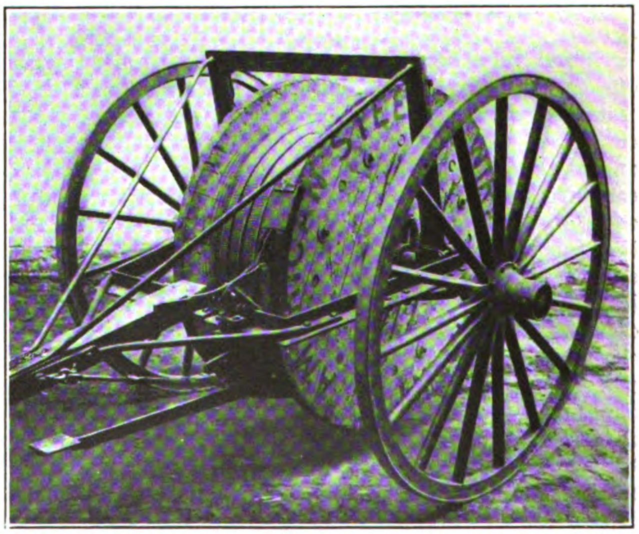
When the new wire has been strung out and put in service and the old wire cut down, the reel in its holder is attached to the rear of the tower wagon, and is towed back to the storeyard.

Of course, where the service permits, the trolley-wire stringing is done with a tower car, which carries a reel of wire on it so mounted that the conductor can be strung out in either direction.

The use of the device described reduces the labor required in loading and unloading reels, obviates the reserving of valuable storage room for the extra wagon, saves the necessity of providing for an extra pair of horses and a driver in case of wire renewal, saves the annual interest on the investment and the maintenance expense of the above, saves the cost for the day of their use either hauling the reel to or from the work or standing idly by waiting for the linemen to complete the work in hand before proceeding to another job, and shortens the actual time required for a given piece of work as compared with the old two-wagon method.

All these items are felt to be worth considering in


PORTABLE TROLLEY-WIRE REEL HOLDER—REEL READY TO LOAD


PORTABLE TROLLEY-WIRE REEL HOLDER—REEL IN PLACE

San Francisco, where the rates of interest and wages are higher than elsewhere.

The same idea might also be applied in stringing out other kinds of conductors, such as overhead feeders or underground cables.

If larger than No. 00 trolley wire is to be strung, or if extra long lengths can be put up producing a strain which might exceed the safe pull on the upper frame of the wagon, the reel holder can be trailed behind another vehicle preceding the tower wagon and all the benefits of the old two-wagon method of stringing be secured. This leading vehicle need be borrowed from some other job for but an hour or so, the emptied reel and holder being then left at the roadside to be towed back to the storeyard by the tower wagon at the end of the day. This, however, has never been done here. In San Francisco, with the many railway curves, grades and intersecting lines, it is seldom in the urban districts that a full mile reel can be strung out continuously or is justified by the wear found on the old trolley wire.

Our standard Trenton tower wagon has always proved amply strong for pulling a mile reel of No. 00 wire out from the anchored reel.

Equipment Defects—Controller Connection Boards, Frames and Covers

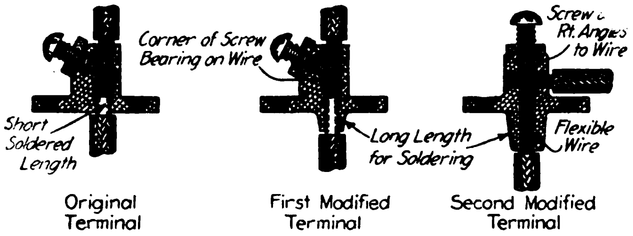
BY C. W. SQUIER, E.E.

Terminals and connection boards in controllers are provided so that the wires running outside the controller can be quickly connected and easily disconnected, thus making the removal of the controllers from cars as easy a matter as possible. They also provide a means for making the connections to the contact fingers in a permanent and stable manner. The most common forms consist of wooden boards located at the bottom or side of the controller on which binding posts of some form are mounted. The front sides of these are usually arranged to receive the wires coming from the motors and grid resistors, while into the backs are soldered the leads running to the finger bases. Cutout switches for cutting out disabled motors are also usually mounted on the connection boards.

The principal troubles experienced with connection boards and terminals are short-circuits or grounds caused by accumulation of dirt or by loose connections. The keeping of the boards and terminals clean is a matter of careful inspection only, and this source of trouble can be entirely eliminated by blowing out the controllers with compressed air and wiping off the accessible parts on each inspection.

Some changes in terminals which have brought about a reduction of the troubles caused by leads breaking or becoming unsoldered, are shown in three accompanying illustrations. The first of these shows a section of the original terminals as received with the controllers. In these the length of wire soldered into the bottom is barely 3/16 in. This length proved to be insufficient. The original terminals also had the screws for fastening the top leads inserted at an angle so that the corner of the screw pressed against the wire on a sharp edge which soon cut the strands away at the point of contact. Vibration then caused a loose connection at this point. In the second illustration, the terminal is shown lengthened so that the amount of surface provided for soldering in the leads is increased to 7/16 in. This effectively prevented the loosening of the connections. The next change was to do away with the angular bearing clamping screw on the wire. This was accomplished by inserting the screw at the top where the wire originally entered, and by drilling a new hole for the wire at right angles to this. The third illustration shows this change and also the provision of increased length for soldering the wire at the bottom.

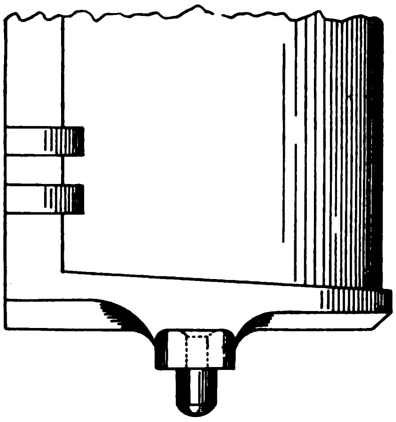
Flexible or stranded wire was also used throughout, as it was found that vibration caused solid wire to break very soon, in case a crack was started by bending. The use of flexible wire permits bending without danger of cracking and also provides a rough surface to hold the solder where it is inserted in the terminal. By having the hole for the bottom lead and the screw in the same line, this hole can be drilled with one operation, and it then remains only to tap out the upper part to receive the screw.



EQUIPMENT DEFECTS—IMPROVEMENTS IN CONTROLLER TERMINALS

In some of the later types of controllers the connection boards have been done away with entirely, the outside leads running directly to the finger bases. This plan provides more room in the controller for other details and perhaps reduces the size of the controller for the same capacity slightly. It also eliminates the danger of short-circuits at connection-board terminals. The outside leads, however, are necessarily much longer and more difficult to handle while controller replacements or removals are being made. These leads are also much more liable to injury, as the arrangement of the leads is left to the man making the replacement, and as permanent a job of control wiring cannot be obtained. As the leads are not supported, their vibration with car movement is much more severe and the danger of their becoming loose at the finger-base terminals is consequently increased.

On roads which change their controllers from closed to open cars in the spring and back again in the fall, in addition to the necessary removal of controllers for overhauling, the ease with which a controller can be connected and disconnected becomes an important one.



EQUIPMENT DEFECTS—PIN RIVETED IN CONTROLLER FRAME FOOT

As the controller frame is intended primarily only for supporting and housing the other controller parts, there is very little that can happen to it other than for it to become broken. Where the feet of the frame are bolted down solidly to the car platform, it usually happens that if a car is in collision so as to bend in or break the front, the controller frame is also broken, or the feet at least are broken off. Some of these breakages can be prevented if the controller is so supported that it will bend over with the dash and is not bolted solidly to the platform. An accompanying illustration shows a method of riveting pins into the controller feet, these in turn to set into holes in the car platform so that they will serve to keep the controller from moving and still not hold it rigidly on the floor. This mounting will permit the controller when fastened to the dash in the usual manner to pivot about the feet in case the dash is bent over without danger of damaging the frame.

The controller cover is another part that should be kept in such condition that it can be quickly and easily opened. As motor cutout switches in most cases are located inside the controller, if it is necessary to cut out a motor on the road the motorman must open the cover, and this in most cases without the use of any tools. Special attention must then be given to covers and to the cover clamping screws and nuts. Covers must set properly in place and be securely fastened. The clamping screws must be straight, threads in good condition and not burred, and the nuts must turn on and off by hand.

The most satisfactory location for the cutout switches is near the motor, one near each, and within easy access from the side of the car instead of inside the controllers. This arrangement permits the motorman to be sure as to which motor he is cutting out, for he can throw the switch near the particular motor which is giving trouble. This method has been in use on one road for nearly ten years and has proved entirely satisfactory.

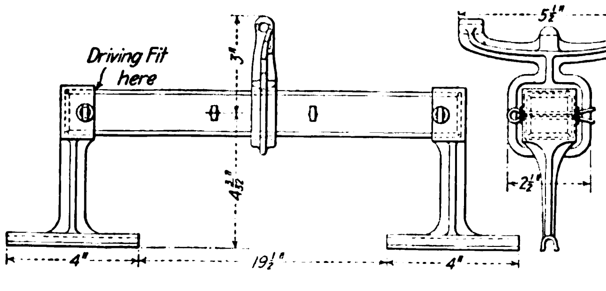
With the cutout switches located inside the controller it is necessary to throw them in the controllers at both ends of the car to properly cut out a motor. The usual procedure is to cut out a motor and then try the car. If the circuit breaker does not blow it is assumed that the proper motor has been cut out. It often happens, however, that the motorman operates with the defective motor in circuit and cuts out the good one.

Overhead Construction on the Twin City Lines

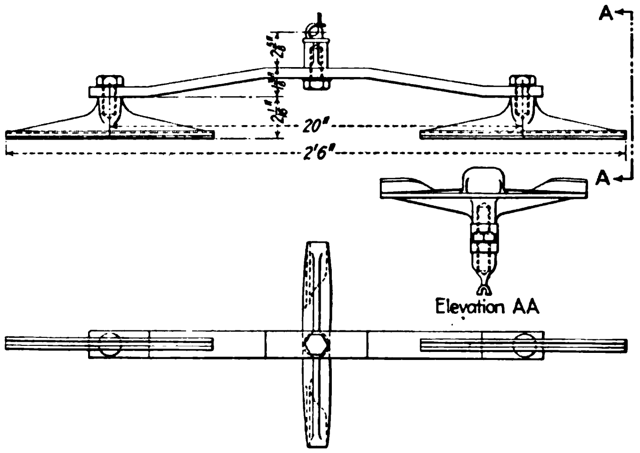
BY J. C. VINCENT
Assistant Engineer Twin City Rapid Transit Company, Minneapolis, Minn.

As is well known, the operating companies composing the Twin City Lines were pioneers in street railway electrification, having started in 1889. Because of this fact and also because the Twin City Lines have extensive shops, the overhead construction in use has been developed along original lines and was manufactured in the railway shops.

The construction in general consists of steel side poles with span wires supporting the trolley wires. In this construction the main idea has been to keep it as light as possible, and at the same time to eliminate hard spots. As the life of trolley wire is determined by the wear at the hangers and special work, the overhead construction has been designed for light and smooth underrunning so as to eliminate pounding on the wire. This article will be devoted to descriptions of the trolley hanger, the sub-feed hanger, the pull-over, the pole top, and a crimping tool used in attaching the hangers to the Fig. 8 wire.



TWIN CITY OVERHEAD—STANDARD HANGER



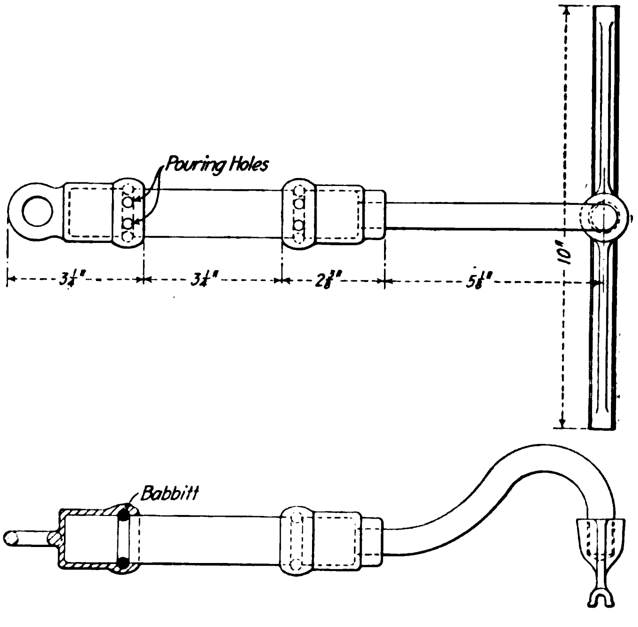
TWIN CITY OVERHEAD—SUB-FEED HANGER

As shown in an accompanying illustration, the trolley hanger consists of two legs attached to the ends of a 2-ft. maple stick, at the center of which there is a sister hook for span-wire attachment. The legs are of bronze, with a 4-in. ear on the bottom of each and a square fitting on the top with provision for pinning to the maple stick by means of a cotter pin.

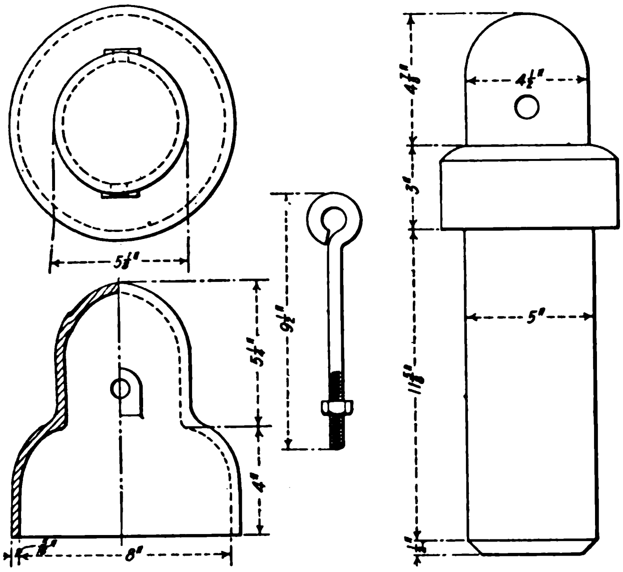
The maple stick is 24 in. long, 1⅜ in. square, with the corners chamfered, and it is thoroughly impregnated with paraffin by boiling. Formerly a somewhat shorter stick was used but it has been found that the use of the longer stick results in more uniform wear, that under the leg being now not noticeably greater than in the middle of the span. The sister hook is of malleable iron, with the top arranged for hooking over the span wire and with a square eye below through which the maple stick slips loosely. The hook is held near the center of the stick by means of two cotter pins.

This construction is light and, as the points of support are not directly below the span wire, the trolley wire rocks slightly as the wheel passes under the hanger and no pounding results.

The sub-feed hanger is similar in general principle to the hanger just described, as far as the provision of flexibility is concerned. It consists of two ears of the usual design carried at the end of a light channel iron with center raised about 1⅜ in. above the ends. At the center this channel iron is bolted to a galvanized mal-



TWIN CITY OVERHEAD—PULLOVER WITH WOOD STRAIN INSULATOR



TWIN CITY OVERHEAD—STANDARD POLE PLUG AND CAP

leable iron hanger for attachment to the span wire. This arrangement gives the desired flexibility and also doubles the current-carrying capacity.

The pull-over consists of a clamp, a gooseneck, and a wood-strain insulator. The wood-strain insulator is used here, as elsewhere in the system, because the composition insulator does not give satisfaction on account of lightning puncturing the insulating material. The clamp is of bronze, and is made with a 10-in. ear. The gooseneck is of ⅝-in. wrought-iron rod bent to the form shown in one of the illustrations, and threaded on both ends.

The wood-strain insulator consists of a cylindrical piece of hard maple, 6¾ in. long and 1⅛ in. in diameter, thoroughly impregnated with paraffin. Near each end is a semicircular groove. On each end of the metal rod is a malleable-iron casting provided with eye, hook or nut, as required. The clamps are fastened to the rod by means of babbitt metal poured into the groove in the rod and into a corresponding groove in the casting. With this design of pull-over there is no heavy weight directly over the wire.

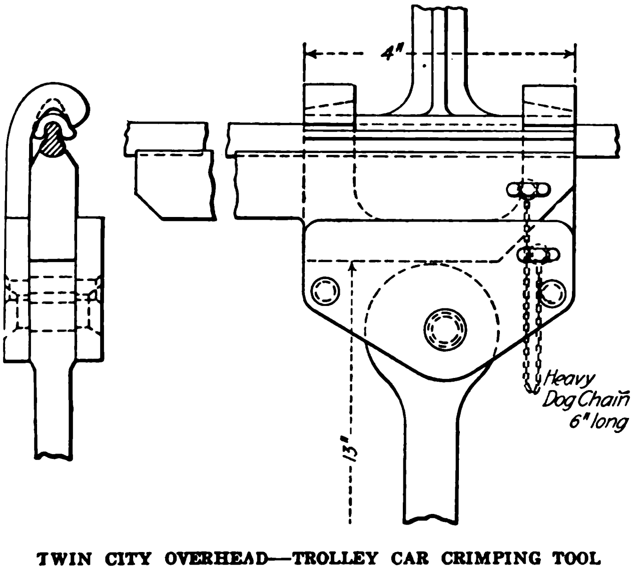
All other special work, such as switches and crosses, is made straight underrunning, of tough bronze, and of as light weight as possible.

The trolley wire adopted as standard by the company is No. 00 hard-drawn copper. This wire allows a firm fastening to the hangers and pull-overs, is easily installed, and is of a size sufficient to carry the current, as it is supplemented by feeders, mostly underground, where necessary. The type of hanger used does not allow the wire to lie flat and it overcomes the objection usually made to Fig. 8 wire. The wire used at present is given an extra pass through the dies, thus furnishing greater tensile strength and hardness and consequently yielding greater life. The choice of No. 00 Fig. 8 trolley wire was determined by our experience with this size and the No. 000 wire.

The span wire used is made up of three strands of No. 11 galvanized steel wire, the light weight supported and the large sags allowed in the span wire, 3 ft. to 4 ft. safely permitting the use of this size of wire. The large sag in the span wire conduces to the flexibility of the construction in both the vertical and horizontal directions.

We use a side pole made of 7-in., 6-in. and 5-in. standard pipe, with 8-in. standard pipe for the ground sleeves. In the top of the pole a pine plug 20 in. long is inserted, this having the form shown in one of the illustrations. Over the plug is placed a cast-iron cap and the span wire is attached to a wrought eye-bolt which passes through cap and plug.

The company has developed a crimping tool for use in attaching the trolley wire to the hangers, and this has given very good satisfaction. The details are shown herewith. The device consists of a double hook which is designed to force the trolley wire firmly into the groove in the ears, the swaging being done with a block and hammer. It is drawn down by means of cam and lever which forces a long anvil against the lower surface of the trolley wire. The anvil is attached to the remainder of the device by means of a chain so that the whole may be kept together.



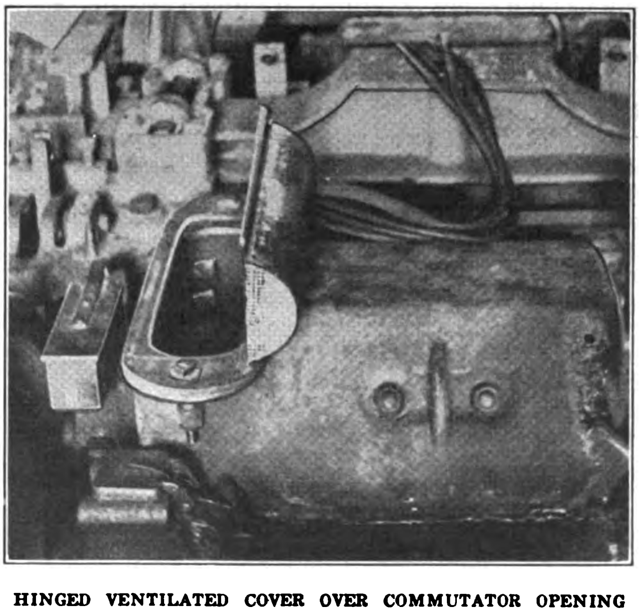
TWIN CITY OVERHEAD—TROLLEY CAR CRIMPING TOOL

Semi-Ventilation of GE-57 Motors

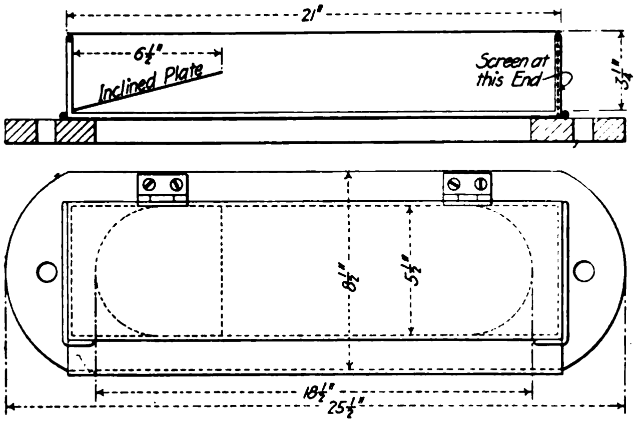
BY R. W. PALMER

Manager Cleveland & Erie Railway, Girard, Pa.

In order to increase the service capacity of the GE-57 railway motors and reduce the temperature of the windings, the Cleveland & Erie Railway has replaced the solid iron covers over the commutators of motors of this type with wood covers having their centers cut out. The open spaces have galvanized-iron covers or hoods, as shown in the accompanying illustrations. Inasmuch



HINGED VENTILATED COVER OVER COMMUTATOR OPENING



DETAILS OF GALVANIZED-IRON VENTILATING COVER

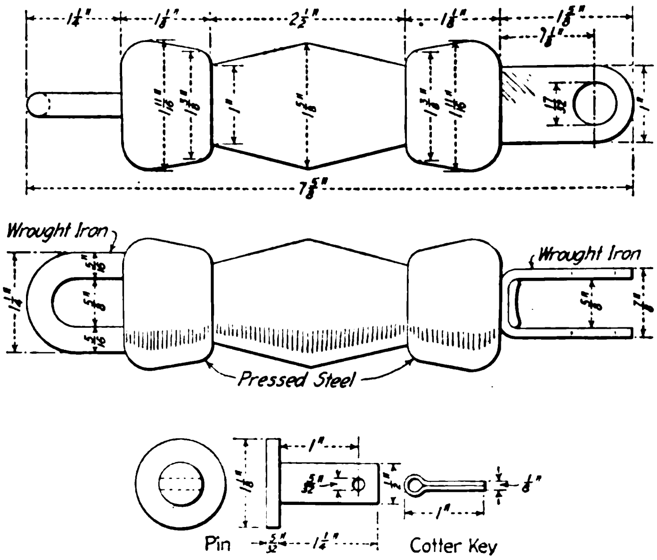
as the cars on this road are equipped for single-end operation the galvanized-iron covers are made right and left-hand. When they are mounted on the motors the ends without the screen are placed toward the front to allow free circulation of air. The inclined plate shown in the drawing acts as a shield to prevent wheel splash entering the motors, the screen on the other end preventing small stones and other foreign substances from entering. The handhole plates or covers under the commutator, as well as the top and bottom plates on the pinion end, are also replaced with screens so as to allow the free circulation of air within the motor frame.

This arrangement has been used with considerable success by the company during the past season. Four of the above two-turn motors, having a gear ratio of 25:59 mounted on Baldwin, Class 78-22-A trucks, have been used under cars weighing 28 tons. In the winter, on account of possible trouble from snow, the standard covers may be replaced, as due to a lower temperature of the surrounding air the windings will not exceed a safe temperature. However, in operating cars through a recent severe snowstorm the GE-57 motors with ventilated covers, as well as the 306-V motors, were free from snow and comparatively dry on the inside.

Swiss Electrification Prospects Revived

The problem regarding the proposed electrification of the Swiss State Railways is beginning to assume a more definite stage, according to foreign reports. Early in December an important conference was held at Berne, at the instance of the Swiss Association for the Regulation of Water Powers and the Association of Electrical Engineers, to discuss the question of electrification. M. Thormann, the engineer who was in charge of electrifying the Lötschberg Railway, delivered a lecture on the various systems of electric operation, and proposed the adoption of the single-phase type, which has given great satisfaction on the Lötschberg Railway. A resolution was passed expressing the hope of the electrification of the St. Gothard Railway together with the approach line to the Simplon Railway, the conference being convinced of the advantages which result from better utilization of the existing water powers by assisting in rendering the country independent, from an economic point of view, in regard to supplies of coal for railway operation.

The Chicago, Ottawa & Peoria Railway made a record during 1915 of having trains on time. With 25,587 scheduled trains operated during the year, 24,162 of these, or 94.5 per cent, were on time.



DETAILS OF B. R. T. WOOD-STRAIN INSULATORS

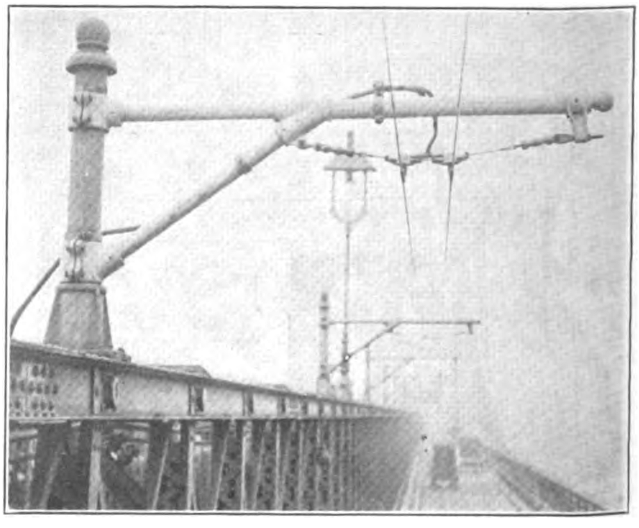
Wood-Strain Insulators for Brooklyn

The Brooklyn (N. Y.) Rapid Transit Company recently installed on its lines some 2½-in. wood-strain insulators in place of 2½-in. globe-strain insulators. The specifications for these insulators are the same as for the 5-in. wood-strain insulators except that the test for the smaller insulator is 2000 lb., whereas for the 5-in. size it is 4000 lb.

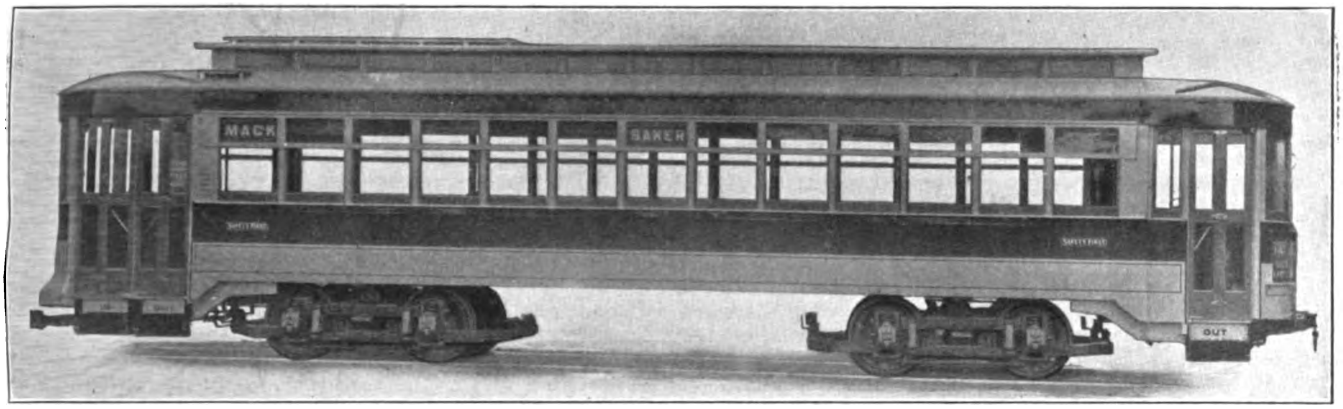
These new insulators are made from second growth, split hickory. The wood is thoroughly seasoned and straight-grained and so treated as thoroughly to fill all of the pores with oil. As a finish, it receives two coats of clear varnish.

Steel caps are used, compressed tightly on the ends of the wood so as to prevent any moisture working in between the cap and the wood but not so tightly as to injure the fiber of the wood. The iron is protected against rust either by a heavy galvanized coating or by being sherardized. The eyes in the caps are placed at right angles to each other.

All insulators were inspected upon delivery to the storeroom. The inspector first carefully examined each insulator for any defects. Each insulator was then tested by having a tensile stress of 2000 lb. applied to it. The company is now considering the advisability of substituting the wood type of insulator for frog pull-offs also.



B. R. T. WOOD-STRAIN INSULATORS ON BROOKLYN BRIDGE



DOOR SIDE OF DETROIT SINGLE-END CAR

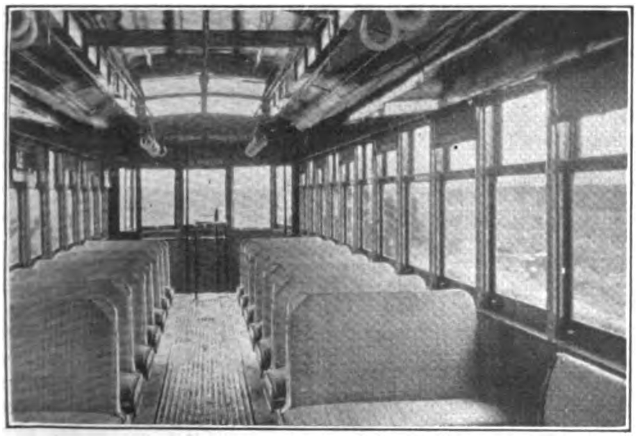
Detroit Single-End Motor Cars

The Detroit (Mich.) United Railway's fifty new center-entrance trail cars were described in an illustrated article by C. L. Keller, master mechanic of this company, in the ELECTRIC RAILWAY JOURNAL of Dec. 4, 1915. This railway company has also had built by the G. C. Kuhlman Car Company twenty-five new all-steel prepayment motor cars, which are shown in the accompanying illustrations. Although the motor car bodies have the same monitor deck type of roof as the trailers and contain practically the same interior specialty equipment, they differ from the trailers in being of the end-entrance type, while the trailers are center-entrance. As they are operated from one end only, the doors of the motor cars are located only on one side of the vestibules, the rear platform being equipped with double folding doors and steps for entrance and exit and the front platform with a single folding exit door. The bodies are without platform bulkheads. The motor cars also differ from the trailers in having a cross-seat arrangement for forty-six passengers, while the others have longitudinal seats for fifty-seven passengers.

The general dimensions of the motor cars are as follows:

Length over vestibule	46 ft. 10 in.
Length of body	33 ft. 4 in.
Width over sills	8 ft. 1 13/16 in.
Width over all	8 ft. 4¼ in.
Bolster centers	21 ft. 2 in.
Height, rail to sills	2 ft. 9⅜ in.
Height, sill to trolley base	9 ft. 3¼ in.
Weight of car body, including seats	16,800 lb.

Among other items of equipment are the following: GE-203 motors, outside-hung "Golden Glow" headlights, Detroit standard pedal sanders and Brill "Dedenda" gongs.



INTERIOR VIEW OF DETROIT SINGLE-END CAR

Packing Ring Practice of the Rhode Island Company

Nearly one-third of the air compressors on the 818 air-brake cars of the Rhode Island Company, Providence, R. I., are equipped with McQuay-Norris piston packing rings. These rings have been substituted for the old type three-part rings, either as renewals or when rebushing cylinders. They are tested at 80 lb. pressure and are somewhat tighter than the old three-part rings. They are of hard, close-grain and fairly brittle cast iron, such as has been found desirable for this service. All rings are 5/32 in. thick except those of the Westinghouse D-1-E compressors. Compressors are overhauled at least every two years and oftener if occasion demands.

The later type of compressors have pistons fitted with three snap rings. When compressors are rebushed, the inside diameter of a 5-in. cylinder is about 1/64 in. scant, which allows truing up of the piston; on the second rebushing the inside diameter is 1/32 in. scant to allow a second truing up of the piston. Not more than two rebushings are advisable, using old pistons.

Growth of Electric Railways

In a paper recently prepared for the Institution of Civil Engineers in England by Henry Metcalf Hobart, now of the General Electric Company, Schenectady, N. Y., statistical tables were cited to show the rapidly increasing extent to which electricity has been employed as a motive power for trains. The rate at which the electrification of sections of American steam railroads has grown since 1895 was shown as follows:

Electrically-equipped single-track mileage of steam railroads in the United States and Canada—1895, 8; 1900, 51; 1905, 215; 1910, 1580; 1915, 3460; total single-track mileage of steam railroads in the United States and Canada—1895, 233,000; 1900, 259,000; 1905, 307,000; 1910, 352,000; 1915, 380,000; percentage of electrically-equipped single-track mileage—1910, 0.45; 1915, 0.91.

The above figures, however, it was explained, did not indicate the growth of the electric railway industry in America. The greatest activity has heretofore related chiefly to independent electric railway properties not necessarily involving train operation. The rapid growth of this business in America is indicated by the statistics below, the totals being given in round amounts:

Total single-track mileage of electric railways in the United States and Canada—1890, 1260; 1895, 12,100; 1900, 19,300; 1905, 32,500; 1910, 40,000; 1915, 45,000; total number of motor cars—1890, 5600; 1895, 26,000; 1900, 43,600; 1905, 64,000; 1910, 89,600; 1915, 100,000.

NEWS OF ELECTRIC RAILWAYS

WASHINGTON COMMISSION WORK REVIEWED

Chairman Reynolds Discusses Activities of That Body for Year Just Ended

Charles A. Reynolds, chairman of the Public Service Commission for the State of Washington, in discussing the work of that body for the year ended Dec. 31, 1915, was quoted in part as follows:

"The accomplishments of the Public Service Commission during the last year may be treated under five separate headings:

" 'The elimination of the utility factor in valuation.

" 'The segregation of property owned by the same utility for purposes of valuation.

" 'The elimination of the telephone deposit.

" 'Improved street car service.

" 'The reduction of the cost of electrical energy for residential lighting and irrigation purposes.'

"Up to the last year the so-called utility factor was used by the Public Service Commission of Washington in the valuation of rights-of-way and other real estate owned by public utilities.

"By the utility factor is meant the multiple used by the engineer after determining the value of a piece of real estate by comparing it with the value of contiguous property. The engineer multiplies that value by two or three, or some other multiple, upon the theory that it cost the company two or three times as much to buy it as it would cost a private individual, even though in fact the land was donated to the utility in the first instance.

"Up to the time of our decision in the Seattle, Renton & Southern Railway case the utility factor was used by the Public Service Commission of Washington in the valuation of rights-of-way and other real estate used by public utilities.

In passing upon the various question which were raised in the Seattle, Renton & Southern Railway case this commission said:

" 'If the rule formerly followed by this commission is incorrect it invalidates every valuation ascertained by the commission where the multiple is used. Shippers and passengers are now paying interest upon millions of dollars that have no existence outside of the imagination or arbitrary notion of a so-called expert. The matter is of so far-reaching importance, both to the railway company and to its patrons, that we deem it proper to set forth at length the reason for the rule as expressed by Justice Hughes of the Supreme Court of the United States.'

"Thereafter the members of the commission at a meeting of the National Association of Public Service Commissioners in Washington, introduced a resolution to the effect that no utility factor should be used in the valuation of real estate. This motion was carried by the National Association unanimously and since that time no utility factor has been used."

Discussing segregation of properties, Chairman Reynolds said:

"Certain corporations in the State of Washington own and operate utilities of different kinds, such as light, water, gas and street railway, in different portions of the State. These corporations desired the Public Service Commission to value their entire property as one property, regardless of their nature or place, or places, of operation. The statute recognizes this right to request segregation, and it seems only right that it should be granted out of common justice.

"In street railway matters the commission met with considerable opposition until the United States District Court held that its right to order adequate and sufficient service was absolute. The commission has maintained that the rendering of service is the duty of a public utility irrespective of returns, and it is on this theory that we have based our acts."

TRANSIT DIRECTOR TAYLOR REPORTS

Head of Department of City Transit of Philadelphia Reviews Rapid Transit Situation There

The annual report of the department of city transit of Philadelphia, Pa., for the year 1915 has been completed by A. Merritt Taylor, the retiring transit director. The report will contain a detailed summary of the activities of the department during the year just ended; the present status of the two high-speed projects now in course of construction; the estimated cost, routes and plans of the additional subway and elevated lines recommended by the transit department; the financial aspects of the entire transit project; the enabling legislation, both Councilmanic and State, passed during the year, and finally a review of the tentative agreement between the city and the Philadelphia Rapid Transit Company, looking to the operation of the city-built high-speed system and to the establishment of universal 5-cent fares in place of the present 8-cent exchange tickets.

The report will lay particular stress upon the necessity for the State Legislature to pass a bill, prepared last spring by Director Taylor, providing that cars should be through routed between lines built and owned by cities of the first class and lines built and owned by corporations within cities of the first class.

Prompt action by all parties to ratify or amend the present tentative agreement between the city and the company in order to insure the abolition of the 8-cent exchange tickets and Philadelphia Rapid Transit operation of the lines will be particularly urged in the report. In this connection two suggestions toward the amendment of the present tentative agreement will be made on the basis of recognition by the city of cash actually paid in on the stock of the Union Traction and Philadelphia Rapid Transit Companies.

The suggestions will be, first, that the preferential payments by the city to the Philadelphia Rapid Transit Company, as provided in the tentative agreement, to protect the transit company against losses due to diversion of traffic from the present to the new lines, be based upon actual investments by the stockholders of the transit company and the Union Traction Company, and second, that provision be made for the investment by the Union Traction stockholders of the balance still owing to make up their full capitalization.

Under the estimates of Director Taylor, it will cost between $15,000,000 and $16,000,000 to equip for operation the city-built elevated and subway lines. Under the tentative agreement whereby the Philadelphia Rapid Transit Company would become the operating company, this cost of equipment could be met through the payment of $19,500,000 by the Union Traction stockholders. For this reason particular emphasis will be laid on the need for this provision in the report.

The suggestions, in effect, would give a 6 per cent cumulative return to the stockholders of both companies on the cash actually paid in since 1895, the time of reconstruction. The compensation for the abolition of exchange tickets would be increased, but this increase would be offset by reductions in the preferential payments to the company. The preferential payments would be in amount necessary to make the net income of the company each year equal to $2,430,000, or 6 per cent on $10,500,000 Union Traction stock (paid in) and on approximately $30,000,000 Philadelphia Rapid Transit stock (paid in). The obligation of the city, however, would under no circumstances be more than $600,000 a year, collected only from the operation of the city-built lines.

The report will contain a completely revised estimate of the cost of construction of the lines now under way and those recommended. The revision is based upon the savings made in contracts already let, and it will also include 20 per cent added to cover cost of engineering, interest and required sinking fund payments.

DES MOINES ELECTION VALID

Supreme Court of Iowa Upholds Vote of Franchise to Des Moines City Railway. Rehabilitation Under Way

Immediate acceptance of the new franchise is announced by Emil G. Schmidt, president of the Des Moines (Iowa) City Railway, following the decision on Jan. 22 of the State Supreme Court that the recent franchise election was valid. Mr. Schmidt said on Jan. 24 that before the week was over Des Moines patrons would be enjoying the new rate of six fares for a quarter, as provided in the new franchise. Mr. Schmidt will hasten to secure from the Federal court the discharge of the company from the receivership into which it was thrown prior to the voting of the new franchise.

The financial reorganization of the company has been delayed only to await the decision of the high court on the franchise election. The date for the acceptance of the franchise expires on Jan. 28, and though the franchise may be accepted without the prior discharge of the company from the receivership the plans of Mr. Schmidt call for the operation of the system under all the regulations of the franchise immediately upon the acceptance of the new grant. For that reason the discharge from receivership is to be secured prior to the acceptance of the grant if possible. To the representative of the ELECTRIC RAILWAY JOURNAL in Des Moines Mr. Schmidt said:

"Dirt will be flying on our improvements for the year, to cost $1,500,000, within a week or two, and next week I expect to close up all of the business of the company pertaining to its financial reorganization. I shall then immediately start plans for the entire rebuilding of the system in the downtown district and construction work on that improvement will start as soon as the weather permits. Contracts will then be let for improvements more distant from the heart of the city, and with warmer weather the people who voted for the franchise will see that we intend to keep our pre-election promises."

A large demand is expected for the six-for-a-quarter tickets with consequent temporary effect on the gross receipts of the company.

The opinion of the Supreme Court holding the election to be valid was written by Justice Preston. Justices Deemer, Evans and Salinger dissented.

NATIONAL CIVIC FEDERATION MEETS

At the sixteenth annual meeting of the National Civic Federation, held in Washington on Jan. 17 and 18, the main subjects were preparedness for national defense and immigration. Many other topics, however, were taken through various committee reports showing constructive work that the federation is doing along various industrial and public lines. One official action was taken when the federation adopted resolutions to be sent to the President and Congress, urging enactment of some plan for pensions for superannuated or disabled federal employees.

Louis A. Coolidge, chairman of the welfare department, said in connection with the subject of profit sharing that organized labor is opposed to the system on the ground that it deprives the worker of his organized bargaining power, and also that employers question it because workers fail to understand its benefits and to take intelligent advantage of them. On the whole, he spoke in favor of the principle as far as it has been tried, but he argued that betterment experiments should not be based on charity but must justify themselves in dividends.

The delegates received advance copies of the introduction to the report on profit-sharing plans soon to be issued. The federation has made an extensive investigation and analysis of more than 200 plans in the United States, and the report will endeavor to show impartially all the important details of the various plans, with the claims made for them and the objections urged against them. No attempt will be made, however, to decide the conflicting claims or to weigh the relative importance of the advantages or disadvantages of profit sharing.

Louis B. Schram, chairman of the national committee for the prevention of industrial accidents, urged that accidents be classified by causes in order better to understand conditions, and that safety devices be required on machines as integral parts when they are made in the factory. The workmen's compensation department reported in regard to the growth of the compensation movement in the United States, while the social insurance department advocated a system of voluntary rather than compulsory social insurance in America. The pension department compared the various systems under federal, state, municipal and industrial employment and supported the idea of federal pensions.

A plea for the support of the federation in the fight for uniform court procedure in all states was made by the chairman of the uniform law committee of the American Bar Association. The national welfare survey committee reported as to the increase in the voluntary improvement of conditions for employees, and particularly of citizenship and trade education for foreigners. Other reports described the progress which has been brought about in industrial hygiene and labor conditions during the period covered by the last thirty years.

COMMISSIONER WOOD INDICTED—INQUIRY TO CONTINUE

Robert Colgate Wood, who resigned as a member of the Public Service Commission for the First District of New York just before charges alleging corruption in office were made against him by the Thompson legislative investigating committee, was indicted on Jan. 25 by the Grand Jury on a charge of soliciting a bribe. He surrendered himself to District Attorney Swann and was arraigned before Judge Mulqueen in the Court of General Sessions. Through his attorney, he pleaded "not guilty," and asked for one week in which to change his plea or make necessary motion. Assistant District Attorney O'Malley asked that bail be fixed at $7,500, and arrangements were made to have the money put up by a surety company. It is expected that Mr. Wood will be brought to trial in February.

An interesting political drama has been enacted in New York in connection with the legislative investigation of the Public Service Commissions. Not content with the scope of its original work the committee began to proceed along other lines. The chairman of the committee sought additional funds and announced that the investigation would continue. The Speaker of the House thought that the committee had done enough investigating and said so. The chairman of the committee promptly announced his dissent. At this point some one drew across the trail of the committee the red herring of expenses incurred by the members for hotel accommodations and entertainment in New York City. An investigation of the investigators was then proposed. Just about this time some one else as a sort of counter irritant, suggested that the inquiry be widened to include the expenses of Governor Whitman on his recent trip to the Pacific Coast. Thereupon an assemblyman said that a Governor ought to be beyond suspicion. On Jan. 25 came capitulation. It was announced that the milk-white flag of surrender had been hoisted over the Speaker's desk in the Assembly; that the Thompson committee investigation would continue to March 7 with an additional appropriation of $30,000, and that it had been determined to squelch the resolution providing for an omnibus investigation of all bills of legislative investigating committees, including the Whitman junket to the Panama-Pacific exposition. In the wake of all this the following picture of political harmony at Albany was painted by one of the correspondents at the capital:

"There never has been such unanimity between Senate and Assembly, between the Democrats and Republicans and between the legislative and the executive branch of the State government since the present administration took hold as there is to-night (Jan. 25) over the sagacity displayed by the ways and means committee. Everybody's face has been saved. The danger of any too deep delving into the doings of the many committees and commissions has been averted."

A perfunctory meeting of the Thompson committee was held on Jan. 27, adjournment being taken to permit the chairman to speak in Brooklyn on the subject "What Our Committee Has Uncovered." The Senator declined to predict the line of inquiry to be followed hereafter.

CINCINNATI RAPID TRANSIT PLAN ADOPTED

At a meeting on Jan. 21 the Rapid Transit Commission of Cincinnati, Ohio, adopted modified plan No. 4 for the route of the rapid transit belt line. In the beginning this belt lint will serve as a nucleus for a rapid transit system for the entire city. It will consist of a double track around the entire course, but the commission has planned spur tracks to take care of portions of the city which the main line does not reach. These tracks will not be built, however, until the main line has proved a success. The commission will ask the voters to pass on a bond issue of $6,000,000 in April, sufficient for the construction of the double track of the main line only. The belt line will be known as the Cincinnati Rapid Transit & Interurban Railway.

The road will be double track and standard gage the entire distance. This will affect the three lines of the Interurban Railway & Terminal Company, the Millcreek Valley Line, the Cincinnati, Georgetown & Portsmouth and the Cincinnati, Milford & Loveland roads, all of whose tracks are broad gage. The lines of the Ohio Electric Railway, the Cincinnati & Columbus Traction Company and the Indianapolis & Cincinnati Traction Company are all standard gage. Engineers estimate that a third rail, to allow the cars of the broad gage roads to use the loop, would entail an additional cost of $150,000, while it will cost the three roads mentioned $112,000 to change their track and equipment to standard gage.

The main passenger and freight station will be built by the time the road is ready for operation, and all interurban cars will be allowed to use it. All passenger cars using the loop must be of metal construction under the decision reached. Freight cars will be allowed to use it at fixed hours between the rush hours and in the early morning hours.

Members Edward Dornette and W. A. Hopkins were appointed a committee to take part in a conference between City Engineer Frank Krug and officials of the Interurban Railway & Terminal Company and the Cincinnati, Georgetown & Portsmouth Railroad relative to making connection with the line. A plan has been suggested by which both may connect over the same track.

The main passenger and freight terminal will be on the site of the city hospital. Other stations will be located at other convenient points.

Mr. Krug was chosen administrative head of the interurban project by the Rapid Transit Commission at its meeting on Jan. 22.

CLEVELAND COUNCIL ACTS ON SEVERAL MATTERS

Fielder Sanders, street railway commissioner, of Cleveland, Ohio, at the Council meeting on the evening of Jan. 24 reported adversely on the plan of giving school children free transfers.

Councilman William Stolte introduced an ordinance providing for the selection of the street railway commissioner by the Council in the future. He argued that this official's duties are to keep Council informed of all conditions pertaining to the operation of the road and that he should not be appointed by the Mayor.

The resolution, recently introduced, requiring that chairs be supplied in street cars for conductors was adopted. Mr. Sanders advised the committee to which this resolution was referred that the company did not favor the idea because conductors, when seated, cannot see people leaving the cars and the number of accidents will likely be increased on this account.

It is possible that the people will be asked to decide whether all cars shall be stopped on the near side of the street. Mr. Sanders reported to the street railway committee of the Council that opinion seems to be about evenly divided. No action was taken on the ordinance requiring all cars to be operated pay-as-you-enter when going toward the Public Square and pay-as-you-leave when going in the opposite direction. Mr. Sanders said the plan would be impractical on some of the lines.

The committee reported adversely on the ordinance to extend the East Seventy-ninth Street line of the Cleveland Railway to Broadway and along East Seventy-first Street to Lansing Avenue.

AS MAYOR ROLPH SEES THE MUNICIPAL RAILWAY

James Rolph was sworn in on Jan. 8 as Mayor of San Francisco, Cal., for another four-year term. In discussing the municipal railway he said in part:

"The municipal railway system was established not only to make profits for the taxpayers but to provide service. It has done both in such excellent fashion that the extension of the system will not only be a financial success, but insure the growth of San Francisco.

"We should extend our municipal transportation system, commencing at the terminus of the Geary Street system at the beach, along the beach to Sloat Boulevard, and thence along Sloat Boulevard to and through the Twin Peaks tunnel. This tunnel is one of the most valuable assets of the municipality, and the control of it for traffic at all times must be retained by the public. Plans should be formulated immediately for the extension of the Municipal Railway system from the tunnel and down Market Street to the ferry in order to provide rapid transportation for the Sunset and Ingleside districts.

"No time should be lost in determining the rights of the city to operate its own municipal system over its own streets, and until this question is settled municipal transportation in one form or another should be provided.

"The city, in view of the injunction granted by Judge Sewall, should take steps immediately to obtain the use of a loop at the ferry terminus for the operation thereon of the cars of the municipality, and to make provision to supply sufficient power for all cars of the Municipal Railway in conformity with Judge Sewall's recent decision.

"The Municipal Railway system should cross Golden Gate Park, thus connecting the Richmond and the Sunset districts and providing much needed transportation in these rapidly growing sections of our city. The Church Street line should be completed without delay to Thirtieth Street."

A. I. C. DEVELOPING PLANS

The $50,000,000 American International Corporation, of which Charles A. Stone of Stone & Webster is president, is slowly developing for doing business with foreign countries, and during the past month has made some important steps in its program for procedure. At the meeting of the directors on Dec. 23 George J. Baldwin, Savannah, was elected vice-president, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8. Mr. Baldwin started immediately for San Francisco to look into the affairs of the Pacific Mail Steamship Company. He has returned and reported to the board the condition of this business and the possibilities for further development of the shipping business, both coastwise and trans-Pacific. He will be the representative of the corporation to devote his time especially to this matter, and will be the officer of the American International Corporation who, in association with one of the officers of W. R. Grace & Company, will especially follow the affairs of the Pacific Mail Steamship Company.

Two other important steps have been taken in the line of completing the organization of the American International Corporation. Dr. Richard P. Strong, the well-known medical expert, has become connected with the corporation. His specific duties will be to assist in building up the new organization with the right kind of young men, and to follow up the men of the organization who are at work in foreign countries; and also to take up any questions that may arise with foreign countries in regard to sanitary and health conditions.

Philip Henry, a well-known engineer, who has given much of his time to the investigation and construction of railroad and other enterprises in South America, has been elected vice-president of the corporation.

A committee of five directors has been formed to look after navigation matters. This committee consists of W. L. Saunders, Robert Dollar, J. P. Grace, James J. Hill and John D. Ryan.

Between 500 and 1000 proposals have already been submitted to the corporation for consideration. It is purposed to employ a large number of young men, most of whom will be college graduates, and to educate them for permanent positions in the foreign field.

SUPREME COURT UPHOLDS STATES' RIGHTS IN WATER POWERS

The Supreme Court of the United States handed down a decision on Jan. 24 affirming that the several States of the United States possess the power to enact laws authorizing condemnation of water power sites and water rights by right of eminent domain. The decision was in connection with the upholding of the constitutionality of the Alabama water power condemnation statutes, in a case growing out of the improvement of the Tallapoosa River. In the decision, which was rendered by Justice Holmes, it is stated:

"The principal argument is that the purpose of the condemnation is not a public one. It may sometimes be difficult to draw the line that is supposed to limit the authority of the legislature to exercise or delegate the power of eminent domain. But to gather the streams from waste and to draw from them energy, labor without brains, and so to save mankind from toil that it can be spared is to supply what, next to intellect, is the very foundation of all our achievements and all our welfare, and if that purpose is not public we should be at a loss to say what is."

STRIKING CARMEN'S UNION PUTS UP NOVEL DEFENCE

While evidence was being heard by Judge J. B. Woodward to support the motion of the Wilkes-Barre (Pa.) Railway for a permanent injunction against its striking carmen to restrain them from interfering in any way with the operation of the cars, counsel for the strikers declared that the union, as a body, was not responsible for the breaking of the arbitration contract. The contention was that a committee represented the union, but that the union, under its law, must ratify any act of its representatives. While an agreement was being negotiated the strike was called, arbitration having failed to settle the difference. The lawyers representing the men contended that the union did not ratify the arbitration because the members never acted on it.

BIOGRAPHIES OF NEW MICHIGAN RAILWAY OFFICERS

Brief biographies follow of some of the newly appointed operating officials of the Michigan Railway, Jackson, Mich., mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 8, page 99, and not so well known as the other officers of the company:

J. H. Weldon, chief of the tariff bureau, began work with the Michigan United Railways' tariff department in April, 1909.

A. J. Bray, the newly appointed auditor of the Michigan Railway, began service with the Michigan United Railways in July, 1906, as chief clerk to the secretary. In March, 1912, he was made auditor of the Michigan United Traction Company, which position he held at the time of his recent appointment.

F. N. Aldrich, auditor of disbursements, began work with the Michigan United Traction Company as a clerk in 1912.

J. W. Slater, auditor of receipts, became connected with the Michigan United Railways Company in 1909. He started as a clerk, checking conductors' turn-ins and car records.

O. H. Degener, auditor of freight accounts and car accountant, began work with the Michigan United Railways' freight department in November, 1907.

J. A. Rosenberger, superintendent of the Owosso and Corunna city lines, was formerly assistant auditor of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind. He joined the operating organization of the Michigan United Traction Company in 1912, and was made superintendent of transportation of the Owosso and Corunna city lines in October, 1914.

C. H. Smith, superintendent of the Northeastern Division, was formerly assistant to the superintendent of the Michigan United Railways at Kalamazoo. In 1912 when the Michigan United Traction Company leased the Michigan United Railways, Mr. Smith was made superintendent of transportation at Kalamazoo. In June, 1914, he was moved to Saginaw as superintendent of transportation of the Saginaw-Bay City Railway Company.

APPLICATION FOR ABANDONMENT REFUSED

A. W. Leonard, president of the Puget Sound Traction, Light & Power Company, Seattle, Wash., filed a petition with the City Council recently asking permission in the name of the company to relinquish its franchise to operate cars on Twenty-third Avenue. The company desires to surrender franchise rights granted by an ordinance approved in November, 1907, extending from Louise Street on the north to Jefferson Street on the south. Mr. Leonard states that the Twenty-third Avenue line has always been operated at a loss. It is estimated that it cost the company approximately $165,000 to install the railway. To tear out the tracks and restore the right-of-way would cost $65,000. The Public Service Commission recently directed the company to operate its Twenty-third Avenue cars downtown in the morning and evening rush hours by way of Madison and Pike Streets. To comply with the order the company would have to construct additional tracks at considerable cost. Mr. Leonard says the company is not receiving a return in excess of 5 per cent upon the value of its entire street railway properties in the city.

The franchise committee of the City Council has denied the application of the company for permission to relinquish its franchise on Twenty-third Avenue and to discontinue the operation of that line. The company's only recourse now is to apply to the courts for an annulment of the Public Service Commission's ruling or for an order compelling the city of Seattle to set aside the Twenty-third Avenue franchise.

Increase in Wages by Wilmington Company.—The employees of the New Castle and the Delaware City lines of the Wilmington & Philadelphia Traction Company, Wilmington, Del., have received notice of a raise of 2 cents an hour. The men now receive 6 cents an hour more than they did six months ago.

Subway Approaches to New Bridge at Cleveland.—On Jan. 19 the Commissioners of Cuyahoga County authorized a bond issue of $500,000 for the construction of subway approaches to the new Superior-Detroit Avenue bridge across the Cuyahoga River. The entire cost of the approaches is estimated at $850,000 and it is believed that Mayor Davis will sign the ordinance placing the entire matter in the hands of the commissioners.

Contributions Solicited for Hatters.—W. D. Mahon, international president of the Amalgamated Association, appealed to the officers and members of the association to observe Jan. 27, the anniversary of the birth of Samuel Gompers, president of the American Federation of Labor, by contributing one hour or more of their pay to the cause of the Danbury hatters, against whom judgment was obtained in the famous boycott case.

New Bedford Company Refuses Demands. — The Union Street Railway, New Bedford, Mass., has refused the demand of the local branch of the Amalgamated Association for a flat rate of 35 cents an hour for all platform men. About 500 men are in the company's service, the present rates ranging from 25 to 30 cents an hour on a six-years' graduated scale. Various other concessions in working conditions were refused by the company.

Severe Storms in Northwest.—Owing to unusual storms which have swept over the entire Northwest, and particularly eastern Washington, since Jan. 1, service on the electric lines operating out of Spokane, Wash., has been considerably disrupted. Officials state not since the first electric railway was built out of Spokane fifteen years ago have trains had as much difficulty in operating as at the present time. Oon Jan. 22 drifts from 20 ft. to 30 ft. deep were reported in some places.

Hearings on the Pittsburgh Ordinances.—The first of the councilmanic hearings on the proposed ordinances to the Pittsburgh (Pa.) Railways introduced at the last meeting was held on Jan. 21 by the Councilmen sitting as the committee on public service and surveys. No action was taken and another hearing was set for Jan. 26. It is expected still other hearings will be held. It was decided by the Councilmen to take up the ordinances by groups, and, if desired, hearings on each group will be held. At the meeting scheduled for Jan. 26 it was proposed to consider the ordinances for turnouts, switches and curves.

Norfolk Franchise Considered.—The sub-committee on franchise and taxation of the joint committee of ten, representing the City Council and the business organizations of Norfolk, in the matter of the proposed new franchise for the Virginia Railway & Power Company, met on Jan. 14 and went over the situation generally. The final date of the conclusion of the matter depends on a report from the sub-committee on commercial electric light and power rates. Entirely outside of the transportation and the electric light and power questions, the company will, it is understood, submit to the committee a new schedule of gas rates.

Mayor Smith on the Philadelphia Transit Program.—Mayor Smith of Philadelphia, Pa., is quoted as follows in regard to the rapid transit program for that city: "I feel that the program for building the Broad Street subway and Frankford elevated line represents as much as it is advisable to take up right away. I feel that at this time we should devote our energies to the two pieces of work under contract. I would not say, however, that the other two lines should not be started until Broad Street and Frankford are completed. I will find out the real demand, the amount of travel and other data, and will judge from that whether the lines should be advocated."

Massachusetts Supreme Court Refuses to Order Subway Construction.—Judge Crosby of the Massachusetts Supreme Court has dismissed a petition for a writ of mandamus to compel the Boston Transit Commission to begin the constrution of a subway between City Square and Sullivan Square, Charlestown, to supersede the elevated structure of the Boston Elevated Railway. An act of the last Legislature was claimed by the petitioner to be mandatory, but the court holds that as the Boston Elevated Railway has refused to enter into a contract with the city of Boston for the use and occupation of the tunnel thus provided the commission is not required to construct the subway in accordance with the act.

Puget Sound Electric Railway Lays Its Case Before Public.—On Nov. 15 a committee of the Puyallup Commercial Club addressed the Public Service Commission of the State of Washington on matters relating to rates on the Puyallup Short Line branch of the Puget Sound Electric Railway. This communication brought a reply from the Public Service Commission, which goes exhaustively into the facts and history of the whole rate question. It being suggested that this clear and comprehensive statement of the commission would be of interest to the people in the communities served by the Puget Sound Electric Railway, the two letters have been reprinted by the company in pamphlet form for general distribution among the riding public.

Wages Up 2 Cents to 3 Cents an Hour in Richmond.—A general increase in the wages of motormen and conductors over its entire system, including Richmond, Norfolk, Portsmouth and Petersburg, was made effective by the Virginia Railway & Power Company as of Jan. 1. The increase will be applied as follows: first-year men, from 18 to 20 cents an hour; second-year men, from 19 to 21 cents an hour; third-year men, from 20 to 22 cents an hour; fourth-year men, from 21 to 23 cents an hour, and men in service five years or longer, from 22 to 25 cents an hour. Ten years ago the maximum wage for motormen and conductors was 15 cents an hour. The new wage scale, therefore, represents an increase of approximately 66 2/3 per cent over the pay current at the beginning of the present decade.

Railway Mail Pay Question Again.—A substitute proposal that the Interstate Commerce Commission shall determine what the Government shall pay to the railroads for the transportation of the mails was made before the House committee on post-offices on Jan. 24 by railroad officials appearing in opposition to the Post-office Department plan to change the existing system of payment. The Post-office Department is advocating legislation that would require the railroads to handle the mails on a "space basis," rather than by weight. This recommendation, generally opposed by railroad interests has been met with the counter-suggestion that the matter of pay be left to the Interstate Commerce Commission, with proviso that the pay shall be continued on the weight basis and the mails shall be weighed yearly instead of quadrennially.

United States Supreme Court Passes on Compensation Act.—The United States Supreme Court on Jan. 17 construed the Washington State workmen's compensation law as abolishing all damage actions in the courts by workmen in the hazardous employments covered by the law, whether against employers or against third persons. The decision was in a case in which the widow and children of Benjamin Meese sued the Northern Pacific Railroad for the alleged negligent killing of Meese, an employee of a brewery, at Seattle, Wash., alongside the railroad's tracks. The District Court held the compensation law abolished all actions for damages, and dismissed the suit, but the Circuit Court of Appeals held that it abolished litigation only of employees against their employers. The Supreme Court upheld the District Court's interpretation and reversed the Circuit Court of Appeals.

Report on Water Power Control.—According to a special report sent to Congress on Jan. 20 by the Department of Agriculture eighteen corporations are shown to be in control of more than half of the water power employed in the operation of public utilities, while more than one-quarter of it is controlled by Stone & Webster Management Associations, Montana Power Company, Utah Securities Corporation, E. W. Clark & Company Management Corporation, Southern Power Company and Hydraulic Company of Niagara Falls. The report places the potential water water resources of the country at a minimum of 27,943,000 hp. and the maximum at 53,905,000. Private power interests reported in 1912 a total investment of more than $2,000,000,000, as represented by the item "cost of construction," averaging $391 per horsepower of primary power installation. Municipal stations reported an aggregate cost of $77,000,000, averaging $188 per horsepower. The Secretary made no recommendations because none was requested.

Toronto Mayor Discusses Railway Problems.—Mayor Church of Toronto, Ont., in his inaugural address on Jan. 10 briefly reviewed the work accomplished last year, and then outlined the matters which demand the attention of the new Council. Dealing with the hydro-electric radial railway, he said that the passing of the by-law showed that the people were determined to have absolute control of the transportation facilities within the city limits. He said the first thing the new Council should do to give expression to the wishes of the people was to appoint a traffic commission, consisting of the city treasurer, works commissioner, harbor engineer, corporation counsel, the Mayor and one other member of the Council. This commission should begin work immediately to prepare the way for the taking over of the Toronto Railway at the expiration of the franchise in 1921. While in favor of the operation of motor buses as a means of solving the transportation problem, he was opposed to granting any more franchises for the use of the streets by any private companies.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Association

The annual meeting of the Central Electric Railway Association will be held at the Hotel Miami, Dayton, Ohio, on Feb. 24 and 25. The executive committee meeting will be held at the same place on the evening of Feb. 23 and afternoon of Feb. 25.

New England Street Railway Club

The date of the sixteenth annual meeting and dinner of the New England Street Railway Club will be March 23, 1916. Definite decision as to where the banquet will be held has not yet been made, but the choice is between the Copley-Plaza and the Hotel Somerset, Boston.

American Museum of Safety

Dr. W. H. Tolman, director of the American Museum of Safety, announces that the annual dinner of that organization is to be held at the Waldorf-Astoria hotel, New York City, Thursday evening, Feb. 3. Addresses will be made by W. A. Fairburn, Wilbur C. Fisk and Elmer A. Sperry. The winners of the five gold medals annually awarded by the museum will be announced on this occasion.

Financial and Corporate

ANNUAL REPORT

Southern Pacific Company-Affiliated Electric Lines

The results of the activities of the affiliated electric lines of the Southern Pacific Company for the year ended June 30, 1915, are shown in the accompanying table. As compared to the preceding year, the total deficit increased from $1,161,462 to $1,444,117, an amount of $282,655 or 24.3 per cent. This was made up of an increase of $2,222 in surplus for the Stockton Electric Railroad, and increases in deficits for all the other lines as follows: Pacific Electric Railway, $73,420; Fresno Traction Company and Fresno City Railway (combined), $10,261; Visalia Electric Railroad, $3,884; San José Railroads, $9,334; Peninsular Railway, $23,289, and Portland, Eugene & Eastern Railway, $164,689. During the year ended June 30, 1915, the railway operating revenues of the seven affiliated companies decreased $655,095 or 5.9 per cent, but the railway operating expenses also decreased $575,603 or 7.3 per cent, so that the net revenue from railway operation was less by only $79,493 or 2.5 per cent. The taxes assignable to railway operation increased $27,504 or 4.8 per cent, and the operating income suffered a loss of $107,008 or 4.1 per cent. The non-operating income showed a slight change for the better, but the deductions from gross income increased $176,801 or 4.6 per cent. Consequently the net income figure or deficit for the year showed the loss before stated.

FINANCIAL AND OPERATING STATISTICS FOR AFFILIATED ELECTRIC RAILWAYS OF SOUTHERN PACIFIC COMPANY FOR YEAR ENDED JUNE 30, 1915

	Total	Pacific Electric Railway	Fresno Traction Company and Fresno City Railway (Combined)	Stockton Electric Railroad	Visalia Electric Railroad	San Jose Railroads	Peninsular Railway	Portland, Eugene & Eastern Railway
Railway operating revenues	$10,292,682	$8,874,507	$231,330	$200,127	$98,736	$346,547	$292,494	$248,939
Railway operating expenses	7,242,141	6,026,802	181,143	129,963	87,653	249,463	263,698	303,418
Net revenue (or deficit) railway operations	$3,050,540	$2,847,705	$50,187	$70,164	$11,083	$97,084	$28,796	*$54,478
Taxes assignable to railway operations	$589,406	$496,477	$12,563	$10,721	$4,300	$19,046	$15,809	$30,491
Uncollectible railway revenues	11	....	....	....	....	....	....	11
Total	$589,417	$496,477	$12,563	$10,721	$4,300	$19,046	$15,809	$30,502
Operating income (or loss)	$2,461,123	$2,351,228	$37,624	$59,443	$6,783	$78,038	$12,987	*$84,980
Nonoperating income	116,984	‡148,130	18,958	2,616	220	6,682	21,597	18,779
Gross income (or loss)	$2,578,107	$2,399,358	$56,582	$62,059	$7,003	$84,720	$34,584	*$66,201
Deductions from gross income:								
Interest on funded debt	$2,977,085	$2,785,600	$42,388	....	....	$124,097	$25,000	....
Interest account with Southern Pacific Company	865,639	147,233	39,634	$7,611	$89,239	33,181	219,367	$329,373
Interest on other unfunded debt	19,513	13,657	115	23	61	117	5,515	25
Amortization of discount on funded debt	88,593	83,044	3,034	....	....	2,513	....	....
Other deductions	71,394	53,345	1,877	....	....	524	4,231	11,416
Total deductions	$4,022,224	$3,082,879	$87,048	$7,634	$89,300	$160,432	$254,113	$340,814
Net income (or loss)	*$1,444,117	*$683,521	*$30,466	$54,425	*$82,297	*$75,712	*$219.529	*$407,015
Tons of commercial freight carried	2,318,007	2,251,342	....	....	§	....	§	66,665
Revenue passengers carried	100,608,827	76,070,474	5,248,580	4,658,303	138,052	8,419,867	2,994,512	3,079,039
Total revenue car mileage	38,563,972	31,433,177	1,348,560	1,012,344	248,607	1,957,731	1,145,395	1,418,158
Total single track mileage	1,429.48	1,058.37	45.01	19.49	48.69	42.64	81.64	†133.64

*Loss. †Includes 73.02 miles of steam lines. ‡Does not include interest amounting to $331,642 accrued during the year on advances to the Pacific Electric Land Company. §Figures not available.

On account of the different form of presentation for the annual report in 1915 and 1914, the foregoing figures may not be exactly accurate, but they are sufficiently so to show the general tendency for the combined lines. The decrease in railway operating revenues was spread over all the seven companies with the exception of the Visalia Electric Railroad, which showed a small increase of $674 or 0.6 per cent. The Pacific Electric Railway had a loss in this item of $592,976 or 6.2 per cent, which accounted for about 90 per cent of the combined loss of $655,095 for the year. Owing to the facts, however, that the Pacific Electric Railway alone contributed more than 85 per cent of the total railway operating revenues of $10,292,682 and that practically all the other lines also showed losses in proportion to their size, it is evident that the causes of such returns were quite widespread.

In general it may be said that there was no change of any account in the rates of the electric lines in California during the last year or in the year preceding, but the use of private automobiles and the extensive development of the jitney movement interfered seriously with the passenger revenue of all the electric lines. It is said that there are about 47,000 privately-owned machines in Los Angeles County alone, this number having shown a considerable increase during the last year. Some of the decrease in revenues was caused by changes in accounting rules following the Interstate Commerce Commission classifications, and the earnings from the wharves and other outside operations were naturally less than during the previous year on account of the general dullness in business. It is stated, however, that this dullness has now a tendency to disappear, and business prospects are much better than they were at this time last year. The various lines are practically holding their own at present, but it is believed that they will continue to suffer from the jitney competition until public regulation of such carriers, which is becoming stronger and stronger, finally places upon them some real part of the public obligations that electric railways have to bear. One comforting point is the fact that the freight business is developing very satisfactorily.

In view of the size of the Pacific Electric Railway, some details in regard thereto are worthy of note as emphasizing the general points previously mentioned. Although the total railway operating revenues of this company, as before stated, showed a decrease of $592,976, the loss would have been much greater had it not been for the substantial increase in freight revenues. This increased $207,936 or 17.2 per cent, while the passenger revenue decreased $473,456 or 6.4 per cent, and other-transportation revenue decreased $327,455 or 36.5 per cent. The increase in freight revenue was largely caused by the increased interchange of transcontinental traffic with the steam railroads, which more than overcame the decrease brought about by the hard times and the motor-truck competition. It would seem that under anything like equal obligations to the public the company would be able to meet quite successfully the competition of motor trucks, as public utilities, except for very short hauls.

In regard to passengers carried by the Pacific Electric Railway, there was an actual decrease for the last fiscal year from 82,084,416 to 76,070,474, an amount of 6,013,942 or 7.3 per cent. The former figure is the correct one for the year ended June 30, 1914, instead of that published in the report of the Southern Pacific Company for this period. A number of conflicting causes gave the general result as to passenger decrease *versus* revenue decrease. The passenger total was affected by the hard times, the motor buses and the good roads for the private automobile traffic. The passenger revenue was affected by these and also by the relatively decreased number of round trips and single trips on the old lines as compared with the total, and also by the strong inclination to use commutation books. This was in part offset, however, by the opening of the through line between Riverside and San Bernardino on the one hand and Los Angeles on the other, thus giving a large average revenue per passenger for about 60 miles of ride.

In explanation of the note in the preceding table, to the effect that the Pacific Electric Railway does not include in non-operating income the interest amounting to $331,642 accrued during the year on advances to the Pacific Electric Land Company, it may be said that the railway company through its land companies has a very large investment in real estate, amounting to some millions of dollars, but it takes no credit in its earnings for money advanced to these companies. This of course affects the income showing unfavorably, but it is nevertheless proper and conservative accounting until such time as it shall have been demonstrated by sale of the land or its use for other purposes that the investment has made its way.

An interesting item in connection with this company's report is the fact that for the year ended June 30, 1915, it included in operating expenses charges paid to steamline neighbors for track rentals and the use of terminals, equipment, etc., amounting to $140,930 as compared to $108,623 for the preceding year. Under power and maintenance of equipment there was also included in operating expenses an item of $277,019 for depreciation as compared to $280,768 for the preceding year. For equipment retired during 1915 there was charged an additional amount of $25,691 as compared to $25,228 in 1914. There were no noteworthy changes in physical property during the year, except the completion of the line between Riverside, San Bernardino and Los Angeles in July, 1914, and between Corona and Riverside in February, 1915.

PROGRESS OF IOWA INTERURBAN LINES

The report just issued by the Board of Railroad Commissioners of Iowa for 1914 contains the financial and operating statistics of electric interurban railways for the year ended June 30, 1914. Comparative statistics for the years from 1903 to 1914 are also published, as shown by the accompanying table. There was an increase of 33.50 miles in the mileage of the interurban companies in 1914. The Davenport & Muscatine Railway showed a decrease of 10 miles, for the 1913 report included the mileage of the street railway lines in Muscatine, now eliminated. The Fort Dodge, Des Moines & Southern Railroad showed an increase of 0.22 mile. The Iowa Railway & Light Company reported an increase of 20.06 miles for new line constructed, and the Waterloo, Cedar Falls & Northern Railway showed a similar increase of 25.81 miles. There was also a decrease of 2.59 miles for the mileage of the Ames & College Railway, this company being controlled by the Fort Dodge, Des Moines & Southern Railroad, and the mileage being included with this company.

COMPARATIVE STATISTICS OF ELECTRIC INTERURBAN RAILWAYS IN IOWA FROM 1903 TO 1914

Year	Mileage, Single Track	Gross Earnings from Operation	Operating Expenses	Net Earnings	Net Earnings Per Mile
1903	98.27	$228,445	$132,621	$95,824	$975
1904	102.41	342,559	217,320	125,239	1,223
1905	151.41	497,645	316,795	180,850	1,194
1906	183.30	629,576	394,486	235,090	1,282
1907	184.51	770,338	476,755	293,583	1,591
1908	245.18	942,780	601,746	341,034	1,391
1909	361.91	1,258,279	734,587	523,693	1,447
1910	373.92	1,450,136	951,894	498,243	1,332
1911	343.25	1,695,991	1,100,354	595,637	1,735
1912	342.74	1,823,192	1,272,340	550,852	1,607
1913	394.23	2,330,385	1,453,624	876,761	2,224
1914	427.73	2,682,102	1,722,072	960,030	2,244

BROOKLYN REVENUES ARE GAINING

The operating results of the Brooklyn (N. Y.) Rapid Transit System for the quarter and the six months ended Dec. 31, 1915, are shown in the following table:

QUARTER ENDED DEC. 31, 1915.

	1915	1914
Gross operating revenue	$6,747,126	$6,367,973
Operating expenses	3,854,443	3,684,069
Net from operation	$2,892,683	$2,683,904
Taxes	423,787	425,057
Operating income	$2,468,896	$2,258,847
Non-operating income	107,649	105,979
Gross income	$2,576,545	$2,364,826
Income reductions	1,209,404	1,188,057
Net income	$1,367,141	$1,176,769

SIX MONTHS ENDED DEC. 31, 1915.

	1915	1914
Gross operating revenue	$14,048,444	$13,607,760
Operating expenses	7,716,609	7,521,934
Net from operation	$6,331,835	$6,085,826
Taxes	855,719	859,928
Operating income	$5,476,116	$5,225,898
Non-operating income	237,184	221,687
Gross income	$5,713,300	$5,447,585
Income deductions	2,371,766	2,350,592
Net income	$3,341,534	$3,096,993

For the last quarter in 1915 as compared to the corresponding quarter in the preceding year the gross operating revenues of the system increased $379,153 or 5.9 per cent, and the operating expenses increased $170,374 or 4.6 per cent, so that the net revenue from operation increased $208,779 or 7.7 per cent. Taxes showed a slight decrease of $1,270 or 0.3 per cent, non-operating income $1,670 or 1.5 per cent, and income deductions $20,747 or 1.7 per cent, with the result that the net income for the period increased $190,372 or 16.1 per cent.

The progress made during the last quarter was naturally greater than that made during the preceding quarter, as is indicated by comparing the foregoing returns with the comparative figures for the whole six months' period in 1914 and 1915. During the six months ended Dec. 31, 1915, the gross operating revenue increased $440,684 or 3.2 per cent. The operating expenses increased $194,665 or 2.6 per cent, and the net from operation increased $246,009 or 4 per cent. Taxes decreased $4,209 or about 0.5, and non-operating income increased $15,497 or 6.9 per cent, but income deductions increased $21,174 or 0.9 per cent. The net result was a gain of $244,541 or 7.8 per cent in net income for the six months.

CLEVELAND RAILWAY HOLDS MEETING

At the annual meeting of stockholders of the Cleveland (Ohio) Railway on Jan. 26, it was reported that the company enjoyed a marked increase in travel during the last four months, and it now appears that it will not be necessary to increase the rate of fare. The penny charge for transfers will wipe out the deficits, it was said, if the city would permit it to continue for that purpose. If not, then the company will have to go to the city for an increase in fares that will accomplish this result.

In his report President J. J. Stanley stated that the track department has recommended the renewal of about 28 miles of track during the present year at an estimated cost of about $1,000,000, and the purchase of four automobile trucks. A storehouse for miscellaneous track supplies, a cement storage house and a salt storage house should be erected on the property on Harvard Avenue, he said, and additional tracks should be laid in the yards at that point. The power department has recommended miscellaneous improvements which, plus 15 per cent for engineering and contingencies, make a total of $507,840.

The only considerable extension of track to be laid this year is about 3 miles on Madison Avenue in Lakewood. The proposed extension on East Thirtieth Street will probably not be built this year, as the sewer in the street has not been completed. President Stanley said that the proposed Clark Avenue extension cannot be completed until after the city finishes a bridge under construction. He also said that just at present there is no intention of issuing any more of the stock, but what may be done in the future depends upon the requirements the city may make in the way of improvements and extensions.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont.—A quarterly dividend of 1 per cent has been declared on the ordinary stock of the Brazilian Traction, Light & Power Company, Ltd., payable on March 1 to holders of record of Jan. 31. Owing to the unsettled conditions brought about by the war, the dividend was reduced in September, 1915, to one-half of 1 per cent, previous to which 1½ per cent had been paid each quarter.

Cities Service Company, New York, N. Y.—A monthly dividend of one-half of 1 per cent on the preferred stock of the Cities Service Company has been declared payable on Feb. 1 to holders of record on Jan. 15. This is in accordance with the announcement made in November, 1915.

Cleveland & Eastern Traction Company, Cleveland, Ohio.—At the annual meeting of the stockholders of the Cleveland & Eastern Traction Company, A. G. Tame, C. Brand, Horatio Ford and H. P. McIntosh, Jr., were elected as new members to the board of directors. Mr. Ford and Mr. McIntosh were elected to the board of the Cleveland & Chagrin Falls Railway, formerily the Cleveland, Youngstown & Eastern Railway, which is closely associated with the Cleveland & Eastern Traction Company.

Cleveland (Ohio) Railway.—The operating report of the Cleveland Railway for December, 1915, shows that the operating revenue was $741,974, compared with $676,197 for the corresponding month in 1914. The actual maintenance and operating expenses for the month aggregated $507,338, while the ordinance allowance was $467,655. The maintenance deficit was $27,659, making a total accumulated deficit in that fund of $593,148. The operating deficit was $12,023, bringing the total operating deficit up to $70,765. The amount received from transfers was $64,217, compared with $57,453 in December, 1914. The interest fund at the end of the year was $542,651. This fund has gradually increased through the winter months, but during the warm weather last year it showed a constant decrease. The increase in December was $45,456, which was the ordinance surplus, but the actual surplus was only $11,863. These figures represent the condition of the fund when Fielder Sanders assumed the office of street railway commissioner.

Danbury & Bethel Street Railway, Danbury, Conn.—Suit to recover $450,000 damages has been brought against officers of the Danbury & Bethel Street Railway by John H. Henshaw, trustee for the estate of George E. Pond. The suit grew out of the recent merger by purchase of the Bridgeport & Danbury Electric Railway by the Danbury & Bethel Street Railway. Mr. Henshaw, in his complaint, alleges that the Danbury & Bethel Street Railway as a result of the merger was made liable for the debts of the Bridgeport & Danbury Electric Railway, to the injury of the estate, which owns stock of the Danbury & Bethel Street Railway.

Glendale & Montrose Railway, Glendale, Cal.—As a result of the investigation upon the California Railroad Commission's own motion to determine the various elements entering into the value of the company's property it is found that the reproduction cost of the operative physical property as of March 31, 1915, is the sum of $204,350, including non-operative property, $205,975; that the reproduction cost less depreciation or present value of the operative physical property of respondent as of March 31, 1915, is the sum of $189,408, including non-operative property, $191,001.

Grand Valley Railway, Brantford, Ont.—The city of Brantford is applying to Parliament for authority to take over the Grand Valley Railway, to extend the line to the village of Cainsville, and to operate it as the Brantford Municipal Railway. Authority is also asked for placing the railway and other municipal utilities under the management of a commission.

Interborough Rapid Transit Company, New York City.—Harris Forbes & Company; Lee, Higginson & Company, and Kissel, Kinnicutt & Company are offering the unsold balance of $25,000,000 of Interborough Rapid Transit Company first and refunding 5 per cent bonds, due in 1966, at 99½ and interest.

Kansas City (Mo.) Railways.—Attorneys for the protestors against the franchise of the Kansas City Railways are preparing to appeal from the decision of the State Public Service Commission denying a rehearing of the reorganization plan of the street railway and light properties. The appeal will be in the Cole County Circuit Court, from which the proceedings would go to the State Supreme Court. The proceedings will have to do only with the validity of the franchise. Plans for the reorganization are proceeding, however, the position of the parties at interest, including the city, being that the decrees and decisions of Judge Hook and the Public Service Commission practically guarantee the validity of the franchise.

Lehigh Valley Transit Company, Allentown, Pa.—The Lehigh Valley Transit Company has declared a quarterly dividend of 1¼ per cent on the preferred stock, payable on Feb. 10 to holders of record of Jan. 31. The last dividend declared by this company was a semi-annual one of 2½ per cent in October last. Previous to that time the company had been making semi-annual payments of 1 per cent for some time.

Ohio Traction Company, Cincinnati, Ohio—The Ohio Traction Company has notified the holders of its $8,500,000 of 5 per cent preferred stock that the quarterly dividend due on Feb. 1 will not be paid, and further dividends will be deferred. A year ago the company passed the dividend on its common stock. Officials of the company say that while earnings are sufficient to provide for payment of dividends on the preferred issue, the approaching revision of franchise provisions in Cincinnati, and the increased cash requirements for serial note maturities and improvements, made the passing of the preferred dividend advisable.

Philadelphia Company, Pittsburgh, Pa.—The Philadelphia Company has called for redemption on Feb. 2 the two issues of 7 per cent interest-bearing scrip, aggregating $1,352,933, which were issued to pay dividends on Nov. 2, 1914, and Feb. 1, 1915.

Pittsburgh (Pa.) Railways.—The Consolidated Traction Company, operated by the Pittsburgh Railways, has sold to the Colonial Trust Company, Pittsburgh, $500,000 of 5 per cent car trust bonds which will be offered at par and interest. The bonds mature in ten annual installments of $20,000 each, beginning with April 1, 1917. The bonds are a first lien on twenty-five double-truck steel motor cars and twenty-five double-truck steel trailers, costing $221,000, of which amount $21,000 cash has been paid by the company.

Public Service Corporation of New Jersey, Newark, N. J.—An increase of 10.8 per cent was shown by the Public Service Corporation of New Jersey in gross business for December, 1915, as compared with the corresponding month of the year previous, and the gross business for the year showed an increase of 5 per cent. For December, 1915, the gross increase in total business amounted to $345,889, and the balance available—after payment of operating expenses, fixed charges, sinking fund requirement, etc.—for amortization, dividends and surplus was $593,096. The increase in surplus available for dividends over the corresponding month of 1914 was $44,971. For the twelve months ended Dec. 31, 1915, the gross increase in total business was $1,781,395. The balance available for amortization, dividends and surplus totaled $4,065,434, and the increase in surplus available for dividends was $263,216.

Southwestern Traction Company, Temple, Tex.—Judge T. S. Maxey in the Federal Court at Waco on Jan. 14 appointed W. G. Haag, superintendent of the Southwestern Traction Company, receiver of the company. On Jan. 15 the Susquehanna Trust & Safe Deposit Company, Williamsport, Pa., filed a suit in equity in the United States District Court at Waco asking for the foreclosure of the mortgage of 1911, the interest on some $130,000 of first mortgage 5 per cent bonds being in default.

West Penn Traction Company, Pittsburgh, Pa.—Announcement is made that the $6,000,000 of West Penn Traction Company three-year 6 per cent secured gold notes will be called on March 1 at par and a half. The notes were sold at 99 and interest when originally offered and ranged in price in the market from 96 to 100½.

DIVIDENDS DECLARED

American Railways, Philadelphia, Pa., quarterly, 1¾ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, one-half of 1 per cent, common.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont., 1 per cent, ordinary.

East St. Louis & Suburban Company, East St. Louis, Ill., quarterly, three-quarters of 1 per cent, preferred.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Jacksonville (Fla.) Traction Company, quarterly, 75 cents, preferred.

Massachusetts Consolidated Railways, Greenfield, Mass., quarterly, 1⅜ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., quarterly, 1¼ per cent, preferred.

Philadelphia Company, Pittsburgh, Pa., 2½ per cent, preferred.

Railway & Light Securities Company, Boston, Mass., 3 per cent, preferred; 3 per cent, common.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

York (Pa.) Railways, $1.25, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) TRACTION COMPANY

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '15	$17,671	*$8,946	$8,725	$2,204	$6,521
1 " " '14	15,704	*9,444	6,260	2,054	4,206
12 " " '15	189,924	*109,374	†80,550	25,824	54,726
12 " " '14	178,083	*114,296	63,787	25,071	38,716
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., Nov., '15	$67,291	*$27,383	$39,908	$28,679	$11,229
1 " " '14	63,274	*28,850	34,424	28,791	5,633
12 " " '15	710,928	*322,777	388,151	344,657	43,494
12 " " '14	678,573	*290,178	388,395	320,945	67,450
DALLAS (TEX.) ELECTRIC COMPANY					
1m., Nov., '15	$161,525	*$98,789	$62,736	$34,067	$28,669
1 " " '14	180,303	*96,199	84,104	33,389	50,715
12 " " '15	1,846,740	*1,114,800	731,940	402,090	329,850
12 " " '14	2,226,381	*1,310,289	916,092	364,241	551,851
EL PASO (TEX.) ELECTRIC COMPANY					
1m., Nov., '15	$93,482	*$44,010	$49,472	$4,186	$45,286
1 " " '14	91,712	*42,184	49,528	4,179	45,349
12 " " '15	968,806	*517,509	451,297	50,378	400,919
12 " " '14	1,041,126	*579,966	461,160	51,375	409,785
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., Nov., '15	$168,260	*$105,554	$62,706	$36,710	$25,996
1 " " '14	195,390	*103,121	92,269	36,752	55,517
12 " " '15	1,965,151	*1,202,237	762,914	932,920	329,994
12 " " '14	2,435,544	*1,323,974	1,111,570	441,465	670,105
JACKSONVILLE (FLA.) TRACTION COMPANY					
1m., Nov., '15	$49,251	*$35,856	$13,395	$14,726	†$1,331
1 " " '14	52,881	*37,229	15,652	13,052	2,600
12 " " '15	614,092	*430,540	183,552	176,349	7,203
12 " " '14	723,598	*477,286	246,312	152,325	93,987
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.					
1m., Nov., '15	$145,692	*$89,001	$56,691	$26,853	$29,738
1 " " '14	157,568	*83,848	73,720	26,808	46,912
12 " " '15	1,718,833	*1,043,340	675,493	330,265	345,228
12 " " '14	2,093,414	*1,166,266	927,148	312,858	614,290
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Nov., '15	$25,032	*$14,421	$10,611	$7,477	$3,134
1 " " '14	24,838	*15,044	9,794	7,542	2,252
12 " " '15	289,671	*179,861	109,810	91,529	18,281
12 " " '14	303,576	*194,186	109,390	91,438	17,952
PENSACOLA (FLA.) ELECTRIC COMPANY					
1m., Nov., '15	$23,516	*$12,407	$11,109	$7,050	$4,059
1 " " '14	18,860	*12,251	6,609	7,353	†744
12 " " '15	254,213	*146,419	107,294	85,072	21,722
12 " " '14	271,024	*172,204	98,820	86,537	12,283
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., Nov., '15	$643,823	*$403,104	$240,719	$182,573	$58,146
1 " " '14	686,820	*401,883	284,937	177,757	107,179
12 " " '15	7,577,430	*4,755,539	2,821,891	2,175,308	646,583
12 " " '14	8,523,731	*5,026,360	3,497,371	2,115,522	1,381,849
TAMPA (FLA.) ELECTRIC COMPANY					
1m., Nov., '15	$83,696	*$44,565	$39,131	$4,342	$34,789
1 " " '14	80,922	*41,927	38,995	4,422	34,573
12 " " '15	980,780	*500,902	479,878	52,423	427,455
12 " " '14	978,606	*527,136	451,470	55,123	396,347

*Includes taxes. †Deficit.

Traffic and Transportation

CONNECTICUT COMPANY'S SAFETY CONTEST

Prizes Awarded to School Children for Safety Suggestions —Megaphone Used for Directing Pedestrians

On Oct. 1, 1915, the Connecticut Company, New Haven, Conn., after having made arrangements with the State Board of Education, sent some 2500 circulars to the teachers in the public schools along the lines of the company announcing offers of cash prizes for the best essays by school children upon the subject "How I Keep Safe Upon the Streets and Roads." All competing essays were sent to the State Board of Education by Dec. 1, and the awards were made so that the local school authorities delivered the prizes to the winning pupils by Dec. 1. The judges were the members of the State Board of Education and an officer of the Connecticut Company. The essays were judged, first for their common-sense safety suggestions and, second, for their English, spelling, composition, etc.

Prior to Dec. 1 992 essays were submitted from thirty-seven different towns, sixty-three from high schools, thirteen from rural schools and 916 from graded schools. Much interest was shown in the contest by teachers and pupils. Many essays reached the office after Dec. 1, but on account of the large number that came in on time it was impossible to consider the ones that were so late that they did not correspond with the terms of the offer of the award.

After a careful reading in the office of the State Board of Education of all of the essays which were submitted on time, the awards were made to the following pupils: Graded schools—First prize of $20 to Cornelius McNamara, sixteen years old, sixth grade, Baldwin School, Watertown; second prize of $10 to Persis Jacobs, thirteen years old, Roger Sherman School, New Haven. Rural schools—First prize of $20 to Gladys Robinson, thirteen years old, Center School, Ellington; second prize of $10 to Mary Schuster, thirteen years old, Center School, Ellington. High schools —First prize of $20 to Grace M. Goodall, sixteen years old, High School, Thomaston; second prize of $10 to Beatrice M. Le Tendre, sixteen years old, High School, South Manchester.

The schools in which the awards were made seemed very much interested in the safety-first movement. Mr. Hine, secretary of the State Board of Education, gave much attention to the contest, which was conducted under the direction of S. W. Baldwin, assistant attorney of the Connecticut Company.

The essay by Miss Goodall in particular reflected great credit upon her mentors. It contained about 1400 words. She began by telling how a serious accident had set a community to thinking about safety. Relating experiences of her own and those she had witnessed or heard about, she drove home her warnings with direct illustrations. She told about a safety campaign in one city in which those conducting the work had men with megaphones stationed at various points to shout at those who crossed the streets diagonally between blocks. The publicity attendant upon offenders against safety principles having their attention thus called to their carelessness had a very noticeable effect.

COURT UPHOLDS SPRINGFIELD JITNEY MEN

Jitney bus owners of Springfield, Ill., won a victory in the Sangamon Circuit Court when Judge Creighton on Jan. 22 granted them a temporary injunction restraining the city from enforcing its jitney bus ordinance. The court declared most of the important sections of the ordinance unlawful. The suit was brought by William Draper and sixteen other jitney men. The bus owners plan to resume operations in the city at once, unless an appeal should be taken by the city. In his decision, Judge Creighton said:

"The court holds that the general subject matter of the ordinance in question is not unlawful discrimination in favor of street cars and automobiles used as ambulances, hotel buses, sight-seeing buses, taxicabs and other classes of vehicles not embraced in said ordinance.

"The court holds that the provision in Sec. 3 of the ordinance limiting the age of one who may be granted a permit as a chauffeur to sixty years and requiring evidence of good character is unlawful and void; that the provision of Sec. 5 requiring a bond of $5,000 for the purposes therein specified, is unlawful and void; that the provision of Sec. 6, providing that a conviction for violation of the ordinance shall automatically revoke the license, is unlawful and void, and that Sec. 10 declaring the operation of any motor bus otherwise than provided in this ordinance a nuisance is unlawful and void. Complainants' motion for temporary injunction is granted."

When the ordinance to regulate the operation of jitneys was passed by the City Commission the Springfield Consolidated Railway filed action before the Illinois Public Utilities Commission asking that the jitney men be compelled to apply for a certificate of convenience and necessity. This case is still pending.

Demand That Seattle Cars Be Heated.—The City Council of Seattle, Wash., has adopted a resolution directing Corporation Counsel James A. Bradford to file a complaint with the State Public Service Commission, demanding that the Puget Sound Traction, Light & Power Company be required to heat its cars whenever the temperature on the street falls befow 40 deg. Fahr.

Extension in Buffalo Safety Appliance Case.—The International Railway, Buffalo, N. Y., has secured an order from United States Judge Hazel in Buffalo, extending the time in which to file its record on appeal from the decision of Judge Hazel, who found the company guilty of violating the federal safety appliance act by not having automatic couplers on its interurban cars.

New Jersey Bill to Regulate Jitneys. — Majority Leader Kates has introduced into the Assembly of New Jersey a bill conferring on cities the right to regulate jitneys. The measure has been referred to the committee on railroads and canals. It brings the jitneys within the meaning of the term public utility and makes them subject to the act creating the Board of Public Utility Commissioners.

Jitneys Ruled from Downtown Oakland.—In order that the safety of the public may be adequately protected and to relieve the congested condition of street traffic now existing, the ordinance governing the jitneys in Oakland Cal., has been amended so that no license for the operation of any automobile for hire as a jitney shall hereafter be granted within a defined zone which comprises the principal downtown sections of the city.

Compulsory Extension of Free Service in Toronto.—At the board of control meeting in Toronto, Ont., on Jan. 19, Mayor Church moved that an application be made to the Ontario Legislature to provide that in cities of 200,000 or more electric railways shall carry nurses, soldiers, including those in training, free of charge. He explained that in Scotland, England and Australia this was the rule. The recommendation was approved and application will be made for legislative power.

Adjusting Springfield Accident Claims.—The wreck on Jan. 10 at Springfield, Ohio, in which five persons were killed and thirty-four injured occurred on West Main Street at a grade crossing of the Springfield Railway and the Big Four Railroad. There is a double curve at this point. The power did not go off, but it is supposed that the motorman, who was killed, did not see a shifting train that was behind a through train which he let pass. The Big Four Railroad and the American Railways are co-operating in the adjustment of damages.

Settling Spokane Bridge Accident Claims.—Officials of the Washington Water Power Company and the city of Spokane, Wash., have reached an agreement whereby the former will pay one-third and the latter two-thirds of all claims for damage growing out of the collapse on Dec. 18 of the Division Street bridge and the death of five passengers in one of the two cars of the company that were on the bridge at the time of the failure. Up to Jan. 22 three claims totaling $75,000 had been settled for $19,550. On this basis it is estimated that all the total claims will be settled for about $75,000. Claims are being settled on the basis of age and earning power of the deceased or injured.

Jitney Permit Granted.—The Public Service Commission of the Second District of New York has granted a certificate of convenience and necessity under the Thompson jitney bus law to John P. Van Ostrand for that part of his route between Geneva and Rushville within the city of Geneva, subject to the terms of the local consent granted him by the city authorities of Geneva. This local consent provides that the buses shall be run only as part of the through line to Rushville and that no goods or passengers may be carried from point to point within the city of Geneva. There was no opposition to the granting of the certificate at the hearing recently held in Geneva.

Public Service Carried 413,472,702 Passengers in 1915.—During the year 1915 the Public Service Railway, Newark, N. J., carried 413,472,702 passengers. This, in spite of jitney competition in Newark, Jersey City, Hoboken and Camden, was 6,194,788 more persons than were transported the year previous. The Essex division was the banner division, with 163,716,474 passengers, and the Hudson came next, with 123,922,415. There are four other divisions of the property—Bergen, Passaic, Central and Southern. A fraction more than 22 per cent of the total represented transfer or non-revenue passengers, whereas in the Essex division nearly 27 per cent were transfer riders.

Fort Smith Jitney Ordinance Valid.—The jitney ordinance of Fort Smith was upheld by the Supreme Court on Jan. 11 when it affirmed the decision of Chancellor Falconer. The ordinance requires each operator of a jitney to give an indemnity bond in the sum of $2,500. The jitney owners sought an injunction against the enforcement of the ordinance on the ground that it was "class" legislation and also on the ground that the city commission exceeded its authority in fixing a bond, thereby creating a civil liability. The Supreme Court held that the contentions were without merit. The decision does not affect taxicab business in Fort Smith or inter-city automobile traffic.

Department of Accident Investigation in Seattle.—The title of the department heretofore known as the claim department of the Puget Sound Traction, Light & Power Company, Seattle, Wash., was changed on Jan. 1, 1916, to the department of accident investigation, the head of this department being given the title of superintendent of department of accident investigation. Effective on the same date F. M. Hamilton assumed the duties of superintendent of the above named department, replacing George Carson, resigned, as previously noted in the ELECTRIC RAILWAY JOURNAL. Mr. Hamilton reports to and receives instructions from G. A. Richardson, superintendent of railways.

Kentucky "Jim Crow" Law.—The "Jim Crow" law which State Senator Charles Knight of Louisville, Ky., stated that he would introduce, has been drafted and introduced in both houses of the State Legislature. Instead of applying only to cities of the first class, the act would require separation of the white and black races on the street cars of all cities and towns of the State. Separate cars may be provided, although fixed or movable partitions, screens or signs will meet the requirements of the measure. Chartered cars for exclusive use of patrons are not affected by the terms of the law and there are other exceptions. Violations would subject the accused to fines of from $5 to $50 and imprisonment not exceeding ten days.

Bristol Jitney Company Fails.—The Bristol Jitney Company, which has been operating for some time in the vicinity of the Tennessee-Virginia line, has gone into bankruptcy, an involuntary petition having been filed by its creditors at the instance of the company. Creditors, it is stated, will probably get less than 35 cents on the dollar. The company was incorporated last summer and for a time enjoyed a large business. It was soon discovered, a company statement notes, that the more people the jitneys hauled the more money the company lost. The fare was advanced from 5 cents to 10 cents, and people returned to the street railway. Recently creditors attached two of the company's automobiles. Efforts to reorganize and obtain more capital failed.

Jitney Defeated at Bakersfield.—The jitney was defeated at a special election held at Bakersfield, Cal., on Jan. 11.

The jitney became an election issue through the referendum of an ordinance enacted a few months ago providing only reasonable regulation of the jitneys. The jitney drivers objected particularly to the clauses which kept them one block away from Nineteenth Street for a distance of three or four blocks in the heart of the city where traffic is congested and which made them stick to their selected route throughout the day. The San Joaquin Light & Power Corporation maintains buses that transfer passengers from their terminals to residence districts and the jitneys paralleled these routes and operated only during hours when business was best.

Advertising the Floods at Louisville.—The Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company, cross-river lines, profited by display advertisements inserted by the companies in the papers of Louisville, Ky., during the recent flood stage of the Ohio River. These lines become especially scenic when the river gets up to the danger mark, which means that the lowlands on both sides are submerged. There are several points on the Silver Hills, near New Albany, and reached by the New Albany City line, from which great areas of flood water can be seen. "Take the Big Red Car" and "See the High Water," and "Complete Trip 20 Cents," were the items emphasized in the advertisements, which set forth the plan in detail.

Conductor Charged with Passing Imitation Coins.—Charged with filing 5 cent coins to register a cent when deposited in the fare boxes on the Buffalo city lines of the International Railway, Andrew Judge, a conductor, has been indicted by the United States Grand Jury and is under arrest for trial at the next term of court. Thomas Penny, of counsel for the company, is co-operating with the United States attorney in the prosecution of the case. The indictment charges violation of Section 168 of the United States penal code, covering the making or passing of an imitation 1, 2, 3 or 5-cent piece. The penalty on conviction is a fine of not more than $1,000 and imprisonment of not more than five years. It is alleged that in making change for passengers, Judge would give two 10-cent pieces and a filed nickel. The 5-cent piece was always deposited in the fare box by the passenger and would only register 1 cent.

Improvement in Columbus Accident Record.—The report of the safety council of the Columbus Railway, Power & Light Company, Columbus, Ohio, will show that there has been a decrease for 1915 over 1914 of 21 per cent in accidents occurring to passengers leaving cars, a decrease of 14 per cent in collisions of cars with teams, and a decrease of 36 per cent in collisions between cars. The number of automobiles in Franklin County on Jan. 1, 1916, was 9294 in comparison with 6484 on Jan. 1, 1915, or an increase of about 43 per cent, but the increase in the number of accidents due to collisions between street cars and automobiles increased by only 3 per cent. There was a slight increase in the number of accidents due to carelessness in boarding cars. People insist on boarding cars when they are moving. The number of accidents to employees shows a slight increase, from the fact that the company at the first of the year ordered that every accident, no matter how trivial, should be reported.

Interurban Character of Service Maintained in Albany.—The Public Service Commission for the Second District of New York has decided the case against the Schenectady Railway and the United Traction Company, with regard to the use of the Schenectady Railway cars for local service in Albany. The commission refused to compel the Schenectady Railway to use its interurban cars on the Albany line for local service. Inasmuch as the Schenectady Railway cars are now being used to supplement the United Traction Company's service between Watervliet Avenue and the city line the commission ordered that the schedules of these two companies be arranged so that they may furnish even intervals. The opinion is expressed that the interurban character of the Schenectady Railway service to Albany must be maintained, one reason being that the interurban cars, with their three high steps and other features unsuited to the ready ingress and egress of passengers, would tend to delay all the Albany local cars if generally engaged in local traffic.

Personal Mention

Mr. Bion J. Arnold of Chicago has been retained by the Public Service Commission of Massachusetts as consulting engineer in the Bay State Street Railway fare case.

Mr. Joseph H. Alexander, formerly chief engineer in the office of Mr. Peter Witt, who retired as street railway commissioner of Cleveland, Ohio, on Jan. 1, has entered the service of the Cleveland Railway.

Mr. Edward A. West, efficiency engineer of the Portland Railway, Light & Power Company, Portland, Ore., is spending a few weeks in Denver in efficiency work on the property of the Denver (Col.) Tramway.

Mr. Thomas A. Wallace has been appointed assistant treasurer of the Toledo Railways & Light Company, Toledo, Ohio, to succeed Mr. William P. Troth who is now in the offices of Henry L. Doherty & Company in New York.

Mr. K. D. Klemm, formerly secretary of the Kansas City, Kaw Valley & Western Railroad, who has been managing the line and handling the building of extensions, was elected president at the annual meeting on Jan. 14. Mr. E. S. Bigelow has been elected secretary and treasurer of the company.

Mr. Thomas H. Turner, who has been in the employ of the Massachusetts Northeastern Street Railway, Haverhill, Mass., for some years, has been appointed master painter, in charge of the painting of all the equipment of the company. He succeeds his brother, Richard R. Turner, who died recently.

Mr. E. W. Decker, who has been a director of the Twin City Rapid Transit Company, Minneapolis, Minn., was elected vice-president of the company at the annual meeting held in New York on Jan. 25. He succeeds Mr. Horace Lowry, who was elected president of the company. Mr. Decker is president of the Northwestern National Bank, Minneapolis.

Mr. Robert W. Boyd has been appointed secretary to Commissioner Henry W. Hodge of the Public Service Commission for the First District of New York. Mr. Boyd has been in independent consulting engineering practice in New York, and was for a time in partnership with Mr. Rudolph Miller, who resigned to become superintendent of buildings of the Borough of Manhattan.

Mr. R. H. Dalgleish, who has been in charge of the electrical department of the Capital Traction Company, Washington, D. C., for the last eight years as assistant to the chief engineer, has been appointed electrical engineer of the company. Mr. Dalgleish is president of the Capital Traction Company section of the American Electric Railway Association, just organized, and a portrait and a short biography of him appear in the department "Association News," elsewhere in this issue.

Mr. W. W. Hunzicker has resigned as equipment engineer with The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to accept a position as engineer with the Ohio Brass Company, Mansfield, Ohio. Mr. Hunzicker was graduated from Purdue University in 1908, and since that time has been actively engaged in street railway matters of a varied character. Mr. Hunzicker was employed with the South Bend, Indiana, properties during 1908-1909, Chicago Board of Supervising Engineers during 1910, and 1911-1915 in the rolling stock department of the Milwaukee properties.

Mr. John N. Shannahan, vice-president and general manager of the Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., has been admitted into the partnership of Allen & Peck, Inc. The other two members of the firm are Mr. C. Loomis Allen and Mr. E. F. Peck. Owing to the fact that Mr. Allen's duties as one of the receivers of the Empire United Railways, Inc., require practically all of his time at present, a change has been made in the work of the other partners. Mr. Peck has taken Mr. Shannahan's place at Hampton, and Mr. Shannahan spends most of his time in traveling in the interest of the firm and inspecting its different properties.

R. F. CARLEY

Mr. R. F. Carley, who has been appointed general superintendent of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill., was born in 1885 and reared in Quincy, Ill. He was graduated from the high school at Quincy, spent two years at Leland Stanford University and two years at Cornell University, Ithaca, from which latter institution he was graduated in 1907 with the degree of mechanical engineer, having specialized in electrical work. Immediately upon graduation Mr. Carley entered the service of the McKinley syndicate at Quincy. Here he spent nearly two years learning the practical side of the operation of a public utility property, working in the car shop, at the power plant, as track foreman and as inspector of trainmen. He also aided in securing a new street railway franchise. Mr. Carley next spent more than a year as superintendent of the railway department of the Galesburg Railway & Light Company. On leaving Galesburg, he made a detailed report covering each of the various McKinley properties. This report was really a physical inventory with pictures, sketches and tabulated data covering each place. Mr. Carley next took charge of the operation of the three interurban power plants of the Illinois Traction System at Venice, Peoria and Riverton, and at the same time acted as an operating engineer for the system. Since 1912 he has been chief operating engineer located in the Peoria office. Next June will complete his ninth year of service with the company.

HORACE LOWRY

Mr. Horace Lowry, who has been vice-president of the Twin City Rapid Transit Company, Minneapolis, Minn., was elected president of the company at the annual meeting in New York on Jan. 25. He succeeds the late Calvin G. Goodrich. Horace Lowry is the only son of the late Thomas Lowry, former president and founder of the Twin City Rapid Transit Company. He was born in Minneapolis on Feb. 4, 1880. He is a graduate of the Minneapolis Emerson grade school and the Minneapolis Central High School, class of 1896, and the University of Minnesota, class of 1900, from which last he matriculated with the degree of bachelor of science. For nearly two years he was employed as an electrician in the company's shops. He then entered the auditing department. When he left the department after a year of service he was chief clerk. Mr. Lowry then retired from the company to look after his father's real estate and personal business interests, which up to that time had been in the hands of several agents. In June, 1908, he accepted the superintendency of the Minneapolis lines of the company and held that position until Dec. 10, 1910, when he resigned to give his entire time to the Arcade Investment Company, of which he is president. During that time he built the twelve-story Lowry building in St. Paul, acting as his own engineer and general contractor. On Jan. 1, 1912,, he was appointed general manager of the Twin City Rapid Transit Company and on Jan. 25, 1913, he was elected vice-president, which office he has held up to his election as president on Jan. 25, 1916. Mr. Lowry is a member of all the leading social and civic organizations of Minneapolis and St. Paul. He was married on March 18, 1909, to Kate S. Burwell and they have two sons.

Mr. N. B. Rhoads has resigned as general superintendent of the Southern Railway & Light Company, Natchez, Miss., to become superintendent of the railway department of the Jackson Light & Traction Company, Jackson, Miss. He succeeds Mr. F. Whitfield, who has been assigned to other duties. Mr. Rhoads was formerly manager of the Waycross Street & Suburban Railway, Waycross, Ga. He entered railway work with the Richmond (Va.) Traction Company. Later he was assistant superintendent of the Savannah (Ga.) Electric Company and then superintendent of the company. He was also superintendent of the Key West (Fla.) Electric Company and superintendent of transportation of the Beaumont (Tex.) Traction Company.

Mr. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., was elected president of the Illinois Electric Railways Association at the meeting held in Chicago on Jan. 21. Mr. Blackhall was born on Nov. 16, 1869, in a little French community named Caraquet, in New Brunswick, Canada. He left home when he was fifteen years old, and after working in several different places in Canada, he went to Portland, Maine, in 1889. In the spring of 1891 he entered railway work with the Woodbridge & Turner Engineering Company, New York, which had taken a sub-contract under the Thomson-Houston Company, then engaged in electrifying the Deering branch of the Portland Railroad. A few months after the Woodbridge & Turner Engineering Company completed its work at Portland the company employed Mr. Blackhall on the construction of the electric railway extending from Buffalo to Tonawanda along the lake. He was finally promoted to the position of superintendent of the road. Subsequently Mr. Blackhall served the Woodbridge & Turner Company in connection with the electrification of the horse car lines in Providence, R. I., the construction of the Westbrook branch of the Portland (Maine) Railway, the building of the Scranton-Moosic line, the electrification of the mule lines in Chester, Pa., the installation of an electric scenic line on Briganteen Island, N. Y., the electrification of the lines in Poughkeepsie, N. Y., and the construction of the independent telephone system at Mt. Vernon, N. Y. After leaving the Woodbridge & Turner Company, Mr. Blackhall constructed an overhead line connecting the new power plant with the old system in Wilkes-Barre, Pa. He next became connected with the Portland (Maine) Railroad in charge of its electrical work and remained in Portland until the spring of 1900. He then secured a position with the American Railways, Philadelphia, on work at Bridgeton, N. J. He was next sent to Joliet by the American Railways in the capacity of electrical superintendent on the rebuilding of the local lines there and the construction of the interurban line to Chicago. Upon the completion of that work he served the American Railways in other places, returning to Joliet in January, 1904, to become manager of the Chicago & Joliet Electric Railway, which position he now holds.

OBITUARY

Richard R. Turner, master painter of the Massachusetts Northeastern Street Railway, Haverhill, Mass., and member of the New England Street Railway Club, is dead. Mr. Turner was born in Providence, R. I., in 1864. He had been connected with the street railway industry for many years and had served directly under Mr. Franklin Woodman, general manager of the Massachusetts Northeastern Street Railway, for twenty-five years.

Henry Hurt, formerly president of the Capital Traction Company, Washington, D. C., and a director of several banking institutions of Washington, died on Jan. 24 at his home in Washington. Mr. Hurt, who was born in Virginia seventy-two years ago, fought with the army of the Confederacy. After the war was over he obtained work as a conductor on a horse car in Washington, D. C. In 1874 he was elected president of the Capital Traction Company. He retired from the presidency of the company in 1895, but remained a director and for the last ten years was vice-president of the company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Lafayette, Ind.—The franchises granted the Lafayette & Northwestern Traction Company in Tippecanoe, White, Jasper and Newton Counties expired on Jan. 1, 1916. The franchises required that the road be in operation by Jan. 1, 1916, or all rights and privileges granted under such franchises would be forfeited. The lapse of the franchises also forfeits the subsidies voted in White and Newton Counties, amounting to about $100,000. [Nov. 27, '15.]

Henderson, Ky. — Drafting of a new franchise for the Henderson Street Railway has been assigned to the railroad committee of the Council. The present franchise will expire in October. It is stated that several extensions of the system will be a part of the price of a renewed franchise.

Morganfield, Ky.—The fiscal court of Union County has issued a permit for the construction of a line between Morganfield and Uniontown, with franchise rights for fifty years. S. B. Anderson, Memphis, Tenn., and G. L. Drury, Morganfield, are interested. [Jan. 15, '16.]

Mt. Clemens, Mich.—The Detroit United Railway has submitted to the Council a proposed new twenty-year franchise. The company proposes to construct a new bridge at Macomb Street and agrees to divide the expense of a new bridge on South Gratiot Avenue, not to cost more than $15,000. It also offers to double-track South Gratiot Avenue.

Kansas City, Mo.—H. B. Pert, president of the Kansas City & Tiffany Springs Railway, has asked the Public Service Commission of Missouri for a certificate of convenience and necessity to construct a line from the north end of Swift Avenue, Kansas City, to Campbelltown, touching the main line of the Quincy, Omaha & Kansas City Railway at Campbelltown. [Jan. 15, '16.]

Pittsburgh, Pa.—An application will be made to the Public Service Commission of the Commonwealth of Pennsylvania by the Pittsburgh Railways for a certificate of public convenience for the reconstruction of the bridge over the tracks of the Western Pennsylvania Railroad on Guyasuta Road in O'Hara Township, Allegheny County. A public hearing on the application will be held at the office of the commission in Harrisburg on Jan. 31.

Dallas, Tex.—The $10,000 deposited with the city of Dallas by J. Mercer Carter and associates ten years ago to guarantee the construction within a reasonable time of interurban lines on which two franchises were granted, has been declared forfeited because construction of the lines has never been started. A third franchise which was granted at the same time has since passed into the hands of E. P. Turner, president of the Dallas Northwestern Traction Company, and has been kept alive and a similar deposit was therefore not forfeited.

Terrell, Tex.—Stone & Webster have requested the Council to extend the time on its franchise until Dec. 31, 1916, in which to begin work on the proposed Dallas-Terrell interurban line. This franchise expires on Feb. 1, 1916, unless extended or work is begun before that date. The Council took the matter under advisement but deferred taking action until a later date.

Ruston, Wash.—The Puget Sound Traction, Light & Power Company has received a franchise from the Council to construct electric transmission lines and to sell light and power to Ruston.

Seattle, Wash.—The franchise committee of the Council has denied the petition of the Puget Sound Traction, Light & Power Company to be allowed to surrender its franchise on Twenty-third Avenue from Louise to Jefferson Street, Seattle.

TRACK AND ROADWAY

Phoenix Railway Company of Arizona, Phoenix, Ariz.—This company has been granted eighteen months' time by the State Corporation Commission in which to rebuild its system.

San Diego (Cal.) Electric Railway.—Work will soon be begun by this company on the construction of an extension to La Playa, for which a franchise was granted a year ago.

Municipal Railways of San Francisco, San Francisco, Cal.—Bids for the construction of the Church Street municipal railway from Sixteenth to Eighteenth Streets and from Twenty-second to Thirtieth Streets were opened by the Board of Public Works on Jan. 17. The two lowest bids received were F. R. Ritchie, $57,276, and Western Motor Draying Company, $57,421.

Florida East Coast Railway, Jacksonville, Fla.—In addition to its regular steam service, this company has inaugurated an electric train service from Jacksonville to Pablo Beach, Atlantic Beach and Mayport.

Washington & Lincolnton Railroad, Washington, Ga.—It is reported that construction has been begun on this company's proposed line by the Morrow Construction Company from Washington to Metasville, 10 miles. M. Mason, chief engineer.

Aurora, Elgin & Chicago Railroad, Aurora, Ill.—Negotiations are pending for the purchase of the opera house block in Aurora by this company. It is reported that $60,000 was offered by the company. It is said that improvements in the waiting stations for the city lines and the third-rail line, as well as added facilities for handling freight, will follow the purchase of the property.

Joliet & Eastern Traction Company, Joliet, Ill.—Plans have been completed by this company to extend its line from Joliet to Hammond, Ind.

Central Illinois Public Service Company, Mattoon, Ill.—Work will soon be begun by this company on the construction of an extension on Vendeveer Street, Taylorville.

Illinois Traction Company, Peoria, Ill.—It is reported that this company is considering the construction of an extension from Springfield, Ill., to Hannibal, Mo., and thence to Jefferson City.

Rockford City Traction Company, Rockford, Ill.—Among the extensions contemplated by this company this year are a line to the Scandinavian cemetery; one on Whitman Street from Church Street to North Avenue and one on North Avenue to Hoffman Boulevard.

Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind.—This company has presented a plan to the St. Joseph county commissioners whereby the tracks near Osceola may be removed somewhat south and the interurban tracks be relaid directly parallel to the Lake Shore & Michigan Southern Railroad tracks. In this manner only one highway crossing between South Bend and Osceola would be needed instead of two, as at present. The proposed improvement will cost between $4,000 and $5,000. It is also said that this company may secure from the New York Central Railroad some land near Elkhart so that it may enter that city on parallel tracks with the New York Central Railroad.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—It is reported that this company contemplates extending its line to Milligan Park, Crawfordsville, Ind.

Keokuk (Ia.) Electric Company.—Plans are being made by this company to extend its line from Frankford to Curryville, with possible extensions to Bowling Green on the east and Centralia on the west.

Arkansas Valley Interurban Railway, Wichita, Kan.—No new extensions are being planned by the Arkansas Valley Interurban Railway during 1916, but the company plans to improve its entire track and equipment. All worn track will be replaced and the entire line from Wichita to Hutchinson will be ballasted with sand rock, the old wooden bridges will be overhauled or replaced by concrete, the terminal facilities at Wichita will be made larger and more rolling stock purchased.

Orleans-Kenner Electric Railway, New Orleans, La.—This company plans to build a 1-mile extension to its lines.

Worcester (Mass.) Consolidated Street Railway.—Work has been begun by this company installing its feed wires in conduits on Main Street from Chandler Street to Lincoln Square.

United Light & Railways Company, Grand Rapids, Mich.—This company is preparing estimates of the cost of extensions planned during 1916.

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—A report from this company states that construction will be begun about March 1 on its proposed line from Kansas City to Tiffany Springs, 15 miles. Overhead trolley will be used. No contracts are desired before March. H. G. Pert, president. [Jan. 15, '16.]

Batavia (N. Y.) Traction Company.—Stockholders in the Batavia Traction Company at the annual meeting decided not to project the line to Horseshoe Lake or any other outlying part of Batavia during the present year, as had been previously discussed.

Binghamton (N. Y.) Railway.—All of the material has been purchased by this company for an extension of its line on Conklin Avenue east from the present terminus for a distance of 5700 ft. Construction was begun last fall, but was discontinued on account of unfavorable weather conditions.

New York Municipal Railway, Brooklyn, N. Y. — Bids will be received by the Public Service Commission for the First District of New York until Feb. 10 for the construction of Section 2-A of Route 12-A, being a part of the Broadway-Fourth Avenue subway in Brooklyn, known as the Eastern Parkway subway. Work must be completed to allow the operation of trains within twenty months from the delivery of the contract, and a bond of $100,000 is required from the successful bidder.

Interborough Rapid Transit Company, New York City.—The Public Service Commission for the First District of New York has approved an agreement between the Interborough Rapid Transit Company and the New York Central Railroad for the joint use of the Putnam Division bridge over the Harlem River at Eighth Avenue and 155th Street. The approved agreement gives the Interborough Rapid Transit Company the right to extend its Sixth and Ninth Avenue elevated lines over the bridge and through 162d Street to a connection with the Jerome Avenue branch of the Lexington Avenue subway, the contract for which has also been approved by the commission. The commission has authorized the company to award construction contracts to the lowest bidders upon certain Bronx lines, as follows: For the Webster Avenue extension of the Third Avenue elevated line, to M. J. Leahy, for $831,110.90; for the Eighth Avenue and 162d Street connection, to the Battery Engineering & Construction Company, for $336,784.50; for the West Farms subway connection, to A. L. Guidone & Son, Inc., for $105,791.

Southeastern Ohio Railway, Zanesville, Ohio.—This company, which has been organized to take over the property of the Southeastern Ohio Railway, Light & Power Company, is planning to construct various extensions.

Sapulpa & Oil Fields Railroad, Tulsa, Okla.—Construction has been completed to Shamrock on this company's proposed line from Dewey to Drumright. [Nov. 13, '16.]

Toronto, Ont.—The Etobicoke Township Council has decided to submit the hydro-radial by-law to the electors on Feb. 12. The municipality was prevented from taking a vote on the question by an order of the court owing to an error being discovered in the printing of the by-law. Toronto Township will vote on the by-law on the same day.

Northern Cambria Street Railway, Patton, Pa.—Plans are being made by this company to build an extension to Hastings. Most of the necessary right-of-way has been obtained, and it is expected that construction will be begun in the spring.

Shippensburg, Newburg & Western Railway, Shippensburg, Pa.—It is reported that this company's proposed line to connect Shippensburg, Middlespring, Newburg, McKenney and Roxbury will be built in the near future. [April 10, '15.]

Three Rivers (Que.) Traction Company.—Operation has recently been extended by this company from Three Rivers to Baptist Island.

Cleburne (Tex.) Street Railway.—It is reported that plans are being considered to improve the property of this company. The line has not been operated for more than a year and has recently been purchased by F. C. Cotton and associates of Denver. The company will be reorganized and known as the Cleburne Traction Company.

San Antonio & Austin Interurban Railway, San Antonio, Tex.—It is reported that this company will begin construction shortly on its proposed line to connect San Antonio and Austin. V. P. Brown, San Antonio, president. [Nov. 6, '15.]

Temple & Marlin Interurban Railway, Temple, Tex.—It is reported that all subscriptions for the preliminary work of this company are paid, and a survey is now being made of the proposed line. W. W. Turner, Marlin, secretary. [Dec. 4, '15.]

Tyler (Tex.) Traction Company.—It is reported that plans are being considered to extend this company's lines. The line was recently purchased by F. C. Cotton and associates of Denver, Col.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—Plans are being considered by this company for the construction of an extension of its lines from Springville to Mapleton in the near future.

Charleston-Dunbar Traction Company, Charleston, W. Va.—It is reported that plans have been made by this company to build a 20-mile extension in West Virginia.

Morgantown & Wheeling Railway, Morgantown, W. Va.—Grading has been completed by this company for its line from Price to Blacksville, and bridges have been delivered. The date of letting the contract for laying and ballasting tracks has not yet been decided upon.

SHOPS AND BUILDINGS

Pacific Electric Company, Los Angeles, Cal.—The city engineer of Los Angeles has approved the plans of the overhead structures and sheds which the Pacific Electric Company proposes to install over Los Angeles Street and at the rear of the company's Sixth Street depot, in order to relieve traffic congestion.

Illinois Traction System, Peoria, Ill.—It is reported that this company has purchased 60 acres of land on the Illinois side of the Mississippi River, just opposite Hannibal, Mo., to be used for the location of interurban shops.

Bay State Street Railway, Boston, Mass.—Plans are being made by this company to enlarge its freight house on Weir Street, Taunton.

International Railway, Buffalo, N. Y.—An agreement has been entered into between the International Railway and the city authorities of Lockport whereby the company will construct a new freight and passenger terminal in that city providing the city withdraws its objections to the one-man cars now being operated on the Lockport city lines. The Council has adopted a resolution directing the company to place two men on the city cars. The company has enjoined the city from enforcing the act and the appeal is pending in the courts.

Interborough Rapid Transit Company, New York City.—In connection with the joint use of the Putnam Division bridge over the Harlem River by the New York Central Railroad and the Interborough Rapid Transit Company, a new station will be constructed by the New York Central Railroad for the use of both companies at or near the easterly end of the bridge, which is to be the southerly terminus of the New York Central Railroad, and ultimately the present station at 155th Street, now used by the New York Central Railroad, will be abandoned.

POWER HOUSES AND SUBSTATIONS

Nashville Railway & Light Company, Nashville, Tenn.—This company plans to install a substation in the near future between the West Nashville and the West End lines in order to increase the efficiency of the railway and lighting lines.

Tyler (Tex.) Traction Company.—It is reported that this company will install new machinery in its power plant.

Manufactures and Supplies

ROLLING STOCK

Central of Florida Railway, Daytona, Fla., will probably purchase at least four new cars during 1916.

Gary, Hobart & Eastern Traction Company, Hobart, Ind., expects to purchase one combination car during 1916.

Moncton Tramways, Electric & Gas Company, Ltd., Moncton, N. B., will probably purchase four new cars during 1916.

Butte (Mont.) Electric Railway has ordered four large open cars, seating ninety persons, 30-in. wheels, from the Niles Car & Manufacturing Company.

Morris County Traction Company, Morristown, N. J., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 22 as considering the purchase of five new cars, has ordered this equipment from the Cincinnati Car Company.

Public Service Railway, Newark, N. J., will commence building at once fifty closed cars of the same type as the sample car which was described in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1916, and 127 open cars of the same type as the twenty open cars built by this company during the past year. The company is also in the market for twenty interurban cars, which will be ordered from outside car builders very shortly.

TRADE NOTES

Edison Storage Battery Company, Orange, N. J., has appointed Paul Sutcliffe as advertising manager. Mr. Sutcliffe joined the Edison interests in 1912, but resigned at the end of a year to become secretary of the W. S. Hill Advertising Company, Pittsburgh, Pa. He has been in the advertising department of the Edison Storage Battery Company for the past year.

Q & C Company, New York, N. Y., announces that the "magnetic" wig-wag crossing signal, owned by the Railway Specialties Company, Los Angeles, Cal., is now, with the exception of California and Oregon, under the exclusive control of the Q & C Company, which will manufacture and sell this device both for the United States and Canada. The device will hereafter be known as the Q & C magnetic wig-wag.

Haskell & Barker Car Company, Michigan City, Ind., noted in a previous issue as having elected Edward F. Corry as president and general maanger, has also appointed the following officers: vice-presidents, C. A. Liddle and Arthur Van Brunt; treasurer, D. A. Crawford; secretary, A. J. McAllister. The main offices of the company will continue to be at Michigan City, Ind., but a sales office will be opened in the Railway Exchange, Chicago, on Feb. 1, and Messrs. Van Brun and McAllister will have headquarters at 5 Nassau Street, New York City.

ADVERTISING LITERATURE

Electrose Manufacturing Company, Brooklyn, N. Y., has issued sheets describing its insulators suitable for 1000 to 1,000,000 volts.

Southern Pine Association, New Orleans, La., has issued a number of bulletins outlining the various uses of and advantages derived from wood block for street pavement and floors of factories, foundries, machine shops, mills, warehouses, platforms, bridges and loading docks. A catalog is devoted specially to a discussion of the elimination of noise by the wood-block pavement.

Goldschmidt Thermit Company, New York City, has issued a large 1916 calendar containing a railroad map of the United States. Illustrations on the sides of the calendar show the various applications of this company's equipment and processes, such as welding for rails and other steel work and a rail grinding machine which can be easily derailed in order not to obstruct traffic.

NEW PUBLICATION

The Preservation of Structural Timber. By Howard F. Weiss. McGraw-Hill Book Company, Inc., New York. 312 pages. Cloth. $3.

As a source of reliable information of fundamental importance concerning the preservation of structural timber, this book will occupy an enviable position among civil engineers, foresters, lumbermen, students and all those interested in the subject. The various chapters treat first of the importance of wood preservation as a means of conserving timber supply, and then take up the factors causing deterioration of structural timber and the effect of preservatives on the wood. The preparation of timber for preservative treatment, the various processes and the various preservatives used for protecting wood from decay, and the construction and operation of wood preserving plants are treated both from a theoretical and practical standpoint, based upon the investigations conducted by the Forest Products Laboratory of the United States Forest Service, of which Mr. Weiss is a director. The author also discusses of the various methods employed in prolonging the lives of cross-ties, poles and cross-arms, fence posts, piling and boat timber, mine timber, paving blocks, shingles, lumber and logs. Other chapters are devoted to the protection of timber from fire and from minor destructive agents. The strength and electrolysis of treated timber and the use of substitutes are also presented in an illuminating manner. The different chapters are liberally illustrated to show the various timber destructive agents and their effect on treated and untreated timber. Various methods of seasoning and treating structural timber are also illustrated, as well as both the simple and more complicated equipment necessary to facilitate timber treatment.

JUDGE KILLITTS ON THE TOLEDO FRANCHISE

In an address before the Commerce Club at Toledo, Ohio, on Jan. 12, on the subject "The Responsibility of the Citizen Under the New Charter," Federal Judge John M. Killits declared that this charter safeguards the city against any franchise that would be oppressive or unfair to the people. The Judge said that the charter is to the city what the constitution is to the State or the nation, but it goes into many details peculiar to the city that are not touched upon by the larger political divisions. It was designed for the management of the city's affairs on business principles and its provisions are numerous to that end. In regard to the authority of the city over street railway franchise matters, through this charter, Judge Killits said:

"Under the charter no street car franchise oppressive or unfair to the people of the city can be granted, and a franchise may be drafted in a much shorter and much simpler form than was possible a month ago. The city is empowered to acquire by purchase, lease or construction any public utility and operate it.

"No franchise can be written to deprive the city from subsequently regulating and revising rates of service, nor from supervising its use and occupation of public places, nor from requiring improvements and changes in appliances, or changes in locations, manner or use of streets and public places. The right to terminate a franchise at any time is preserved and an ordinance cannot be written so as to destroy the city's power to condemn the property.

"There are many other provisions which safeguard the city and which become part of every ordinance granting a franchise, and which cannot be avoided even by the approval of the voters of a referred ordinance. The charter must be amended first before its terms can be avoided. Great care was exercised to secure to the people complete control of these matters and to make hasty and improvident legislation impossible."

On Jan. 1 the Citizens' Traction Company, Oil City, Pa., put into effect a new rate of increased wages, which places the wages of first-year men at 22 cents an hour, second-year men at 23 cents, third-year men at 24 cents, fourth-year men at 25 cents, and fifth-year men at 26 cents. The increase for first-year men is 2 cents an hour. For all of the other men the increase is 1 cent an hour.

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ATTENDANCE AT THE MID-YEAR MEETING

The large attendance at the mid-year meeting at Chicago yesterday is proof of the wisdom of its selection for the winter meeting. First, it was somewhat of an experiment because it is the first mid-year meeting to be held away from the Atlantic seaboard and only the second mid-year meeting which has been held away from New York. Undoubtedly the attractive program in the way of papers arranged by the subjects committee had much to do with the large attendance. The topics chosen were very timely and were ably treated in the papers presented. They held the undivided attention of those present. Nevertheless, the record-breaking attendance at both the meetings during the day, and the total registration, showed that no mistake was made in the choice of Chicago. The banquet in the evening was brilliant as usual, a condition which was enhanced by the distinguished character of the speakers.

CHANGES IN THE CONSTITUTION

The subject of greatest internal interest in the affairs of the association discussed at the mid-year meeting was, of course, that of the proposed changes in the constitution admitting manufacturers, bankers, consulting engineers, publishing houses and others interested in the electric railway business as full company members of the association. This matter was not reached until late Friday afternoon, but the vote of the railway companies taken after the discussion showed that the members were unanimous in approving the plan. In this we believe the association acted wisely. As Mr. Brady and General Harries explained, the effect of the amendments adopted is simply to offer the opportunity to any company or individual who is interested in the policies and purposes of the association to join its membership. The change will interfere in no way with the present Manufacturers' Association, and in our opinion it should not be allowed to do so as long as the manufacturers want to retain their present organization. The Manufacturers' Association has been of great assistance to the industry in the past, but, as we said last week, we are strongly convinced of the importance of still greater co-operation between the manufacturing and operating sides of electric railways, and this the plan now adopted offers. The American Association is to be congratulated upon opening its doors wider than they have been before. Membership in it is a great honor and offers an opportunity which we hope many will embrace, for co-operating in the larger work to which the American Association had set its hand.

COMPETITION WITH OTHER INVESTMENTS

Mr. Willcox's paper at the mid-year convention was a clear exposition of the present needs of the electric railway industry, so far as the investor is concerned. Legislatures, commissions and courts can declare what they consider is a fair return on railway investments, but no pronouncement by them on this subject can compel anyone to invest money in railway enterprises, no matter how important such may be to the development of a community. There is certainly no dearth of opportunities for good investments now. Practically the entire world is asking the United States to assist in the financing of industrial and railway undertakings, and a number of foreign governments are offering bonds in our markets at attractive rates of interest. It is this condition which determines what is a "fair rate of return," at least for new investments, not what the legislatures, the commissions or the courts think. As for the investor in existing properties, his rate of return is indeed more subject to their control, but, as Mr. Willcox says, the adoption of anything except a liberal policy here would be less disastrous to the investor than to the public. His loss would be limited to the money which he had in the property, but in the aggregate this would be small compared with that which would be suffered by the community through stunted growth, because if rapid transit brings growth, progress and enhanced opportunity and values, the lack of it certainly will obstruct and prevent them.

EXPORTS AND GOVERNMENT CO-OPERATION

The average American has little knowledge about foreign trade, or his interests heretofore have been largely domestic, but the present world trade situation and the undeniable advantages of an expanding foreign trade through its stabilizing influence on home industry make it imperative that every citizen begin to take a lively interest in this subject and use his influence to secure a proper treatment thereof. We wish that every citizen would thoroughly acquaint himself with the need for a successful development of our foreign trade, and to that end we can do no better than to refer him to the proceedings of the foreign trade convention held in New Orleans last week. The important point is that the government through its consular and commercial attaché services professes to and indeed does aid in our foreign trade extension, but the endeavors along this line are more than negatived by the legal obstacles raised by Congress. Three agencies we could make invaluable use of in expanding our foreign trade—American investment and banking in foreign lands, co-operation of American manufacturers and a merchant marine—but in each case there is hampering legislation. According to Chairman Davies, the Federal Trade Commission stands ready to aid in bettering conditions along these lines, but we want to see on the part of the whole government an active co-operation with American export business. It is highly important that all restrictive legislation be removed from our export field, and the country is waiting for deeds, not words. The present administration, in now asking for a halt in transportation legislation, seems to give hope of other improvements, but it must do much more before we can be certain that the government's attitude of hostility toward business in general has been transmuted into beneficent co-operation.

WHAT RAILWAY REGULATION NEEDS

Owing to the peculiar form of our government, with its inherent state rights and its delegated federal powers, the steam railroads have for some time been compelled to obey the often conflicting mandates of the Interstate Commerce Commission and all state commissions within whose jurisdictions they operate. Indeed, although the dominance of the federal commission is clearly established for questions involving interstate commerce, the powers of the state commissions over intra-state matters have been so exercised along selfish lines that the steam carriers have really been burdened with the rule of forty-nine different masters. The inefficiency and foolishness of such a regulatory system seem now more widely recognized, and without doubt the time is ripe for bringing about a physical centralization of control over steam carriers in the hands of a federal commission.

From our indorsement of this proposal made by Senator Underwood at the mid-year meeting, however, it must not be concluded that we favor the same form of centralized control for the electric railways of the country. The steam railroads are primarily constructed for and used in interstate commerce and are so national in scope that centralized federal control is the only logical plan. On the other hand, electric railways as a whole and other public utilities are so local in character that the limit of centralization of control in such cases is the state commission instead of heterogeneous municipal boards. Some electric railways cross state lines, it is true, but this fact is a geographical incident that generally detracts nothing from the local character of such carriers. In all doubtful cases we believe that state regulation should be given the preference, and we thoroughly deprecate any attempt on the part of the Interstate Commerce Commission to assume control over electric carriers on narrow technical grounds.

The electric railway industry, therefore, has no need for a physical centralization of control, but one improvement can be made in the regulatory practices of state commissions governing such carriers. We refer to what might be called a mental centralization—a close adherence by all state commissioners to standard basic principles of regulation. State commissions have been too prone to keep their attention entirely on local problems or else to study general regulatory practices simply to be able to exploit some different theory whose only merit, if it can be called such, was its novelty. More than enough regulatory theories and practices have now been evolved, and commissions should begin to give up their individual foibles and aid in the establishment of a broad and unified basis of regulation that would embody the best regulatory practices of the different states. There is danger, of course, that in the search for basic principles the commissions might adopt concrete standards in such matters as safety regulations, electrical codes and the like so as to fit only conditions surrounding the operation of large companies and thus inflict inequitable regulations upon the smaller utilities. If the program were worked out with calm judgment, however, so as to treat all utilities with equal fairness, much could be done toward unifying regulatory precepts and procedure. Fairness must be shown in all things, if regulation is not to break down and thus open the way for wholly undesirable government ownership, which Senator Underwood rightly disapproves so strongly. The public should, therefore, take a vital interest in removing all handicaps and in supporting utilities through a fair unified system of regulation.

VALUATION OF UTILITIES

The problem of valuation is of paramount importance in the electric railway field, at least on its non-technical side, and it fully merits the attention paid to it at the mid-year meeting in Chicago. The whole question, of course, is so filled with perplexities and complicated by a multitude of conflicting opinions as to what the law is, or ought to be, that no definite solution can be expected at one conference, but if the addresses and the accompanying discussion have clarified some of the main issues involved, a notable advance has been made.

The main address, presented by Mr. Guernsey, was a meritorious exposition of the general theory of valuation and its application to rate-making. We agree with Mr. Guernsey that the primary meaning of value is intrinsic worth as measured by exchangeability in open market, but we feel that valuation is not a problem to be restricted by definitions drawn from the immature and changing science of economics. True, the Supreme Court has created the term "fair value," but we believe in passing over all abstractions as to the reconciliation of this term with economic precepts, and in basing our views upon what was really intended. The court was simply trying to designate an amount upon which earnings might fairly be allowed, just as it at other times has set a fair basis for taxation or acquisition of property. The fair amount in all these cases is made up of many factors, whose varying importance and recognition cause the fair basis to increase or decrease in particular instances. In cases of property purchase or condemnation, earning capacity and the franchise are property rights that will be protected in the absence of contractual prohibitions, while in capitalization cases franchise allowances are restricted to actual payments therefor, and in rate-making cases the earning capacity has often been considered of only collateral interest and franchise rights have often been disregarded.

The point is that the determination of a fair basis in utility valuation for various purposes has been a matter of considering all the relevant facts involved and bestowing upon each factor what was deemed to be its proper degree of importance. It is true that no artificial formula can be made to govern valuation cases, but it seems as if some advancement could be made along the line of ascertaining what valuation factors should receive primary attention in particular kinds of cases. For instance, the Supreme Court has held that in establishing a rate-making basis the original cost of construction, the cost of permanent improvements, reproduction cost, market value of stocks and bonds, probable earning capacity under particular rates prescribed by statute, operating expenses and all other material factors must be given such weight as may be just and right. But is there any single factor in rate-making cases that should by its very nature receive prime consideration? The two great elements are original cost and reproduction cost—which of these should predominate? The courts have held that where accurate evidence of original cost is presented, it should not be considered irrelevant in determining fair value, but they have refrained from saying that reproduction cost should receive major consideration, and they have not said that the adoption of one or the other basis of valuation by law would be unconstitutional.

We mention this situation simply because of the uncertainty that it indicates in valuation work. The question of a rate basis for the future has not been so difficult of solution, for it is generally admitted that the real criterion should be the actual legitimate investment honestly made. For the past, it has also been generally admitted that equitable considerations should govern, but in actual practice both the utilities and the public have been fearful of the results if one definite basis of valuation should be adopted. The utilities have feared that the original-cost basis would presuppose an admission of the agency theory, with its assumption of control but lack of responsibility on the part of the public, while the public too has opposed this basis because it was not prepared to deal fairly and liberally with money invested pursuant to all past legal requirements. On the other hand, the utilities have sometimes opposed the reproduction-cost basis because of the inability of the public to recognize all the necessary details that are involved in utility development outside of the mere up-building of the physical framework, while the public has vociferously asserted that the utilities favor this method only in order to take advantage of unearned increments of value on their property.

Thus the whole situation has been complicated by suspicion and uncertainty, but the time is rapidly approaching when a more definite understanding must be reached if the industry is to continue its appeal to the investor and the public is to receive the increased service that the country's growth demands. We do not presume to state conclusively whether original cost or reproduction cost should be adopted in order to dissolve the present uncertainty, although we believe that on account of the many vicissitudes and changes of equipment in the electric railway field the original-cost basis is the better one in general for recompensing the investor for his sacrifice. What we want, however, is a definite standard of valuation one way or the other, so that investors will know through the public treatment of utilities how to judge them in the competitive field. A unification of valuation terms, as Mr. Kealy suggests, would aid in reaching a standard. And this standard may well be liberal at the outset, for otherwise the public will suffer more than the early investors.

THE RATE OF RETURN

Quite naturally the rate of return for electric railways was a subject for full discussion at Chicago, for the granting of a proper return is as vital a matter as the determination of a just valuation. All phases of the subject were thoroughly reviewed, but we wish to comment particularly on the future aspects of the problem. As Mr. Mortimer pointed out, speculation about the future rate of return needed to attract new capital involves an inquiry into the magnitude of the actual returns, their record of stability, the tendency exhibited by them and the general hazards of the electric railway business.

Facts presented along these lines by Mr. McGrath and other speakers clearly show the restraints upon the investment of new capital in electric railways. If the future is to bring that development of the industry needed for the public welfare, the investor must be reassured in regard to the sanctity of private property and its right to freedom from public attack and to the enjoyment of a just and equitable return. What such a return will be, numerically, we cannot say, but we do know that it will not be that adjudged by the courts to be just outside the confiscatory minimum. What is a fair return in any case is decided by the stability of the investment, the return yielded by other investments of a similar character and the prevailing rate of interest. In other words, the return must be determined with the fact in mind that the capital which must be had can be secured only in a competitive field where relative stability of investment is of prime consideration.

Electric railways have a right to expect a rate of return that, instead of being restricted as near the confiscatory limit as possible, approaches the maximum limit, or a return which under honest accounting and management will attract the capital needed for the development the public wants. If the public insists on a low rate of return, this will have to be guaranteed by the government if the hazard of the industry is to be offset, but how much simpler it would be to allow a rate of return commensurate with the risks involved and the ends to be obtained. The investor has long been sustained by his faith in a just attitude of government toward utilities, but the country is sorely in need of a faith in utilities that is based on constructive public assistance rather than maintained in spite of incessant public attacks and restrictions.

What the Electric Railway Wants

In His Address at the Mid-Year Banquet President Henry Told of the Present Needs of the Electric Railways and How All Can Be of Much Help in Relieving the Existing Situation of Many of Its Burdens

By CHARLES L. HENRY
President American Electric Railway Association

CHARLES L. HENRY

PRESIDENT CHARLES L. HENRY of the American Electric Railway Association was the first speaker at the banquet on Feb. 4 at the Congress Hotel. In his opening remarks he referred to previous mid-year meetings of the association and gave a sketch of the work accomplished by the association during the past year. He then said, in part:

THE STATUS OF PUBLIC SERVICE REGULATION

"Our electric railway companies occupy a peculiar and in some respects a very difficult position. So far as the ownership of the properties is concerned, they are private companies in every sense of the word, but so far as the management and control of these properties are concerned, they are subject to the regulations and control of public service bodies. Congress through the Interstate Commerce Commission, the State through the public service commission, the city through its council, board of aldermen and other governing bodies, all tell us what we can and must do, and what we cannot and must not do. We occupy this peculiar position because we are public utilities—that is, we are companies serving the public under and by virtue of grants of some kind or character from the public authorities. We are, in fact, transacting a public business, a business which the public, through the State or the city might itself transact, but which it has delegated to us because it has been demonstrated that it can be and is more satisfactorily done by private companies. The public, represented by the nation, the State or the city, commissions the company to operate its cars upon specified terms and conditions, the company always being required, however, to provide all of the money necessary for construction and to take all of the risks incident to the business.

"On account of the business being of a public character, these public authorities referred to are vested with the power of regulation so as to protect the interests of the public in the operation of the railway property. The company is not permitted to proceed independently along lines it may decide upon, like any other business organization, but must constantly listen to and heed the regulations of the various governing bodies. They tell us how many and what kind of cars we shall operate, what signals we must install, what provision must be made against accidents at grade crossings, what protection there must be against electrolysis, what portion of the streets on which our tracks are located we must pave and keep in repair, the speed at which we shall operate our cars, the number of stops we must make, the transfers we must give from line to line, the compensation that must be arranged for between the company and its employees in case of injury by accident; in short, to a very large extent, they take from us the right of determining how our business shall be conducted and ofttimes put upon us the burden of payment for things for which we are very remotely, if at all, responsible.

"As in the beginning the public in no way provides any of the capital necessary for the construction of the electric railway property, so it assumes no responsibility for the financial results of the operation of the property, and even if regulations prescribed by its governing bodies cause loss to the company, the public does not make good such loss. The natural result of this peculiar relation which we occupy to the public is that the companies are sometimes very seriously embarrassed in the management of their property. It not unfrequently happens that by reason of burdens in the way of taxes, street improvements, additional service, the making of unreasonable regulations regarding transfers and otherwise, it is made impossible for a company to earn enough to pay operating expenses, including these burdens, and have anything left to pay a reasonable income upon the capital invested. In other words, the persons who have furnished the money to build the property and thus make it possible for the people to enjoy its benefits and advantages are compelled to go without any compensation or pay for the use of the money thus provided. It is plain to see that if such a condition is brought about in even a few cases, holders of money for investment become frightened and afraid to invest in such property further, and then the public also suffers, because, without sufficient capital, electric railway properties, like any other business, cannot be properly maintained or operated, the necessary improvements and additions cannot be made, and the public then cannot have the transportation facilities which it ought to have.

"If public supervision is intelligently and properly exercised, then instead of public supervision being an injury either to the company or to the public, it should be of very great benefit to the company and of very much greater benefit to the public—though I feel compelled to say that so far as my observation has gone, supervision of such a character is, up to date, largely theoretical and not often manifest in actual practice. It is entirely proper that the public should have an oversight of the construction of electric railway properties to the end that they be constructed and equipped so as to give the best results in their proposed service for the public. It is also entirely proper that the public should have a supervising hand in the operation of these properties so that the purpose for which they are constructed and being operated shall be fully and satisfactorily met. The great difficulty, however, especially during such times as we have been passing through for the last few years, has been the disposition largely dominating the public mind, on the one hand, unjustly to criticise and find fault and, on the other hand, to call for additional service and the placing of additional burdens on the railway company. These calls and additional burdens are very frequently imposed without any careful or comprehensive consideration of the question, and quite generally without regard to the financial effect upon the electric railway company, and, therefore, upon the service it is called upon to render the public.

Burdensome Conditions

"On account of this condition of the public mind, many things have been required of electric railway companies without any semblance of justice, and apparently without any reason except that the public has the power to require it. Take as an illustration the requirement frequently—yes, generally—made of electric railway companies, to pave and keep in repair certain portions of the street along which the railway is operated. This is a requirement not at all in the interest of the public, but solely in the interest of the abutting property owners. If the street railway were not there, the abutting property owners would pay for the improvement of the street but, as there is a street railway along the street, the company owning it is compelled to pave and keep in repair a large portion of the street and in some cases the entire street. The idea first originated in connection with the horse-car lines when, indeed, they occupied and used the street in such a way as to injure it and, therefore, made frequent repairs necessary, thus furnishing some reason for the practice. But it is otherwise with electric cars. They touch no part of the street except the rails. They carry no dirt upon the street. They do not wear it out and, in fact, furnish a way many times for other vehicles, especially after snow storms, when otherwise they could not go up and down the street.

"Within the last two years a peculiarly fine illustration has been given of the fallacies of the claim that street railway companies should be required to pave and keep in repair the streets on which their tracks are located. All of a sudden jitney buses came into use. This system of freebooter transportation sprang up in the various communities, and the principal reasons why it was thought to be profitable were that these bandits could pick out and follow the short routes and use without any charge the pavements which the street railways had built. What could be more unjust or unfair? How long do you suppose such a condition would have been allowed to continue if the city itself had owned and was itself operating the street railway lines? Every dollar that the street railway company is compelled to pay in the improvement of streets unjustly adds just one dollar to the cost of transportation; that is, the man who rides upon the cars must pay his part of that dollar for the improvement of the street which should be paid for by the owner of the abutting property.

"Take another illustration. It quite generally happens that there is a tendency to require the street railway companies to give, without additional compensation, numerous transfers from cars of one line to cars of other lines, thereby increasing the length of ride which a passenger may take for the original and only fare paid by him. This has been carried, I understand, in the city of Chicago to such an extent that a passenger may actually ride 30 miles for a 5-cent fare. No one will pretend for a moment that 5 cents is a reasonable or proper fare for such a ride, and it necessarily follows that the man who receives such a ride for 5 cents is riding part of the way at the expense of other patrons of the company. Without being dishonest to those holding the company's obligations, one man cannot ride for less than his ride is worth unless another man pays more than his ride is worth. The company cannot in fair honesty to all pay—in fact, donate—the expense of street improvements properly chargeable to abutting property owners, nor can it carry a passenger a longer ride than he pays the value of, without those who ride upon the cars contributing just that much to the finances of the company.

"The spirit of unfairness in the public mind, to which I have referred, is also strongly manifest in another department. An idea seems to have grown up in most communities that an electric street railway is a natural and proper prey for any and all kinds of demands, whether just or unjust, and this manifests itself in connection with damage claims as much as in any other way. People will make claims against an electric railway company wholly without any foundation or right when they would not think of doing so against an individual or a mercantile concern. When it comes to questions regarding accident claims, there seems to be a very great dearth of any sense of honesty or integrity on the part of claimants and their friends. They are wholly unable to see that the company should not be responsible for what the claimant himself is to blame, and they shut their eyes entirely to all the fair and equitable requirements which rest upon a claimant in connection with these matters.

Is There a Public Civic Conscience?

"It would be easy for us to spend hours going over the various things illustrative of the public mind which I have mentioned and after we have spent much time on them we are led to ask ourselves the question: 'Is there indeed any public civic conscience?' It seems sometimes that there is not, but, upon further reflection, we will, I think, conclude that there is a civic conscience, but that apparent self-interest blinds and smothers it so that in time it becomes and is wholly inactive.

"It needs no extended argument to show that we must fear for the future of electric railway companies unless this condition of the public mind and this inclination on the part of the public can be changed from what it now is.

"We have a right to expect from people who have been advanced to public office that they will be fair-minded and give such questions a full examination resulting in a course of action that will be right as between all concerned, and quite usually this is the case. We must not, however, be surprised, with the public mind as it is, that sometimes persons occupying these official positions—legislative, judicial and executive, whether national or state or city—still act along the lines of such public opinions. They are only a part of the general public and when for a time, whether short or long, they, coming out of the masses, are intrusted with public authority, sometimes do not rise to a full realization of their duties but continue to reflect in their public acts the principles which actuate the public mind. Some candidates in their campaigns discuss and promise things which they think will make them the most popular with their constituents, and when elected they feel called upon to carry out the things which they have advocated in their campaign speeches.

It follows then beyond question that the public at large needs to be educated along right lines on all questions involving civic conduct and on all questions concerning which the public has to deal with electric railway companies. If this can be brought about, then the future prosperity of electric railway properties is assured.

A WAY IN WHICH ALL CAN ASSIST

"I take it, therefore, that the most important thing to which electric railway people can devote themselves is the education of the public mind upon these questions, and right here is where every person interested in the industry can assist. The electric railways of the country employ more than a quarter of a million of people in their maintenance and operation. Add to these those who are members of their families or dependent upon them for support and we have a vast army of people interested in the business and financial success of the electric railway properties. These people constitute a large and respectable portion of the various communities, and if they will thoroughly advise themselves regarding all questions of importance in connection with the building, financing and operation of their roads and during their idle as well as their working hours will keep these questions in mind, they will become an intelligent and influential body of instructors upon these questions, and their influence will soon manifest itself. The manufacturers, with their vast army of salesmen and other employees, can also greatly aid in this work which so badly needs to be done.

"However, we cannot hope to influence the people unless they are at least in a friendly state of mind. If they are irritated and angry at things that have occurred on our lines or in connection with our business they will not be found ready to receive any explanation of the affairs of the company. They must first be gotten in a good humor with us. We must, as far as possible, try to explain satisfactorily any thing that has aggrieved them, and in doing this it will be proper and advisable to show the difficulties of the situation and why the company should not be censured. Moreover, the manner in which we perform our duties will have much to do with the influence which we have upon the thoughts of those about us. The conduct of employees is to most people the one thing which determines their view of the company. Courteous conduct on the part of trainmen, agents and other employees of the company who come directly in contact with the public will go very far toward disarming the public of prejudicial feeling against electric railway companies, and this same kind of conduct on the part of the president and the general manager and their hundreds of assistants will add materially toward winning the contest in which we are engaged. We must have the public friendly to us.

"By what I have said, I do not mean that we should concede unjust or unlawful things in order to placate any of the public, for I believe that the man or company who stands squarely by what is right in demanding what is due him stands better before the public than he who cringingly concedes what is unjustly demanded for fear of making enemies. Nevertheless, it is so easy to be wrong and unfair in our own view that it is quite a dangerous thing to act upon the theory that we are entirely right and others entirely wrong. Usually there is at least an element of right on the other side, and even when we cannot see any, it is always better to pour oil on the wound and be sure not to add any additional irritant.

WHAT THE RAILWAYS WANT

"What is it we want to teach the public? What change is it we want made in the public mind? In the first place, we want them fully to appreciate, feel and know that we are really their agents transacting their business for them, doing for them what they have delegated to us, because, as stated, it has been demonstrated that private companies can and do operate electric railway properties more satisfactorily and more to the interest of the public than this public could itself operate them. We want them to understand that while thus acting as their agents we are entitled as such to just and fair consideration and treatment, and that if we are not accorded this we cannot on our part properly perform our part of the compact. Instead of the public being required to advance the money necessary for building these railways, we have taken that burden and risk upon ourselves. We have induced people to invest in and become holders of our bonds and capital stock—this was the only way we could raise the money to build the properties—and now we cannot pay the interest and dividends which this money thus invested entitles them to unless we can receive for the services we perform fair and proper pay and compensation. If the public owned and operated the railways themselves, they would surely insist upon and see that every one who patronized the cars paid what the service rendered was worth. Why should we then as the agents of the public not be accorded the same treatment? Again, if the companies are required to do and pay for things they should not do and pay for, just to that extent they are deprived of ability to meet their obligations for operating expenses, taxes, interest and dividends.

"Exactly the same would be true with the public if it owned and operated the railways. Would the public, if it owned and operated the electric railways, consent, as a charge against these properties, to improve streets for the benefit of abutting property owners, pay damage claims that were unjust or submit to the payment of anything that was not equitably and properly a charge against the railway properties themselves or the operation thereof? In brief, what we want the public to learn and act upon is that when a demand is made of any of our companies it should be answered the same as if the public itself owned and operated the properties which we own and operate. Let the acid test be applied, namely, that we should have for our services the same compensation the public would demand, that we should have the same rights and privileges guaranteed to us which the public would demand and that we, as the agents of the public, should be oppressed with no burdens that the public would not allow the same properties to be oppressed with if it owned and were itself operating them.

"Of course, all this that I have said is on the assumption that the railway companies on their part strive to their utmost to give the public the best service possible, for, after all, this is the foundation and the only foundation upon which we are permitted to rest our demands of the public.

"If all of us interested in the industry strive to carry out the principles and do the educational work which I have indicated here to-night, it will not be many years, or even months, before a different feeling on the part of the public toward the electric railway companies will be apparent. Then it will not be possible for anyone successfully to make demands upon us for unjust claims, nor will unjust burdens be laid upon our shoulders, but we should secure proper and satisfactory compensation for the service which we render to our patrons.

"In my opinion, the public will be fair and just when it understands the questions it is to act upon. Some people may not be able to lay aside their prejudice and selfish interest, but the large body of the public will be inclined to do what is fair and will want to see justice done between the companies and the individuals constituting the general public."

Railways and Government Regulation*

Speaker Points Out Difficulties of Regulation and Reasons for Lessened Borrowing Power of Railroads—Rates Must Be Increased—Regulation Problem Must Be Solved Along Line of Private Ownership and Centralized Government Control

By OSCAR W. UNDERWOOD
United States Senator from Alabama

Photo by C. V. Buck

OSCAR W. UNDERWOOD

NO more important question now pending before the American people waits proper solution than the settlement along just and economic lines of the vexed problems of transportation. The President of the United States in his recent message to Congress recommended that a commission be appointed to give a thorough investigation to all the problems that confront us in this field. As I understand the purpose of this investigation, it is not to hold an inquest on what has happened in the past. If errors have been committed or injuries have been done, that is a question for the courts and not a question of legislation. The real purpose to be accomplished by the investigation is to give an opportunity for all concerned—the farmer, the merchant, those directly engaged in transportation, the Interstate Commerce Commission and the railroad managers—to appear before a committee of Congress and state their views in reference to the solution of this great problem to guide our legislative course.

You may ask me, why the need of an investigation at all? There may be those present who believe that the transportation companies of the United States are engaged in private business and that they should not be interfered with by government regulation. To them I can only say that the transportation of the commerce of this country by the carriers is so closely allied to the healthy growth and the economic business development of the nation that its regulation was inevitable from the beginning. If we are unable successfully and fairly to regulate the transportation systems of America, the country will demand that we go forward, and the next step ahead is the government ownership of the railroad lines. A step in that direction would be most unfortunate, and it would lead to many evils that we dream not of to-day. To avoid these, we must work out a satisfactory system of government regulation, both for those engaged in the shipment of freights and those who have their money invested in the means of transportation—and this as soon as possible.

DIFFICULTY OF REGULATION IN UNITED STATES

In almost all countries the railroad question is one of first importance. In other countries the problem has not been so difficult of solution as in our own, owing primarily to two causes. Our large population and vast natural resources located far inland and at great distances from water transportation makes railroad carriage indispensable, and industrial freedom could be guaranteed only by just regulation. The most serious difficulty that has in the past prevented the solution of the problem here and is not met abroad, is a political one. Our system of government, under which the states possess certain inherent governmental rights and the federal government the great powers that were delegated to it in the beginning by the states, increases the difficulties and uncertainties that surround the problem before us.

It has been said that "No man can serve two masters," and under the regulation of to-day the transportation companies of America must obey the mandate of the federal government and at the same time the orders of each state through which the railroad line makes its way. All of the important railroad lines run through two or more states and are subject to different laws and regulations whenever a train crosses a state line. Go into the baggage car of an express train leaving Chicago and you will find a package that will reach its destination within Illinois resting against a parcel whose destination is beyond the state line. Consider for a moment that the one package is subject to the rule of one master and the other must obey the mandate of at least three masters. The courts have held that under the protection of the federal constitution the right of the railroads to charge rates that will produce a reasonable income on invested capital must be held inviolable, but how can we successfully determine what is a reasonable charge to be allowed for invested capital when we leave the determination to three or more sovereignties, each acting in its individual sphere?

LESSENED BORROWING POWER OF RAILROADS

Low rates and adequate facilities are demanded by the public, but the granting of one is often the denial of the other. Adequate facilities very often require the expenditure of large sums of money, but low rates prevent the accumulation of surplus capital and lessen the borrowing power of the roads. Without new railroad facilities commerce cannot be expanded beyond the present limitation and trade has met a permanent barrier to its future development.

Two decades ago the great trunk lines of the country were able to borrow in this country and abroad the money necessary to increase their facilities at 4 and 4½ per cent interest. Railroad bonds were considered by the investing public a first-class investment. How is it to-day? It is often with great difficulty that the best transportation systems in the United States are able to renew their old loans or place new ones. Practically none of these loans can now be placed at 4 per cent interest. A large majority of the bonds or notes sold in the last year earn above 5½ per cent interest and some are placed at rates as high as 7 and 7½ per cent. What is the effect of this condition on the shipping public? It must be borne in mind that of every $1 that is earned by the transportation companies of America, 88 cents must go to pay wages, up-keep and operating expenses, and only 12 cents goes to the capital account. It must also be borne in mind that there is no speculative enhancement in the value of the railroads that can be converted in the coffers of the company because the property of the railroad is needed for its operation, and when the lines are once built the operation must continue in the interest of the public, and whatever their relative value may be does not affect the earning capacity of the company.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

The sole source of revenue for the maintenance, development and expansion of railroad systems must come from the men who ride on the trains as passengers and from the men who ship their goods over the railroad lines. If the interest rates are increased, the transportation companies must pay. In the end, however, they must get the money to meet the increases either by the reduction of wages, curtailment of facilities or an additional charge on passenger and shippers of freight.

From a practical point of view, the last alternative is the one that must be adopted. When a transportation company twenty years ago placed its bonds at 4 per cent interest and renews them to-day at 6 per cent, so far as the public is concerned it is identically the same as if the company had increased its bonded indebtedness by one-half at the old rate of interest. And yet the public derives no benefit whatever from the increased charge. It is, therefore, necessary in the interest of the public even more so than in the interest of invested capital, that the credit of the transportation companies should be so good that they can secure the capital for their present maintenance and their future development at the lowest possible charge.

WHY STATUS OF RAILROAD SECURITIES HAS CHANGED

There may be many reasons to account for the changed status of railroad securities as investments in recent years. You may say that it is due to adverse legislation that has alarmed the investing public. Whether the legislation has been unwise and ill-considered, or whether it has been just and fair, there can be no question that the investing public has become alarmed as to the solvency of railroad securities. It is also true that recent legislation of Congress exempting state and municipal bonds from national taxation has invited capital into that field of investment. Again, it is true that the past generation regarded industrial securities as a more or less speculative investment, but the development of the great industries of to-day along safe and conservative lines has opened a field for the use of capital at higher rates of interest than the transportation companies of America can afford to pay, because there is no governmental limitation on the profits that can be made in industry and there is a hard and fast limitation, fixed by law, on the earning capacity of railroad securities.

Moreover, the opening of new fields for investment has taken away from the transportation lines much of the market they enjoyed for their securities in the past. The rates of taxation have increased in every state. Wages have gone up. The cost of equipment and supplies has greatly increased. If it had not been for economic management, many of the railroads that are running to-day would have been forced into the hands of receivers.

In short, the transportation companies of America have been unable to earn sufficient capital to enable them to meet operating expenses and interest charges and accumulate a surplus with which to provide for betterments and improved and safer facilities, and their credit has been so seriously disturbed that they are unable to borrow money for the new improvements at reasonable rates of interest. In fact, it can be said without expectation of contradiction that taken as a whole the transportation system of the United States, as far as performing its proper functions in the transportation of freight to the ultimate markets and the carriage of passengers to their destination with safety and economy, is breaking down.

HOW THE PROBLEM SHOULD BE SOLVED

What then must we do to restore confidence in the minds of the investing public as to railroad securities, to insure rapid transportation of passengers and freight at reasonable rates, and to provide for the safety of transportation and the increased facilities that are necessary to transport the growing business of the nation? These results cannot be accomplished by moving backward or divorcing the transportation system from government control.

In my judgment, we must find the golden mean. We must solve the problem along lines of private ownership and government regulation. We must consider the wisdom of substituting one master for the forty-nine masters that regulate commerce to-day. We must consider the wisdom of government supervision over the issuance of all transportation securities with the assurance to the public that new capital will be invested to secure proper facilities and used for legitimate purposes—not for speculation. We must assure the public that we stand for a system of regulation which will allow the transportation companies to charge such rates for carriage as will enable them promptly to meet their interest payments as well as their operating expenses. We must perfect a system of regulation that will recognize that the transportation lines are great public highways in which the people are as much interested as those who have invested their capital in them, that every shipper in America must have equal rights in the transportation of his goods along those highways, and that rebates and discriminations of all kinds must be of the past and prohibited in the future. Furthermore, we must recognize that the man who is willing to invest his money at a moderate rate of interest in railroad securities is not exploiting the public but is a public benefactor.

In my opinion an adequate transportation system means:

1. Roadbeds must be made more secure and more permanent.
2. Trackage must be enormously increased and many roads double tracked.
3. Safe equipment must be sufficient to satisfy requirements at any and all times.
4. Terminal facilities must be greatly improved and largely increased.

Stated briefly, then, the question is whether the American people are willing to put up with an unsafe, inferior and inadequate transportation system or have the intelligence to pay for one that will supply their needs and protect the lives of the people. The main trouble with the regulation of railways is that corporate law has been destructive, not constructive, has been piecemeal, not comprehensive.

To solve these problems, it is proposed that a committee of Congress shall give a thorough and complete hearing to all who desire to present their views. Let us hope that the result of the investigation will be productive of wise legislation—legislation that will build up and not destroy—legislation that will be helpful and not hurtful—legislation that will bring lasting and complete prosperity to the people of America.

Principles of Railway Valuation*

What Value Consists of, How It Should Be Ascertained and What Use Should Be Made of It—General Discussion of Relevant Facts to Be Considered in Valuation Work, with Particular Exposition of Reproduction Cost Theory

By NATHANIEL T. GUERNSEY
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N. T. GUERNSEY

EMINENT engineers have contended that value should be determined by cost, or fixed by the cost of reproduction, with or without the deduction of depreciation, or that it should be something ascertained by capitalizing earnings. Each contention is an attempt by a forced definition of the word value, to work out the result which the facts under consideration seem to demand as just; and so we have a cost value, a reproduction value, an investment value, a rate-making value, a taxable value, the adjective in every instance being in effect a confession that what is under consideration is not value, or fair present value, but something which the adjective distinguishes from it.

Value, when applied to the property of public utilities, means what it means when applied, under like conditions, to any other class of property. It is what the property is worth. It is, adopting the language of the dictionary, the "price equal to the intrinsic worth of the thing," its "real equivalent." Just as soon as it is conceded, for the purpose of working out an equitable result in one case, that value may be construed to mean something other than value, the door has been opened for construing value to mean something other than value in order to work out an inequitable result in any case. It will not serve the interests of either the utilities or the public (which, in the final analysis, are not antagonistic), to attempt to solve any of the questions that are presented by juggling with the meaning of words, or by giving them an arbitrary definition. Any inequalities in the law may be more surely and promptly corrected by facing them squarely.

HOW IS VALUE TO BE ASCERTAINED?

The value of any public utility at any particular time is a fact which must be deduced from the application of trained, intelligent, honest judgment to a great many other facts. The Supreme Court said in the Minnesota rate cases (230 U. S. 434) that the ascertainment of value is not a matter of formulas, but there must be a reasonable judgment properly considering all relevant facts.

The knowledge which will enable one to distinguish the relevant from the irrelevant facts and to assign to each relevant fact its proper weight is something that cannot be attained without experience. The fact that value is the result of trained judgment should tend to restrict the field, if not to entirely eliminate the class, of so-called experts, who are not experts at all but who are mere theorists, and who are dangerous because of their eagerness to apply to the property of others their theories, honest but absolutely unsupported by the results of practical experience, and therefore untrustworthy.

RELEVANT FACTS TO BE CONSIDERED

The fact that value is something to be determined by the application of reasonable judgment to all of the relevant facts, leads naturally to the inquiry, What are the relevant factors bearing upon the value of an electric railway or of any other public utility? As long ago as 1898, in the case of Smyth *vs.* Ames (169 U. S. 466-546) the Supreme Court called attention to the more important of these factors as follows:

"And in order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of its bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case. We do not say that there may not be other matters to be regarded in estimating the value of the property."

This statement, which has been referred to with approval in practically every subsequent case involving a like question, specifies as important factors the original cost of the property, the cost of its reproduction, its capitalization and its revenue. It clearly leaves the door open for the consideration of every other material factor.

It is probable that no person could enumerate all of the factors which should be taken into account, or which are in fact actually taken into account, in a proper determination of the value of any public utility, because it is improbable that any person of trained judgment, even though exercising that judgment soundly along correct lines, would be able to specify every factor which consciously or unconsciously had affected his conclusion. Consistently with this fact, and probably because of this fact, the courts, while specifying certain factors as pertinent and entitled to consideration, have never attempted to specify all of the material factors and have been careful not to exclude from consideration anything which may actually affect the value of the property in question. The cases decided by the courts overwhelmingly negative the proposition that any single thing or any single factor can of itself be a measure of value, doing this sometimes by direct statement and more often inferentially but not less certainly.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4. Discussion on this address by George Weston and P. J. Kealy appear later in this issue.

Just as there is no formula through the application of which value may be ascertained, there can be no formula which will determine the relative weight which the various factors affecting value should have in any particular case. The weight to which they are entitled is to be determined by the facts and circumstances of the particular inquiry. This is very aptly illustrated by evidence as to cost. Such evidence is competent under the authorities. This is settled beyond room for controversy. But the weight to which this evidence of cost is entitled, and it may vary from nothing to almost controlling importance, depends upon the circumstances of the case.

Many valuers, who have never made the analysis of the situation which leads to the formulation of this rule, have recognized its soundness through their practical application of it in their own work. Original costs, where a long period of time has elapsed and where the conditions when the costs were incurred vary radically from the conditions which exist at the time of the valuation, can have but very little, if any, appreciable weight in determining the question. Recent costs, incurred in the immediate past, where there has been no such variation of conditions, are accepted as most persuasive evidence of what present costs would be, while for the item of work under construction, the actual expenditures, where known, are usually adopted. Cost, while not a measure of value, is a legitimate and valuable factor in arriving at value, if it be intelligently and properly applied.

Capitalization is another material fact, whose weight depends wholly upon the surrounding circumstances. Securities recently issued for cash are entitled to and receive serious consideration. Securities issued long ago, under circumstances that may not be now ascertained with definiteness or certainty, are entitled to and in fact receive much less consideration.

The facts as to net revenue are without exception held to be material, and they are in fact material, notwithstanding the interdependence between earnings and rates. What conclusively establishes their materiality is not the unanimous holding of the courts, but the fact that this holding accords with the experience of every person who has ever tried to buy or sell a public utility.

The courts through their decisions cannot make a factor material which is not in fact material, nor do they attempt to do this. What they attempt to do is simply to declare the principles which have been developed out of innumerable business transactions.

REPRODUCTION COST

The other factor specifically mentioned in Smyth *vs.* Ames is what is now usually called the cost of reproduction. Practice has properly recognized this as, under normal conditions, the most important single factor affecting the determination of the value of a public utility. In a nutshell, the reproduction method is nothing more than a refinement and application of the rule of common experience which has taught everyone who wishes to buy something to test the reasonableness of the price by what it would cost him to obtain the same thing either by constructing it himself or by procuring it from another source.

The estimated cost of reproduction should be the estimated cost of reproducing a duplicate of the going plant, not the cost of reproducing something that it is believed would be a satisfactory equivalent. What is to be ascertained is the value of the existing plant, not the value of some other plant which it is expected (but not all expectations are realized) would perform the same functions or accomplish the same results. To the extent that the hypothetical plant departs from the existing plant, there is injected an element of uncertainty which tends to impair the accuracy of the estimated cost of reproduction. In cases where the existing plant contains elements which obviously would not be incorporated in a new plant intended to perform the same service, the valuer will do just exactly what the prospective purchaser would do under like circumstances, that is, he will take these factors into account in determining the weight which the estimated cost of reproduction shall have in connection with his ultimate conclusion as to value.

The proper application of the reproduction theory calls for the exercise not only of judgment and technical training of the highest order, but of imagination as well. The value of the conclusions reached is affected not only by the accuracy of cost estimates, such as unit prices and allowances for what are usually designated as overhead items, but, underlying and to a certain extent controlling these things, by an accurate conception of just what the process of reproduction involves. It must include in connection with the hypothetical plant every step which would be involved in the reproduction of the existing plant, because each one of these steps involves the expenditure of money, and even with the greatest care in this connection it is almost certain that there will be omissions. It is not probable that the valuer will erroneously include matters which are not incidental to the reproduction of the property, but it is almost inevitable that he will be unable to anticipate everything, and that there will therefore be some omissions.

Because it is necessary to include all factors to make the work of the valuer as accurate as possible, he must put himself in the position of a person about to reproduce the utility in question, and as a preliminary matter must attempt to reproduce in his mind every step which would be taken, from the inception of the idea to the completion of the plant in its present condition, including such attributes of the property as its business and earning power.

In making an estimate of this kind some of the steps which would naturally be taken are the following:

a—The conception of the idea and the consideration of it.

b—The discussion of it with other persons whom it might be necessary to interest in the project.

c—The employment of engineers to estimate in a very rough way the amount of capital which it might be necessary to acquire.

d—The consideration of this report and the determination whether the project seemed practicable and to promise a profit.

e—The employment of counsel and securing of advice in a preliminary way upon franchise and organization questions.

f—The preparation of a franchise by counsel, negotiations between counsel and the municipality with reference to the adoption of the franchise, and the time and effort which would be required to secure its adoption.

g—The organization of a corporation to take over the franchise and construct the plant.

h—The preliminary survey of the territory with a view to laying out the plant, determining the location of the necessary real estate for works and things of that kind.

i—The optioning and acquisition of the necessary real estate.

j—The preparation of definite engineering and architects' plans which could be made the basis of definite contracts for material and construction of such parts of the work as would be contracted.

k—The creation of a definite preliminary organization which would take charge of the doing of the actual work of construction, the securing of the necessary capital and its disbursement, and the creation of an operating organization which probably would be created gradually, contemporaneously with the work of construction.

l—The actual work of construction.

m—In connection with the work of construction, the building up of the business and operating force and business organization.

In connection with the consideration of these various steps the valuer will determine the time which will probably be required for the work. In determining this, he will be governed by the point of view of the prospective purchaser, who may elect to either buy or build. This purchaser would take the period which, all things being considered, would in his judgment be most economical.

This general outline is sufficient to make it clear that the proper application of the reproduction method involves much more than a mere listing of the physical property and the application to the quantities thus obtained of unit prices. This is an important part of the process, but it is by no means all of it, and any practice which is based upon the erroneous assumption that this listing of the physical property and application of unit prices is the entire process, must inevitably lead to conclusions grossly unfair to the utilities.

The accuracy of the estimate must depend to a considerable degree upon an accurate inventory of the property which goes to make up the utility. Such an inventory, however carefully taken, will involve more or less in the way of omissions. These will be comparatively unimportant. Something of much greater importance is the fact that the inventory of a completed property cannot, in the very nature of things, show the temporary work incident to its construction.

This is very strikingly illustrated by the subway construction which is now under way in the city of New York. The cost of the temporary surface for the street and of restoring the permanent surface, the cost of the temporary sidewalks and of restoring the sidewalks, the cost of the temporary elevated railroad structure and of its permanent supports, the cost of the temporary facilities for the water, gas, telephone, telegraph and lighting properties, and of providing for them permanently, are all of them, with perhaps some minor deductions, a part of the cost of the subway, and yet they are each of them items that any inventory which may be taken in the future will fail to disclose. Factors of this nature are involved in every estimate of the reproduction cost of a utility.

DATE OF VALUATION

The date as of which the valuation should be made is a question which has furnished a subject for considerable theoretical discussion. There is an answer to the question which is as sound as it is simple. Like many other questions relating to this matter, it can be solved best by putting one's self in the position of the prospective purchaser who is invoking the estimate of the cost of reproduction to check the price, and asking what he would do. With a prospective purchaser, this is not a merely theoretical matter. It is a concrete, practical matter. The alternative that is presented to him is either the purchase of the actual property or the construction of a like property, and the course which he will pursue is determined by the question of cost. It is perfectly clear that he cannot, having this question presented to him, put himself back three or four or five years and begin the construction then. He must construct in the future. For this reason, the reproduction theory, properly applied, requires that the building of the hypothetical plant shall be after the date of the valuation, and not prior to that date.

OVERHEAD CHARGES AND UNIT PRICES

There are certain other items of expense which are just as inevitably a part of the cost of the structure, which cannot be definitely ascribed to the specific items which go to make up the structure. These are illustrated by the cost of engineering and the interest during construction, contingencies, omissions, taxes, insurance, personal injuries and many other items of a like general character. These overhead items, together with the results deduced from the application of the unit costs, will give what is frequently, but not strictly accurately, called the cost of reproducing the physical property.

The unit prices and the overhead estimates are interdependent. Perhaps the best and most usual practice is to include in the unit prices all items going to the cost of the labor and material, including the wages of the foreman superintending the labor, incurred up to the time that the material is put in place in the structure. But there are wide differences in the practices of valuers upon this question, and there is undoubtedly a middle ground which includes a number of debatable items which may with propriety be classified either with the unit costs or with the overhead allowances. The essential thing is that there be the proper co-ordination of these two classes of items, so that taken together they will properly provide for each item of expense which reproduction would involve.

Unit prices are not to be determined by the market price upon the date as of which the valuation is to be made, or upon any other particular day. During the period of reconstruction, the prospective purchaser has every reason to believe that there will be variations in the prices of labor and material. In determining whether or not he shall buy or build, he will take this factor into account. He will consider all of the available information as to prices of both labor and material, and all of the other facts which will help him reach a conclusion as to what the probable tendency will be during the period of construction, and thus make estimates which in his judgment will cover insurance against this uncertainty.

A determination of what the proper overhead charges shall be is peculiarly a matter for trained judgment. No allowance should be made for any item on account of which actual expense will not be incurred, and on the other hand, no item of necessary expense should be excluded. Where there is uncertainty, it must be taken care of because this again is something which has been paid for in the completed plant. Items such as taxes, personal injuries, insurance and the like, can in general be estimated very accurately by those who have the advantage of large experience in connection with works of the same character.

FRANCHISES AND GOING VALUE

Franchises should be considered, if franchises are necessary to the operation of the utility. Not much progress has been made toward working out a basis for definitely approximating their value. It cannot be said, however, that they are not worth at least what it would cost to obtain other like franchises, nor can it be said that such other like franchises could be obtained without the expenditure of money, and the time and effort that represent money.

Going value is the element which represents the difference between the actual value of property and what the value of the same property would be if it were not a going concern with an established business, earning money. No argument is necessary to support the proposition that a plant with this attribute of an established business is worth more than the mere bare bones of the same plant, and if this element of value clearly exists, it is clear that it must be taken into account. It is an error to think of going value as something separate and apart from the physical property. It is in fact something that cannot be separated from it, but is one of its attributes.

How this element of value should be measured is another question. The Wisconsin theory, the theory based upon early losses, and the cost of reproducing this attribute of the plant, are theories which have been strongly advocated. It should be clearly borne in mind that each of these theories is intended to serve the same purpose, *viz.*, to aid in correctly appraising this element of value. Some of these methods are fundamentally based on cost, some of them upon the cost of reproduction; some may give better results in some instances, others in others. None of them can be taken as an absolute measure. Each of them at its best is simply an aid to the exercise of reasonable judgment. If the proposition is correct that a plant with this attribute is worth more than a plant without it, and this contention has the sanction of common experience every where, some means will be devised for giving to this element of value the weight to which it is entitled.

DEPRECIATION

Without reference to the question whether in establishing a schedule of rates the cost of reproducing the property, undiminished by depreciation, should be taken as the factor, it is clear that in ascertaining the actual value of property such depreciation as actually exists must be taken into account. The reasons which require the consideration of appreciation likewise require the consideration of depreciation. The reproduction method applied to any property automatically takes into account appreciation and depreciation to a large extent. If it did not, the result should coincide with original cost.

Where, as in all of these cases, the effort is to ascertain the value of a single entity as a going concern, the mere fact that all parts of it are not new—the mere fact that through the maintenance and reserve accounts provision must be made for continuous renewals—is not enough to warrant the inference that there has been any lessening in the value of the property in question. On the other hand, it is a matter of common knowledge that no new railway is worth as much as the same line after it has been seasoned by time and use. It is not an exaggeration to say that any public utility, well and efficiently maintained and operated, is perhaps without exception not only worth as much, but worth more than an absolutely new like plant.

Another thing that should be given strong emphasis is the fundamental error in the assumption that the amount which may be at any time in the depreciation reserve measures the actual depreciation of the property. There is absolutely no warrant for such an assumption. If a prosperous property has piled up a reserve equal to 100 per cent, this certainly does not mean that the entire value of the property has been destroyed; and on the other hand, the fact that a property has no reserve is not a demonstration that it has not depreciated. Unless this be true, depreciation would be a mere matter of accounting, and it would be easy to prevent it by carrying no reserves upon the books. It is a question of fact, only ascertainable through an actual inspection of the property by some one whose training and experience has qualified him to draw sound conclusions.

It is difficult to imagine any public utility, reasonably well engineered, located in a community sufficiently developed to need such a utility, as worth less than it would cost to reproduce it. If the existing utility were destroyed, a substitute would have to be provided. It could not be said that this substitute would be worth less than its cost, and its cost would be equivalent to the cost of the reproduction of the existing utility. But there are other factors which the estimator must take into account. Important among these are the financial history of the plant, the probable development of the community in which the plant is located, whether the plant is thoroughly well engineered with reference to both the present and the future, as well as many other facts which will vary with the conditions that surround specific utilities.

WHAT USE SHOULD BE MADE OF VALUE

It is a mistake to assume that, value having been fixed, and fair return having been fixed by the determination of a rate simply high enough to avoid the charge of confiscation, what should be the net proceeds from a reasonable rate schedule can be ascertained by multiplying these two factors together. This accords neither with the law nor with sound business sense and policy. Instead of determining what would be a reasonable schedule of rates, this process simply fixes the line that limits the jurisdiction of the regulating body below which it cannot go. It, in a broad sense, represents the cost of the service. There is another factor that is of just as much importance in determining what is a reasonable rate—that is, the value of the service of the consumer. Between the cost as a minimum and the value as a maximum lies the field for regulation.

The matter has never been more aptly put than by Justice Swayze,* from whose opinion the following excerpt is made:

"The next question is whether the rate fixed was just and reasonable. On the one hand, a just and reasonable rate can never exceed, perhaps can rarely equal, the value of the service to the consumer. On the other hand, it can never be made by compulsion of public authority so low as to amount to confiscation. A just and reasonable rate must ordinarily fall somewhere between these two extremes, so as to allow both sides to profit by the conduct of the business and the improvements of methods and increase of efficiency. Justice to the consumer, ordinarily, would require a rate somewhat less than the full value of the service to him; and justice to the company would, ordinarly, require a rate above the point at which it would become confiscatory."

In the determination of this question between these two extremes, the regulatory body should consider what any business man would consider if a like question were presented to him. Some of the factors which would normally and naturally be taken into account are the value of the property, the cost of reproducing it new, the cost of rendering the service, the value of the service to the consumer, the financial history of the property and whether its profits have been large or small. Much of the difficulty that has arisen in connection with these matters has been due to the misapprehension that value when ascertained should exclude from consideration many of these other material factors.

The valuation of any public utility, whether it be made by the utility or by a regulatory body, should be treated as a broad question to be determined justly and fairly, not to be controlled by mere theories and technicalities, except in so far as their use will tend to an equitable and just conclusion.

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*Public Service Gas Company *vs.* Board of Public Utility Commissioners *et al.*, Supreme Court of New Jersey, decided July, 1913.

Rate of Return on Railway Capital*

Factors to Be Considered in Speculating as to Future Rate of Return Needed to Attract Capital—Causes Contributing to Lack of Railway Stability—How to Reduce Future Rate by Automatic Regulation of Revenues and Expenses

By J. D. MORTIMER
President North American Company

J. D. MORTIMER

INVESTIGATIONS in the cost of electric railway service show that after operating expenses, return on capital is one of the principal elements affecting cost. The aggregate return on capital is the annual income available to pay interest on bonds and other evidences of indebtedness and dividends on share capital. The rate of return results from the association of the aggregate annual return and the amount of capital. With a given aggregate return, the rate of return will vary inversely with the amount of capital. The determination of the actual rate of return requires a definition of the method of measuring capital, thus naturally leading to the subject of valuation, which is discussed by other speakers.

Taking things that are as they are, our greatest interest lies in speculation as to the future rate of return necessary to continue to attract capital into the electric railway business. Money for the extension of electric railways comes from those having money to invest. It may come from the sale of bonds or from subscriptions to stock, or both. The sale of such securities brings the electric railway into competition with all other classes of investment in the market for capital. Capital will flow into those investments where the certainty of a given rate of return is greatest. It will shun hazardous investments unless the promised rewards are great in the event of success.

Speculation on the future rate of return necessary to procure electric railway capital results then in an inquiry with respect to the magnitude of actual returns, their stability as evidenced by the past, the tendencies of the future and the hazards of the business. These are all matters of importance in measuring the needed rate of return for new capital. The problem is made more difficult by the fact that the electric railway business has been shown to be one of decreasing returns. The return on the initial capital is in most cases less to-day than it was five or ten years ago, or when it was originally invested. This condition has resulted from a number of causes, the principal among which are the increase in operating expenses and the decreases in gross earnings. The rate of return on new capital must then be so large as not only to provide an adequate return on the new capital but also to offset the decrease in return on older capital arising from the causes mentioned. These facts have tended to limit the investment of new capital in the electric railway business, and it is difficult, if not impossible, to determine the rate of return which investors will demand in the future.

Hence, in discussing the future rate of return for the traction industry, one finds himself forced to consider it from the standpoint of relative hazard and stability when compared with other businesses competing for the free capital of investors. F. W. Doolittle, in his book on "Studies in the Cost of Urban Transportation Service," gives a table showing the returns in a group of thirty-six industrial concerns. The rate of return on capital varies from 3.89 per cent to 112.9 per cent, with an average of 19.3 per cent. There are only nine concerns out of the group for which the annual rate of return is less than 8 per cent. The table shows twenty-three out of the group, or 64 per cent of the total, for which the return was 9 per cent or more. These figures indicate the nature of some of the competition in investments which the electric railway industry must meet.

Of the hazards in the business, or causes contributing to the lack of stability in rate of return, the principal ones may be briefly classified as follows:

1. Variation in gross earnings arising from:
   a—Variation in earnings, resulting from variation in business conditions.
   b—Competition, arising from other forms of transportation.
2. Small rate of growth of revenues.
3. Increase in operating expenses, caused by:
   a—General rise in level of wages and cost of materials.
   b—Higher service standards.
   c—Increase in taxes.
4. Non-productive investments, such as:
   a—Paving within track zone.
   b—Placing wires underground.
   c—Grade crossing separations.
   d—Abandonment of existing lines before the useful life of property has expired.
5. Contingent costs, arising out of improvement in return circuits.
6. Uncertainties of valuation, arising from the lack of agreement in respect to fundamental principles of measuring utility capital, and the uncertainties as to the final disposition of electric railway utilities in the social scheme.

These causes of lack of stability and return are frequently accentuated by attacks or agitation on the part of municipal officials. Sometimes these attacks are developed in order to raise an issue, while often they arise from some fancied defect in service which the agitation is designed to correct. They are never made with the full knowledge of the financial aspects of the business. These attacks in almost every case cause more permanent harm than they do temporary good. They cause the railway business to be regarded by investors as an extremely hazardous venture, and one that is subject to hostile attack. The investor measures the hazard by the frequency and the extent of the fluctuations in the actual rate of return, the danger of confiscation of all or a portion of the investment, and the nature, frequency and extent of hostile attacks by public officials.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

REDUCING THE NEEDED RATE OF RETURN

The rate of return necessary to attract capital into the business under the conditions that exist for most electric railways, may be reduced by contractual guarantees made by the municipalities. These guarantees may eliminate the hazard or reduce it to a very small quantity. Where a municipality provides in a franchise for rates of fare which increase automatically with decreasing gross revenue or increasing expenses and conversely, so as to provide a constant rate of return, and at the same time protects the company against loss upon the termination of the franchise, the return necessary to attract capital may approach the legal rate of interest.

In general a more universal recognition on the part of the public, that electric railways are far from the bonanzas that their promoters believed them to be, is essential to the procuring of substantial justice in the treatment by the public and in the regulation of railways by regulating commissions. Moreover, a frank acknowledgment on the part of electric railway owners and operators, of the hazards of the business and of the conditions necessary to insure its future expansion, is necessary before the industry can expect either to see a revival in the business or to receive that fair treatment which justice and equity demand.

Uncertainty of Utility Valuation*

Hesitation of Investors Toward Public Utility Securities Is Caused by Uncertainty About Valuation Results—Valuations Will Decline in Favor, but as Long as Used Should Be Conducted Fairly and Liberally—Investors Have Faith in Future

By T. S. WILLIAMS

President Brooklyn Rapid Transit Company

T. S. WILLIAMS

ONE factor in ascertaining the measure of return from public utilities is the margin of receipts over expenditures, and the other is the value of the property upon which such return shall be computed. Obviously the operation is a failure from an investment point of view if the net returns, after setting aside adequate reserve funds, are not sufficient to pay a fair rate of interest upon — what? Cost? Yes, if the original and added properties remain substantially unimpaired, and the securities representing cost continue to be held by the original owners. In the case of reorganized properties, however, where by reason of past failures securities representing costs have been scaled down, then the financial test of success is the ability to earn fair interest upon the diminished—not original—cost. And, on the other hand, in the case of properties not reorganized but successful, where, as the prices of the securities representing actual costs have risen and new investors have come into ownership at the enhanced prices representing appreciation in earning capacity and in physical property, the operation is a failure if the return is not sufficient to serve as a reasonable return not upon original cost but upon present value. Please bear in mind that I am speaking now of securities and their prices representing real values—whether original cost or present cost of reproduction—not fictitious values.

Now, the investment point of view should be largely the economic and the public point of view. As long as public utilities are furnished by private capital neither equity nor the self-interest of communities justifies any less favorable attitude. Otherwise such investments will diminish or cease, and the conveniences will be curtailed or withheld, unless furnished by the uncertain resort to general taxation. No injuries from excessive rates have ever been shown which outweigh the injuries from crippled transportation. And crippled transportation is no longer a threatened evil. It is already existent and the results are apparent. It is a stupendous fact, as pointed out recently by the *Railway Age Gazette*, that, in spite of the increase in population and the country's marvelous expansion in practically every line of industry, the mileage of new railroad constructed in the United States in 1915 was less than in any year within the last sixty-six, with the exception of three years during the civil war, and that in Dec. 31, 1915, 38,661 miles of railroad were in the hands of receivers, and more than $1,500,000,000 of railroad bonds issued by such railroads were in default or in jeopardy of default.

PURPOSES OF VALUATION

Valuation of public utilities has three principal purposes—as a basis for issuance of stocks and bonds, as a basis of rate-making or as a basis for acquisition by purchase or condemnation. Logically, the general standards of valuation for any of the three purposes should be the same, although equitable considerations influencing the amount allowed may be stronger in determination for one purpose than for another and, in addition, the elements entering into the aggregate of values will, of course, differ. For instance, in purchase and condemnation the earning capacity and the franchise are property rights which, in the absence of contractual reservations to the contrary, the courts will protect as an element of value, but in authorizations of capital issues the franchise is now generally excluded by law beyond a limited amount, and in valuations for rate-making both earning capacity and franchise are usually disregarded. And, again, in rate-making, values may exist which are not reflected in any capital issues, representing property paid for out of other funds than the proceeds of such issues, or representing appreciated property.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

But it is an uncontrovertible assumption that, as a matter of square-dealing, when stocks and bonds have been issued pursuant to public authority upon actual values, nothing less than the par of such capital issues should be regarded as the amount upon which a proper return should be allowed in rate-making, even though this rule be not applied to valuation for acquisition. And it is, furthermore, a reasonable assumption of justice, even if not so uncontrovertible, that where, as often in the past, bonds and stocks have been issued pursuant to legal requirements, with or without official investigation, in excess of actual values, they should be duly respected in the fixing of rates, even though the authorized rate of return on the securities representing such excessive values may properly be less than in the case of capital issues at actual values. Official recognition of these assumptions of fundamental justice would eliminate much fear among holders, or prospective holders, of such investments.

INVESTORS FEEL UNCERTAIN ABOUT VALUATION RESULTS

The hesitating attitude of investors toward public utility securities evidenced in recent years has been due not merely to the imposition of restrictive and sometimes retaliatory legislation affecting return in the shape of interest or dividend, but to doubt as to the integrity of the investment itself, owing to the uncertainty of valuation as a basis for any of the three purposes mentioned, and to fear that the power of valuation for rate purposes may be used to depreciate the value of property for governmental acquisition. Official valuations of such properties are, like some modern diseases, a comparatively recent development. They have naturally followed the transfer by legislatures to commissions of broad powers of regulation, supervision and rate-making. The commissions, as a rule, are not composed of men of special knowledge, and, skeptical of suggestions from practical and experienced persons and inclined to be demagogic, they have surrounded themselves with inexperienced helpers and advisers schooled in the atmosphere of theory, often hostile to property rights, and always keen for retention of salaries by display of activities which only make unnecessary labor and trouble for their superiors. Out of this situation have naturally come confusion of thought, wide divergences of official action, the infliction of injustice, the sacrifice of savings and the consequent unsettlement of security prices.

VALUATIONS WILL DECLINE IN POPULARITY

Valuation of great enterprises like railroads, lighting properties and telephone companies, involves so many factors, requires such expert service, costs so much money, upsets so much confidence and yields so small a measure of benefit to the public, that it should be employed in rate-making only under exceptional cases of apparent injustice. The universal official resort to it will accomplish more public harm than good. If the power of valuation is exercised unjustly to reduce rates, it will drive capital out of such investments and the chief sufferers will be those to whom facilities or enlargement of facilities are thereby denied. If exercised justly it will in many cases necessitate an increase in rates, to the possible disadvantage of the public. Even any uniform application of what would theoretically be considered a just rule of valuation will in its effect upon competing public carriers often put one or the other out of business, and the possibilities of other chaotic complications are unlimited. A few more years of experience in valuations are likely to diminish their present popularity.

VALUATIONS MUST BE BASED ON FAIR-DEALING AND LIBERALITY

If valuations are to be for a time fashionable, however, it is vitally essential that the principles underlying and governing them should be such as will insure substantial justice to investors and subserve a sound public policy. To-day there is no general concurrence of opinion upon either the theory or the method of valuation. It is not merely a mathematical question or an economic question. Too much is at stake in the direct and indirect results to limit investigation and conclusion to any such narrow bounds. No fixed statistical rule can apply justly to all cases. The widespread discussions which have followed the act of Congress directing a valuation of interstate railroad properties show how divergent intelligent opinion is upon this subject. Even the economists are beginning to see that the problem is not an easy one and cannot be solved by the application of mere theory. And among the operators of and the investors in public utilities there are also differences of opinion. But we can all agree on this at least, that behind all official investigation of values must be the desire for fair-dealing—fair-dealing to the investor, to the operator and to the public—and on this, also, that a liberal attitude in the determination of values is likely to be a very vital influence toward the people's comfort and prosperity.

VALUES SHOULD NOT BE HELD CLOSE TO NON-CONFISCATORY LIMIT

I wish to emphasize in this connection what is sometimes overlooked, that this matter of valuation, whether for rate-making, for capital issues or for acquisition, involves not merely such values as will be upheld by the courts as within the bounds of law. The courts are called upon to pass upon more limited questions than the utility commissions and the legislative bodies. To the courts, upon review of administrative valuations or rates based thereon, are presented as a rule the questions of contractual rights or confiscation of property. May the Lord have mercy on our people if administrative or legislative bodies confine their conclusions to merely what will pass this legal test! From those public servants we expect not merely what is legal, but what is reasonable encouragement to a necessary industry and to the broadest welfare of the public. If the rate of return on public utilities is limited to 5 or 6 per cent upon even a fair valuation, then investments in such enterprises will have to be guaranteed by government or money for them will not be forthcoming, in view of all the attendant risks of such business. On the other hand, a generous return, commensurate with that from private industries, will be productive of general good in stimulating the supply and the character of public utility service.

APPEAL OF UTILITY SECURITIES TO INVESTORS

Probably the greater part of the savings of the public is invested to-day, directly or indirectly, in the securities of public utility corporations. This would, perhaps, not be true if the government's attitude toward such corporations had always been such as it has been during recent years. From force of habit, or from hope of a changed attitude, this tendency to investment is still great though diminished. Yet this anomalous situation prevails—that a man may put his money into any private business of manufacture, merchandise, mines or finance, and rest assured that there is no limitation upon possible profits except those which are imposed by the natural laws of trade, economic and industrial conditions, or poor management. But if he puts his money into public utility stock he does it to-day without any assurance whatever, except that inspired by the hope of good faith, that no matter how much the corporation earns he can be allowed to receive only such a rate of return as the courts may declare is not confiscatory, on a valuation of property which the courts may approve. And if he takes the more conservative course and puts his money into a public utility bond bearing a fixed rate of interest, he has no substantial assurance that the government will let him receive the interest or get his money back at maturity of the bond. Why does he do it? My supposition is that he does it because, in the first place, with due allowance for all the failures of public utility enterprises, their shares have in the past offered a fair speculative opportunity and their bonds a reasonably safe investment; in the second place, unlike most private (even though corporate) concerns, the public utility corporations furnish complete reports of their operations; and in the third place, and most important, the average investor has not yet lost faith in the attitude of the government toward public utilities, and believes that it will treat them and him justly and fairly.

This faith, then, is our chief reliance—the great safeguard of the savings of millions of our people, the hope of our industry, and the promise of that extension and development of transportation facilities of which our country is sorely in need. Is it a misplaced faith? I think not. But to justify it the people must be informed, investors must be aroused and public servants must do their duty with intelligence, fairness and fearlessness. And we as operators, as responsible directors of such wide-reaching undertakings, as guardians of these savings, have the primary duty of winning public confidence by strict adherence to high standards of business ethics, and by such capable management as is possible with the facilities which conditions permit us to supply. With such public confidence behind us we need not fear the political crippling or destruction of our properties.

Return on Massachusetts Investment

The Writer Shows How Under the Massachusetts System of Regulation Investment has Increased but Rate of Return has Decreased—Rate Must Not Be so Low as to Be Confiscatory but Must Be High Enough to Attract Capital

By D. J. McGRATH

Research Division Electrical Engineering Department, Massachusetts Institute of Technology

SOME time ago a member of one of the best-known corporations promoting and managing public utility enterprises placed the following proposition before the research division of the electrical engineering department of the Massachusetts Institute of Technology. He said: "There seems to be something the matter with the street railway industry in many parts of this country. A number of companies are apparently unable to pay their way under present conditions, while others seem to be quite prosperous. Nearly all, both the bankrupt and the prosperous, have the standard 5-cent rate of fare for carrying passengers, yet in only a few cases does the total revenue received seem to be reasonably proportionate to the necessary and proper expenses. The general public has many criticisms to offer concerning our rates and our service, but it has little or no conception of the relative magnitude of the expenses which make up the total service cost. As you can approach this problem free from the preconceived ideas and possible bias which we who are so closely connected with it may have, will you not study the question in a scientific and analytical manner, and present your findings and conclusions to the public and the railways alike?"

D. J. MCGRATH

This research has been undertaken, much statistical material has been accumulated and a fund of general information has been obtained. Many companies in the eastern and middle western parts of the country have been visited and inspected. Their officials have been interviewed. The reports of many public service commissions and local regulatory bodies have been studied, and members of the staff of these commissions and other bodies have been consulted. At present, we are slowly digesting and filling out all this material, and hope in the not too distant future to be able to make public some useful data and fairly definite conclusions on the street railway fare question.

Very early in our work we began to appreciate the fact that one of the most important factors in our problem was perhaps the most difficult one upon which to secure any really definite information. I refer to that factor which you will recognize under the various titles of the cost of, the investment in or "fair" value of the property required for providing transportation service. Correlated with this factor is the less elusive but still perplexing problem of the "fair" or "reasonable" return on that cost, investment or value.

We could not indiscriminately accept the gross capitalization of any and every street railway as a fair criterion of the real cost of the property required to give the service. Whatever may be the reasons, good, bad or indifferent, justifying past issues of stock

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

bonuses, stock dividends, promoters' profits and the like in individual cases, it would evidently be most improper to standardize them in a study of this kind. Neither were we equipped or sufficiently endowed with funds to go out and make engineering valuations of the electric railways.

MASSACHUSETTS LINES CHOSEN FOR INVESTIGATION BECAUSE OF STRICT REGULATION

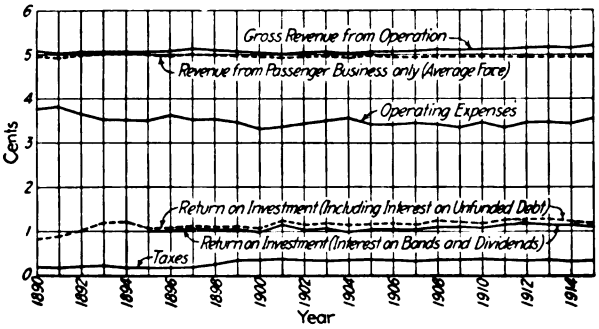
In this dilemma we naturally turned our attention to the street railways in the State of Massachusetts, where for many years the accounting and the financing of companies have been under strict public regulation, and where, because of certain fundamental laws, we can to-day safely accept capitalization, investment and property cost as meaning very nearly one and the same correct amount in the street railway field. The laws of Massachusetts have been very strict as regards the issuance of securities for anything other than *bona fide* extensions, additions or betterments, and have been ably and justly administered by the Railroad Commission and its successor, the Public Service Commission. Of course, there is always the possibility that in spite of legal obstacles and commission supervision, some minor irregularities may in some cases have crept in, but if they have, they are certainly small and relatively unimportant in the general problem.

Under these circumstances, then, it is illuminating to review the history of some of the Massachusetts lines, and to see what capital has earned as its reward for spinning a closely interwoven web of steel rails across the State and for furnishing transportation to nearly every city, town and hamlet. The annual reports of the commission, containing statements of the receipts, expenses, assets, liabilities and traffic statistics of each railway, are well adapted to such a study. We have traced back the history of the finances, operations and growth of several systems and also of the industry as a whole in Massachusetts, through a perid of twenty-five years, to 1890.

GENERAL DECLINE IN DIVIDENDS PLAINLY MARKED

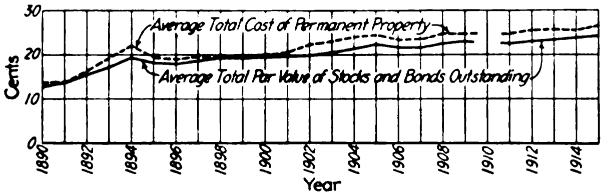
At that time the street railways were in the process of electrifying their lines. The total track mileage, the equipment, the traffic and the total investment were insignificant when compared with the magnificent size of this industry to-day. In the year 1890, despite the heavy costs of electrification, the average dividend on all outstanding street railway stocks in Massachusetts was 7.10 per cent, computed on the mean average par value of stocks at the beginning and end of the fiscal year. Since then there have been variations, up and down, but the general decline in this form of return on actual investment is plainly marked. As shown by the accompanying graph in Fig. 3, the lowest level was reached in 1905, when the average dividend was only 4.57 per cent.

It was about that time that the street railway operators in Massachusetts were confronted with the necessity of making heavy expenditures for renewals and reconstruction of depreciated property. Such expenditures cannot be legitimately charged to new capital, but must come out of earnings. This matter of providing funds for renewals is one of the big problems of the Massachusetts companies to-day. If it be asserted by anyone that the dividend rates of the early '90's were unwarranted, and that the companies should have reserved this money for future depreciation, it must be remembered that the gross amounts of money then involved were relatively small when compared with more recent years. Moreover, it was only this apparent prospect of profitable investment that led the early in-



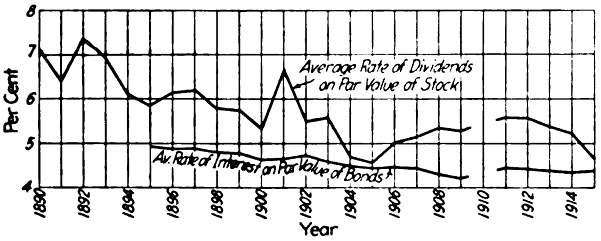
RATE OF RETURN—FIG. 1—AVERAGE RECEIPTS AND EXPENSES PER REVENUE PASSENGER

In this and the following diagrams, the years indicated end on Sept. 30.



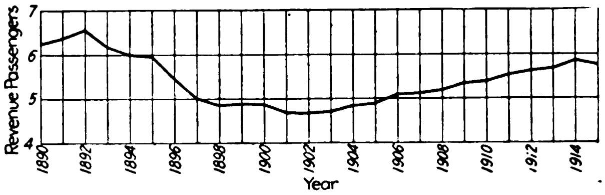
RATE OF RETURN—FIG. 2.—AVERAGE TOTAL INVESTMENT PER REVENUE PASSENGER

Total amount taken is the average between the beginning and end of the fiscal year, divided by the number of revenue passengers carried in that year.

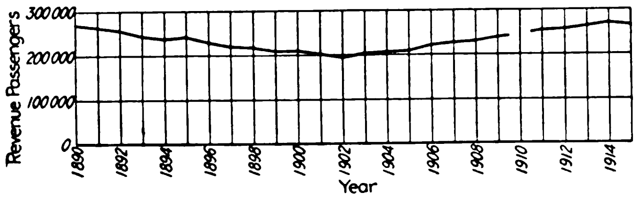


RATE OF RETURN—FIG. 3—AVERAGE RATE OF RETURN ON INVESTMENT

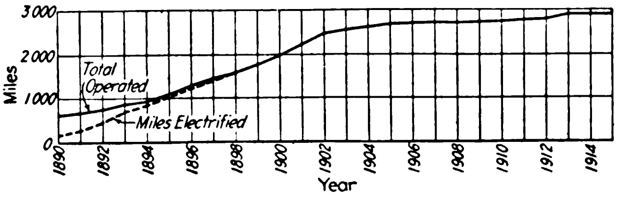
If the total cash premiums that were paid in on stock are considered, the actual return in the form of dividends is even less than shown in the upper curve. In 1914 it would be about 4.8 per cent, and in 1915 about 4.3. If the premiums and discounts on bonds are considered, the actual return as interest on bonds is somewhat greater than shown in the second curve. In 1914 it would be about 4½ per cent, and in 1915, about the same.



RATE OF RETURN—FIG. 4—AVERAGE NUMBER OF REVENUE PASSENGERS PER CAR-MILE



RATE OF RETURN—FIG. 5—AVERAGE NUMBER OF REVENUE PASSENGERS PER MILE OF TRACK OPERATED PER ANNUM



RATE OF RETURN—FIG. 6—TOTAL MILES OF SINGLE MAIN TRACK vestors to risk their money in a more or less experimental form of transportation.

Since 1901 the average dividend in Massachusetts has never been so high as 6 per cent. It would seem that the extremely low payments from 1903 to 1908 far more than balanced any possibly excessive dividends in the early '90's. Since the very moderate average of 5.6 per cent in 1912, there has been another period of decline until in the last fiscal year, ended June 30, 1915, the average dropped to 4.67 per cent. The reduction of dividend rates on the largest two systems in the State, the Boston Elevated Railway and the Bay State Street Railway, account for this last large decline.

As a matter of fact, these averages are really even lower than they appear to be here, if they are computed on the actual total cash invested, for in many cases investors believing in the ultimate stability and prosperity of the street railways have paid considerable premiums for their stocks, especially on the larger roads. These premiums have been put directly into the street railway property. On the basis of the premiums listed in the 1915 report of the Public Service Commission, the average return on investment in stocks was only about 4.3 per cent.

As a partial offset to these low rates of return, consideration must be given to the tax system in Massachusetts whereby residents of that State owning stocks of street railways incorporated in that State are not taxed on such stocks. The street railway corporation itself is charged a corporate franchise tax which accomplishes the same purpose. Another asset of some value to the stockholders in prosperous companies is their ability to sell their "right" at a slight margin of profit, when new shares are offered to them under commission authority at prices slightly below the prevailing market value. The sale of new stock, however, cannot be made at less than par value.

RECORD OF BOND INTEREST

What of the bonds of Massachusetts companies? Unfortunately, the early reports of the Massachusetts Railroad Commission do not show the interest paid on bonds as distinct from the interest and discount on various forms of floating debt. By 1895, the reports had been made sufficiently detailed to make these distinctions clear. In that year the average interest on the mean outstanding funded debt was about 4.97 per cent. In 1915 it was 4.39 per cent. This decline in the average rate of bond interest is different from the dividend decline in that it is due to the inherent stability of the bonds, and the reasonable assurance of continuous interest payments, having priority over the dividends on stocks. The decline in rate of dividends is due only to the lack of sufficient income to pay higher rates, after other expenses are taken care of.

While investors in the stocks of Massachusetts street railway corporations do not have to pay taxes on them, the bonds are not so exempted, and if ownership in such bonds is honestly declared, the owner has to pay over to the tax assessors from $1 to $2 or more out of every $4 or $5 that he receives as interest on his $100 bond. Savings banks do not pay direct taxes on such bonds when they own them, but they pay a State tax of one-half of 1 per cent on total deposits.

INCREASING INTEREST AND DECREASING RATE OF RETURN

Up to this point we have been discussing only average conditions applying to the street railway industry as a unit in Massachusetts. Of course, these averages are made up of many different individual cases, with extremes in both directions. There are some prosperous and some very impoverished companies in this State. We have made studies of the reports of a number of individual companies, carrying our investigations back as far as 1890. A method of analysis which we have termed the "life curve" method has been developed. By these life curves we endeavored to show graphically the history of certain factors, such as revenue, various expenses, investment, return on investment, traffic, etc. Many of these items have been computed and plotted on the basis of the revenue-passenger unit. At first it seemed as though a general condition of increasing investment and decreasing rate of return existed for all street railways, but of course there soon were found to be some exceptions.

In a number of individual cases, however, especially among the larger and more important companies, the average cash investment per revenue passenger carried per annum has increased materially since 1890 without any proportionate increase in the fraction of each passenger's nickel available for return on investment. In some cases the investment has doubled and even tripled, from about 10 or 15 cents to 20 and 30 cents per revenue passenger carried, while the receipts per revenue passenger, i. e., the 5-cent fare, and the net earnings available for return on investment per revenue passenger have remained practically constant. On the great majority of Massachusetts railways to-day from 1 to 1.5 cents out of each passenger's 5 or 6-cent fare goes to paying interest, dividends and rentals of leased lines. These figures based upon the revenue-passenger unit are not clever ways of juggling statistics to prove anything that it is desired to prove. They are merely arbitrary transformations of the gross total figures, which anyone can easily verify by reference to the annual reports of the Massachusetts commission, and they are so changed into smaller units because they are easier to comprehend and are more significant in this form to the average man.

The causes of the increasing investment in particular companies, and of the average condition in Massachusetts, are too numerous and too complex to be thoroughly discussed in this paper. Some of this increase came early and suddenly in the cost of electrifying. Some is due to the building of extensions in unprofitable territory and to increasing the length of haul for the 5-cent fare, where the density of traffic was not and has not yet become sufficient to make these extensions profitable, but where operation once started must somehow be continued for the well-being of the population.

The accompanying charts, in which the figures are based on the totals and averages for all Massachusetts street railways considered as a unit, show very clearly the growth of investment and the decline in the rate of return. Other factors, such as the rapid growth of track mileage up to 1902 and its subsequent cessation, are also indicated. Conditions as they exist to-day in Massachusetts show that some companies are earning a good return, while others are paying no return whatsoever on cash actually and honestly invested in capital stock. One or two are even in receivers' hands, as they cannot pay the bare interest on outstanding bonds, which cannot be more than one-half the total securities. As to the average condition of the whole industry in the fiscal year ended June 30, 1915, the total par value of stock and bonds received an average return of only 4.55 per cent, while stocks alone received an average dividend of 4.67 per cent, and bonds alone an average interest rate of 4.39 per cent.

WHAT A FAIR RATE OF RETURN MEANS

What constitutes a fair rate of return? We find the widest range of opinion on this subject, from the radical who would deny any return whatsoever on capital investment, to the just as impractical conservative who would argue that having established his monopoly he should be allowed to earn unlimited profits from his special privilege. Ignoring these extremists, we all agree that a fair rate of return as a minimum must not be confiscatory or less than current interest rates in enterprises of somewhat similar characteristics. On the other hand, as a maximum, it is quite plain that it must be limited to an amount not exceeding that which will be sufficient freely to attract new capital when it is needed for additions and improvements. It is in this respect a purely competitive matter. Of course, those who have capital invested in railway securities would like, if possible, to receive higher and higher returns. That is only a natural desire, but if monopoly demands excessive returns on its investment, the public will find capital at more reasonable rates.

In recent rate cases in Massachusetts the Public Service Commission has seemed to hold that 6 per cent on the capital stock may be considered at least reasonable and fair under Massachusetts conditions, but it does not undertake to guarantee that poorly managed roads or those unwisely and imprudently located shall earn this much. Neither does it undertake to limit well-managed, prosperous companies to this rate as a maximum. In 1915, eight out of fifty-three companies paid dividends aggregating more than 6 per cent on the par value of the common stock, all of which was sold for cash at par or more than par when originally issued. Four of these were leased companies on which guaranteed dividends were paid as rentals by the lessee companies. The other and less cheerful side of the story is that six paid 6 per cent and thirty-nine out of the fifty-three companies paid dividends of less than 6 per cent. Of these, twenty paid no dividends whatsoever.

The laws of Massachusetts do not permit a street railway to issue shares of stock at less than par. Yet unless there is almost positive assurance of continuous and uninterrupted dividends, anything less than 6 per cent is sure to push the market value of stock below par, even under conditions otherwise so favorable as in Massachusetts. Under another law, a street railway may not increase its funded debt above the limit of its capital stock outstanding. These two statutory limitations have resulted in the highly commendable condition that the outstanding securities of Massachusetts street railways actually represent the investment in and cost of the property, and that the securities are well balanced as between stocks and bonds. At the same time, it is easy to see the difficulty in which a company finds itself when, under unprofitable rates of fare or some extraordinary expense burden, it fails to pay reasonable dividends and its stock falls below par. It is then practically impossible to get new capital for additions and improvements. Who will invest $100 per share in new stock while the older shares are worth less than that in the open market? That is the situation in which the Boston Elevated Railway finds itself at the present time.

WHAT SHOULD BE DONE TO ATTRACT NEW CAPITAL?

Shall we say that because some of the street railways are now unprofitable it was unwise to build them in the first place and therefore let them go to the wall, their present owners standing the loss? Shall the large consolidated companies which are now in financial difficulties abandon service on the thinly settled rural and suburban lines which are a constant source of loss and which could not be made to pay at any rate of fare? Or shall fares and fare systems be revised in Massachusetts? Shall we increase the unit fare from 5 to 6 cents or more, where lines are now unable to earn a fair return? Sometimes such horizontal increases in fares fail of their purpose because of the loss of short-riding traffic at higher rates. Or shall we shorten existing 5-cent fare zones, or even revert to a uniform mileage rate of fare? Shall we charge one rate in territory where the traffic is dense and the cost of service per passenger is low, and a different and higher rate in thinly-settled territory where the cost of service per passenger is high? Or is it reasonable and fair to charge a somewhat excessive fare to the people in prosperous sections in order that service may be maintained in poorer sections which are not self-supporting?

Take the case of the Bay State Street Railway, which is now before the Massachusetts Public Service Commission with a petition for increased fares on practically all of its many lines, covering the whole eastern end of Massachusetts. Quite naturally there is strenuous opposition on the part of the public. Nearly every community affected has authorized representatives to appear before the commission and present arguments against the increase in their particular districts. The people of the thinly-settled districts argue that the fares are already as high as they can stand, that the traffic is still altogether too light and that any increases in fare will make it still lighter and be generally ruinous to service. On the other hand, the people of the thickly-settled mill cities, and similar districts of dense traffic, assert that in their territory the company is making at least a fair return on its property, and that they should not be obliged to support unprofitable lines which were consolidated with theirs in the earlier history of the company. The Bay State Street Railway, as a unit, is apparently in need of some increase in revenue if it is properly to maintain its property and pay a 6 per cent return on its common stock. The stockholders of the railway are, naturally enough, indisposed to make a gift of their investment to the railway patrons and are anxious to receive at least a 6 per cent return.

WHAT THE RESEARCH DIVISION IS TRYING TO DO

It would be presumptuous of us to offer, in advance of the commission's decision, any solution of this particular case. Indeed we are not yet ready to present any definite conclusions or solutions of the street railway fare problem. We are not endeavoring to prove that street railways should charge and receive higher fares. There are many lines which are successful at present rates. But it is clear that some companies are distinctly unsuccessful at present rates, and by unsuccessful it is meant that they are unable to pay even a fair interest rate on cash actually and honestly invested in the business. It is also clear that on many successful, as well as unsuccessful railways, the 5-cent fare is a legacy of the horse car days and short-line period, that it bears little or no relation to the actual fair cost of service, and that it is unreasonably low for the service and length of ride which some passengers receive and unreasonably high for others.

It is toward the possibility of offering some logical and helpful suggestions on these matters that we are now working, and for this purpose that we are gathering statistics and general information. This paper has been limited to a single topic and that topic limited to conditions in the single State of Massachusetts. Our investigations, however, have covered, and will continue to cover, a much wider field. The American Electric Railway Association numbers among its members representatives of all branches of the street railway industry, public commissions and public utility experts. If any member has in his possession any data or any suggestions which might possibly serve to throw additional light on this problem, we most earnestly solicit his correspondence.

Competition with Other Investments

Capital Cannot Be Obtained to Develop the Electric Railways Unless a Reasonable Return Is Not Only Promised but by the Experience of the Industry Is Made Dependable—The Interest of the Public Is Greater Than That of the Investor

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ELECTRIC railways, from the standpoint of the public, are merely public utilities—properties built and operated by the capital of private investors, dedicated to serve the people in the vital business of local transportation, charged with the duty of giving adequate service to the community in the territory served and of making such extensions as the demands of the public require and such improvements as progress in the applied arts permits and under obligation also to give such service at reasonable rates.

But from the standpoint of the investors who supply the capital required electric railways are business enterprises, offering opportunity for the employment of capital in a permanent business, with expectation of reasonably steady income and reasonable profit; they have become great financial institutions, requiring large capital. They can be operated successfully only by the keen appreciation of their managers of the fact that the foundation of the business is the capital invested and that the business must be conducted, while with due regard to its obligations as a public utility, always as a financial institution into which no capital will flow except upon an expectation of profit.

Profit cannot be expected, and of course no new money can be obtained for the properties, unless the financial records demonstrate the safety of the capital already risked in the enterprise and earnings permitting the payment of a reasonable return upon it, also the security of the additional capital required, and the promise of earnings on both the old capital and the new capital sufficient to justify a reasonable certainty of the payment of a fair return on both.

The endeavors of the managers of the property in respect to its securities are therefore twofold; first, to protect the integrity of the investment already made and endeavor to earn and pay reasonable returns to the present investors; second, to show such security for further investment and such certainty and amount of future returns as will attract the additional capital required for extensions and improvements, through the sale of additional securities.

Legislation, regulation and management may affect the value of outstanding securities and may facilitate or obstruct the sale of additional securities. Stocks and bonds already outstanding are evidences of property, and property itself is protected by the constitutional prohibition against taking without due process of law.

The legislation creating commissions for the regulation of public utilities has charged the commissions with the duty of permitting only just and reasonable rates for service rendered, and generally the orders of the public utility commissions have involved either reduction of charges or improvements and extensions of service. A reduction in charges results, of course, in less income per unit of service and affects the earnings distributable to securities, while improvements and extensions of service also usually involve expenditures of capital to secure which new securities must be sold. The standard fare for street railways being 5 cents, often fixed by ordinance or contract, the regulation of electric railways has more often affected service than earnings.

Upward of $5,000,000,000 are invested in electric railways in the United States, and the magnitude of this financial interest of the people of the country is the measure of the obligation of public service commissions to see that the charges for the service are not only just and reasonable to the passengers but also for the investor.

The electric railways of the country serve every city and every town, every large industrial district, every seaport, extensive suburbs and countrysides, resorts and amusement centers; the interurban lines connect cities with cities and provide the only transportation for great areas; they are the cheapest means of transportation; vast millions of our population depend on them daily between home and business and in the many activities of commercial life. An occasional failure of service because of fire or storm or flood brings instant inconvenience or loss or suffering to many thousands. Electric railways are a great national industry —a great national convenience—a great national necessity—a great national asset. That government function which interests itself in the economic welfare of the people can have few obligations greater than the preservation and protection of electric railway service for the present needs of the country and the promotion and encouragement of its improvement and expansion, in quality and extent, to keep pace with its increasing use and meet the future demands of a country growing rapidly in population and tending as rapidly to undue concentration.

The trolleys, urban and interurban, permit concentration of workers in business and industrial centers, simultaneously with diffusion of residence in suburban and country districts, and are both the instruments and the cause of this tendency, of such great import to our social and industrial health and activities.

These active and interacting tendencies toward concentration and diffusion of population have put demands on electric railways not contemplated by the original investors or dreamed of by the most farsighted economist or financier. Lines originally running a few miles, operating on light rails, carrying passengers in small cars drawn by horses the length of the line for 5 cents, have expanded through the adoption of electricity and responded both to the facilities available and to the increased demand, so that now big, handsome, well-lighted and heated cars with adequate equipment serve as easily and as quickly square miles of territory as their forerunners served city blocks. We may well point with pride to the expansion of street car service as one of the great accomplishments of this age.

No economist would hesitate to declare that the encouragement of this great industry to the full performance of the task it has set itself, and the promotion

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

of its expansion and improvement adequately to meet the more exacting and dependent demands of its millions of industrial patrons is one of the big tasks of this day and to-morrow, calling for the most intelligent co-operation of science, efficiency and finance, and of individual effort with governmental support.

THE PROBLEM TO BE SOLVED

The problem is not that of so financing and operating a finished work as to conserve the interests of the investors while serving a static and satisfied demand. It is rather the constant and repeated rebuilding and expansion of a vast, economic, arterial system by the application of the latest achievements of science to the ever heavier and wider distribution of the energies of the very life and body of the community served—a system which grows, producing a redoubled new demand for every new facility afforded and which needs not only coal and steel and brains, but vast wealth to adjust its functions to its requirements, and the moneys constantly required must come ultimately from the pockets of the people.

Capital, the aggregate of funds free for investment, is sought by our own Government, offering the credit of this nation as security; by other great governments, which are offering now as high as 7 per cent; by states and cities, by railroads and banks, by the steel and other metal industries, by manufactories, and multifarious opportunities are offered with varying security and rate of return, and varying attractions real and sentimental. The capital required for electric railways must be sought in competition with all the securities appealing to investors for funds, and there is little hope that it will be available unless the usual requirements of investors are met. These requirements are that capital already invested in electric railways be amply protected and made safe and regularly pay a reasonable return, and that new capital be amply secured and made safe and a reasonable return on it not only promised but by the experience of the industry made dependable.

What constitutes a reasonable return is succinctly stated in the admirable "Report of the Railroad Securities Commission" to President Taft, Nov. 1, 1911:

"We hear much about a reasonable return on capital. A reasonable return is one which under honest accounting and responsible management will attract the amount of investors' money needed for the development of our railroad facilities. More than this is an unnecessary public burden. Less than this means a check to railroad construction and to the development of traffic. Where the investment is secure, a reasonable return is a rate which approximates the rate of interest which prevails in other lines of industry. Where the future is uncertain the investor demands, and is justified in demanding, a chance of added profit to compensate for his risk. We cannot secure the immense amount of capital needed unless we make profits and risks commensurate. If rates are to be reduced whenever dividends exceed current rates of interest, investors will seek other fields where the hazard is less or the opportunity greater. In no event can we expect railroads to be developed merely to pay their owners such a return as they could have obtained by the purchase of investment securities which do not involve the hazards of construction or the risks of operation."

Not only the protection of the present huge investment but the future of the industry depend on the ability of the electric railways to offer securities of such safety and promise as will attract the needed new money, in competition with all other securities offered in the money markets of the country, and those charged with the management and regulation of the industry may well inquire what course must be taken to secure this result. This responsibility rests quite as much on those regulating electric railways as on those who manage them.

The conditions inherent in the electric railway business give peculiar power to the people, acting through their representatives, the legislators, utility commissions and city councils. Not only is the business a natural monopoly, competition bringing increased cost and decreased efficiency and service to the public, but both the location of the investment and the area of the market for the service rendered are definitely and immovably fixed. In this latter respect the industry differs from almost all others. The site of a factory can be moved, if unbearable conditions of whatever origin are imposed, without a necessarily total loss of the going business of merchandising, which in turn is conducted over areas without fixed limits, reaching markets where demand exists; and if one market is shut off, whether by tariffs or transportation costs or fashion's changes, another can usually be found or created by progressive management; and the goods dealt in may be changed, and in fact in all industries are constantly changing, to meet varying market conditions.

Not so a street railway. The plant is so rooted to the soil that it cannot be moved without total loss; its market is the territory served and no other can be reached; its output is transportation in that territory and cannot be varied. So is the industry peculiarly defenseless against oppression, whether through declared attempts at confiscation or throttling under the guise of regulation.

The dedication to the public service and the immobility of investment, plant and market, making attack easy and defense difficult, throw upon the public the concurrent obligation that the investment shall be protected in its entirety, and neither shall the rates be made too low nor service requirements too onerous to permit a reasonable return on capital invested and the new capital required for extensions and improvements.

But beyond the responsibility to the investor, the public served has a greater interest—a selfish interest —much more concrete and material, if no less real and compelling, than the duty to be honest. The public has a greater interest in the electric railway than all the investors, because in every community the electric railway is a necessity and every day a greater necessity to the due course, order and progress of the community life.

It goes without proof that the loss to the public, in all but the most exceptional cases, would be much greater, were the electric railway totally destroyed, than the loss to the investor. In such a case, beyond the immense inconvenience, the lack of the speedy, safe and cheap transportation of passengers would instantly destroy values in real estate, buildings, leaseholds, going businesses, stocks of goods and means of employment, immeasurably greater than the value of the investment in the railway itself.

It may not be so instantly apparent, but reflection will bring conviction, that impairment of the ability of the railway properly to serve the public, while injurious to the owners, must react more severely on the public and the community. The investor feels it instantly in loss of income. The public does not see or hear the loss of efficiency, the loss of time, the decrease in population, the loss in value of real estate, the stoppage of progress and the stunted growth; but is it not necessarily true, that if rapid transit brings growth, progress and enhanced opportunity and values, the lack of it will obstruct or prevent them?

The public served, then, and the investors have an active interest in the prosperity of local transportation lines. The growing community, offering opportunity for successful and profitable business in all the activities of modern industry; factories, shops and new construction for the labors of the people; labor, market and profits for the employer; absence of undue congestion of population; homes in the suburbs for men of small incomes and remoter and less crowded residences for the well-to-do—these usual conditions of the modern American city have followed the development of electric transportation and are impossible without it. Find a dull, backward and inactive town, and you will find an unprofitable street car system, unable to give modern service through the inability to secure and recompense the needed new capital. The community served and its transportation facilities are part of one whole, and the success, growth and prosperity of one is dependent upon like prosperity of the other. The security and safe and adequate return to the investor in electric railway securities react to give better transportation facilities to the community, and if oppressive regulation reduces the earnings so as to imperil the principal or the returns of the capital invested, the public will suffer for the lack of the facilities efficient transportation would give. There is no conflicting or divergent interest; the investor and the public prosper or suffer together. Each has a common interest in promoting the prosperity of the other.

THE NEED OF A NEW PUBLICITY

Now the interest of the investor is concentrated in the management, which knows these things, while the interest of the public is diffused, and to each man is secondary to his own private affairs. So, upon the management of the electric railways rests the responsibility of making these aspects of their business clear to the public and those of the public servants who are responsible for the regulation of their common interest. It is no easy task, and while it is recognized and much discussed by every live management, too much emphasis cannot be laid upon the necessity of a new publicity—an insistence that the public learn and know the common interests of the traction lines and the community.

The service demanded by the public requires every right and so-called privilege given to the transportation company, and these are used primarily in the service of the public and are essential to public service, while they are merely elective and incidental to the investor. Capital is the freest and most fluid of commodities. It may go where it pleases, and it does go where security and return are best assured, while local rapid transit is an insistent necessity in every community. None of the incidents to transportation is necessary to capital. The corporate machinery for the concentration of investment funds, the stockholder's immunity from personal liability and his right to vote and to act through directors and officers, the franchise, the right-of-way, the use of the streets and the power of eminent domain are the essential instruments of transportation, without which it cannot be had. They are not the only recourse of capital, which can seek employment in a thousand other attractive and profitable enterprises. They are the "special privileges" the demagogue so delights to shout of. They are, in fact, the essential facilities afforded by the public to provide itself with its necessity. Let them be taken back by the public—and while an enormous amount of capital will be destroyed and the investor will suffer tremendous loss, the public will suffer more.

Capital is proverbially timid. It refuses to venture again where it has been ill treated, deprived of a fair return or suffered loss. Once diverted by losses from the enterprises to which it is accustomed to flow, and persuaded that repeated losses will follow its investment in a field become dangerous though previously profitable, capital would require long years of good records to induce it to return. It is far more important to the American public that its local rapid transit facilities grow and expand and bring in new population and multiply the wealth of the urban and interurban districts, than that American dollars be given a chance to earn a precarious return by investment in this particular business.

Deprived of expanding rapid transit, the American city will ingrow and strangle itself in unclean congestion. Deprived of safe and profitable investment in rapid transit securities, the American dollar will earn a surer and a larger return in unregulated industries.

These truths the public must be shown, and by the managers of electric railways. The public is selfish and uninformed, it may fatuously believe that it is benefiting itself by requiring extensions and improvements of service without also providing for a fair return. If the public is instructed in its own interest, it cannot long be blind to the profit of two dollars in convenience and efficiency and value to itself for every dollar fairly earned for electric railway stocks and bonds—nor to its loss, if loss follows investments in public service.

Securities of electric railways will not be salable if constantly increasing mileage, involving new investment, is demanded for the same 5-cent fare; if an even greater share of the income must be be expended to meet requirements for costly improvements in service without increased return; if higher costs of material and labor must be met out of shrinking earnings; if modern and expensive pavements, not used or injured by the cars, must be paid for out of earnings, while interest and dividends are left unpaid.

Unless the public is prepared to assume the financial burdens and political evils of state or municipal ownership of these modern necessities, all unreasonable demands on the capital invested or required in electric utilities, and on their static or decreasing income, must be removed. The public must be made to recognize its own vital interest in the industry and do its part by restraining unfair demands under the guise of regulation and by protecting investment and providing rates which will insure a fair return; and when these reasonable requirements of capital are met, electric railway securities will successfully compete with any in the world's markets.

The burdens on the managers in these essential utilities are great, and to them is added their obligation to the investors and the public to disclose frankly the real problems of local transportation in the precarious financial conditions of their properties. The recent reports tend to show a decrease in gross income per dollar of investment, an increase in operating expenses due to increased cost of materials and labor, the normal extensions and improvements in service and the demands of regulating bodies, a large increase in taxes, large increases in non-remunerative investments such as street paving, a constantly diminishing return on the capital invested, a shrinkage in the surplus applicable to depreciation and available for contingencies and periods of dull business. A further danger confronts the business in the tendency still further to limit the income through appraisements and valuations not recognizing the true value of the properties or the vital interest of communities served in their prosperity, and by fixing a "rate of return" not adequate to meet the demands of modern service or permit the earnings sufficient to justify investors in providing money needed for extensions and betterments and improved service, and for maturing obligations at the lower rates the inherent soundness and permanence and legitimate earnings of the service should assure.

Attacks, whether ignorant or malevolent, must be met by frank and courageous disclosure of all the financial difficulties and dangers besetting the business, as well as convincing presentation of the results to the public of strangulation of electric traction, and the common-sense and self-interest of the people must respond to these honest endeavors by assuring a fair policy of honest treatment and a just and reasonable reward.

Increasing Capacity of Urban Systems*

Author Discusses New Construction Procedure to Be Followed When Capacity of Old Surface Lines Reaches Saturation Point—In Case of Subway Construction Community Should Finance Improvement and Share Fixed Charges Until Ultimate Capacity Is Reached

By M. C. BRUSH
Vice-President Boston Elevated Railway

M. C. BRUSH

According to a careful analysis of the increase in population in various cities as compared to the increase in street railway patronage, the latter increase is at a slightly higher rate per year than the square of the increase in population of the territory served. (Passenger Transportation Report of special committee, City of Manchester Tramway Department, Feb. 2, 1914.) As a result of the marked increase in patronage in such cities as New York, Philadelphia and Boston, a condition has been reached on various highways where it was deemed impossible or at least uneconomical further to increase the number of street cars per hour. There is some difference of opinion as to the exact point of saturation for surface car service. To analyze in detail this condition requires an assumption as to minimum headway between surface cars. Various estimates show that an interval of nine seconds between moving units on the street is consistent with safety. Assuming this fact and adding to it the estimated period of rest of seven seconds for a car, to permit of passengers boarding and leaving, would result in cars passing a certain point at the rate of one every sixteen seconds. Under these conditions a maximum speed of 12 m.p.h. and an average speed of 8 m.p.h. can be maintained where the usual number of stops are made. This figure is probably correct for practical operation.

In the report of the Merchants' Association of New York by its committee on transportation and engineering, 1903, it is stated that "with a time interval of sixteen seconds the number of cars that may be moved past a given point per hour is 225." The committee did not believe that on congested streets like Broadway, New York, a service of more than 220 cars per hour passing a point in any one direction could be reasonably expected under the most favorable circumstances likely to occur, but felt that this number per hour was a reasonable estimate of what should be done. The committee further stated that it was confirmed in this belief by its own observations of what was being done at this time in Boston, and by the many observations on Broadway at Chambers and at Houston Streets.

Experience in Boston partially confirms the opinion of the committee, for previous to the opening of the Washington Street tunnel it was believed that a point of saturation had been reached when there were operated between two points on Washington Street a maximum of 213 cars per hour in each direction. Previous to the opening of the Boylston Street subway in Boston as high a number as 260 cars per hour were operated in one direction over a very short section of a certain line on a special occasion, but it was possible to handle this number of cars only by operating part of the service in the Tremont Street subway and around the Park Street station loop.

The Public Service Commission for the First District of New York on April 17, 1908, ordered "a minimum number of twenty-five cars in one direction in each fifteen-minute period on certain sections of Broadway." This would be at the rate of one car every thirty-six seconds, and it is believed by some that this is the lowest headway consistent with reasonably rapid movement of cars when all conditions are considered, such as vehicular interference, line intersections, joint usage of certain stretches of track, etc. However, this thirty-six second headway is exceeded on some lines in New York on certain short stretches of track where they operate from two to three times as many cars as are required for a thirty-six second headway.

SATURATED CAPACITY AND NEW LINES

There should, of course, be kept clearly in mind, in the study of maximum capacity of surface lines, the difference between the maximum number of cars that it is possible to operate and the speed consistent with good service. In view of the preceding citations, however, it is fair to assume that when street car service for short stretches of track has reached a number slightly in excess of 200 cars per hour the capacity on this stretch of track might be said to have reached a saturation point, after which additional arteries must be utilized or other transportation facilities provided. Of course this figure is also governed by the width and alignment of streets, as well as by the size of the units and general traffic conditions.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

When tracks on a certain street have reached the saturation point, whatever that may be, and additional transportation facilities must be provided, every conceivable effort should be made to use parallel streets for additional surface tracks or even build an elevated structure. It is absolute economic waste recklessly to spend enormous sums of money for subway construction merely because a particular highway has operating upon it all the surface cars consistent with either good transportation or economy, and subway construction should only be decided upon after other and less expensive means of furnishing additional transportation have been sufficiently studied to prove their inexpediency. The enormous amount of traffic absolutely necessary to support expensive subway construction makes it incumbent upon those responsible for such expenditures to satisfy themselves thoroughly that the traffic offered and the conditions prevailing compel subway construction rather than the use of other arteries on the highway or even private right-of-way construction on the surface.

HOW INVESTMENT AND FIXED CHARGES ARE AFFECTED

From the commencement of operation of surface-car service over a specific stretch of track, up to the time when such track is completely saturated with cars, the interest charges for the investment on this particular stretch of roadbed per passenger decreases as passengers and riding increase. Hence, up to the point of saturation or up to the point when the total capacity of the road is used, the greater the number of passengers the less the expense for fixed charges per passenger.

On several properties in the United States there have been constructed high-speed underground thoroughfares either as a result of surface tracks having reached a point of saturation or because of the demand of the public for more expeditious transportation. Immediately after such construction the fixed charges per passenger have jumped entirely out of proportion to what they were at the moment of surface track saturation. Ordinarily, owing to the nature of construction of the subway, where it is necessary to build the same cross-section for a one-car train on fifteen-minute headway as is required for a two-car train on a minute and a half headway, the fixed charges per passenger carried are entirely out of proportion to the ultimate capacity of the subway.

A marked example of the enormous investment necessary for construction of a subway is that of the Washington Street tunnel in Boston, built in 1908. The surface car tracks over the highway under which the Washington Street tunnel was constructed for a distance of approximately 1 mile represent an investment of approximately $253,000, while the tunnel cost approximately $9,500,000. As far as we are able to learn, this is the most expensive mile of roadbed and track in the world, not excepting the Jungfrau tunnel in Switzerland.

In other words, the transportation companies building or leasing subways have been compelled to meet the enormous fixed charges and pay the same rent or interest, whether the demands of traffic require the operation of a few cars per hour or the use of the maximum capacity of the subway.

PUBLIC SHOULD HELP BEAR FIXED CHARGES

In certain instances there has been no substantial increase in rate of patronage where rapid transit service has become necessary. That is, the rate of increase of passengers carried per annum is not materially changed upon the inauguration of rapid transit service. In general it is granted that the cost of operation per passenger capacity with trains in a subway is materially less than for electric car service on the highway, but unless the load factor is such as to give an opportunity for using a reasonable capacity of the subway throughout a large percentage of the twenty-four hours, the fixed charges per passenger considerably more than offset the reduction in operating expense per car passenger capacity.

The original basis of establishment of rate of fare was entirely without regard to enormous subway investments with a right-of-way furnished by the community. If as a result of entirely changed conditions, such as the outgrowing of the highway capacity or the pressure of the community, it becomes necessary to construct expensive underground thoroughfares, then either the rate of fare must be changed to meet these changed conditions or the community as a whole must bear, at least in a measure, according to the indirect benefits accruing, a certain portion of the fixed charges until such time, if ever, as the ultimate capacity of the tunnel is reached and the load factor more nearly approaches 100 per cent.

The effect upon capital of companies which are endeavoring to furnish adequate transportation facilities and which have to pay interest or rentals on enormous investments entirely out of proportion to revenue received, can be readily seen, and the consistency of the arguments as well as their equity compel recognition to the extent that where investments of this character become necessary, the community as a whole must be compelled to participate in their support. This has been well evidenced by the case of New York, where in the construction of the latest subways the city contributes in part toward the investment and fixed charges until such time as the net earnings resulting from the operation of the subway permit payment, after proper charges of every character, including operation, depreciation, etc.

The construction of subways, which are nothing more or less than public highways, differs from other similar public improvements such as surface highways, sewers, water systems, park systems, etc., in that instead of being constructed from time to time in the degree to which the capacity is to be used, it is necessary because of the physical nature of tunnels to build them substantially as large and at as great an expense in the first instance as is required to provide for not only the immediate requirements but for the requirements of several years in the future. It is entirely fair and proper that the community should have improved rapid transit facilities and thoroughfares just as rapidly as they are willing equitably to digest them. It is thoroughly unfair, however, that a street railway should be called upon to pay the entire interest on such an investment when the demands of the traffic and the amount of business available requires at the moment only a small proportion of the total available capacity.

In view of the marked increase in land values and general benefit to the community as a whole resulting from subway construction, it would seem equitably sound that those property owners who so materially benefit should contribute in some proportion toward the fixed charges for such improvement. If the unit of fare were increased, the tenants of the buildings in the territory involved would pay, as a result of the subway, not only increased fare but also increased rent, while the property owner would receive all of the benefits without participating in the expense.

GENERAL PROGRAM TO BE FOLLOWED

When the conditions on a certain highway have reached such a point that additional transportation facilities are necessary, there should first be an effort made to utilize parallel highways with surface tracks at a reasonable and proper investment consistent with the traffic offered. If this for proper reasons is dismissed, effort should then be made to construct surface tracks on private land or elevated tracks on either private land or the highway. If for good and proper reasons these other means are dismissed, there is but one choice left and that is the construction of subways.

In other words, every conceivable effort should be made to provide additional transportation facilities at as low an investment as is consistent with the demands and the traffic offered, and the construction of subways should be entered into only after the most careful, thorough and conservative study and consideration of other means of furnishing transportation and with a full knowledge of the seriousness of burdening the community with tremendous investment and correspondingly large fixed charges. If it is finally concluded, with a perfectly clear perception of what the financial results will be, that subway construction is necessary, it would seem fair that in the first place the municipality, metropolitan district or state should finance the improvements, as undoubtedly money can be raised at a lower rate of interest than where such financing is done by private owners. Moreover, the community as a whole should participate with the company and the riding public in the payment of interest charges. More specifically, upon the completion of subways or tunnels built by the community they should be leased to the transportation company serving that community on a sliding scale charging rental according to the relation between the capacity used and the total capacity. By such an absolutely fair and equitable arrangement the movement for subway construction would automatically regulate itself in a manner fair and equitable to all interests.

The Elements of Utility Valuation*

The Author Lays Stress on the Importance of Intangibles and the Use of the Entire Income for Service—Reproduction Cost New When Used as a Basis for Rate-Making Should Not Include Deduction for Depreciation—Other Interesting Points

By GEORGE WESTON

Engineer Board of Supervising Engineers, Chicago Toaction

GEORGE WESTON

THE address upon "Valuation" presented to the association by Mr. Guernsey is a very carefully prepared and valuable contribution to valuation literature. It deals with this very interesting and important subject from the standpoint of a lawyer. Any representative of the public should approach the subject of valuation in the same spirit. Fair play should be the fundamental principle actuating those participating in the work, and I infer that the author includes the public's interest as well as that of the utility corporation when using the terms "justly" and "fairly." The author speaks as though he had wrestled with the problem in an attempt to determine all the factors applicable and in an endeavor to get the other fellow to agree with his analysis in determining the fair and reasonable valuation of a public utility property.

He admits that no formula may be applied to a public utility which will establish its value. I fully agree with the principle that the facts must be accepted to obtain just regulation. Publicity should be the general policy of public utilities. The quickest and surest way for them and the public to come to an amicable understanding is for both to meet the issues frankly and willingly and "lay all cards upon the table face up."

From the viewpoint of a worker on the side of the public, I agree also with the author when he says that the interests of the public and the utilities are similar or not antagonistic. The purpose or object of any utility is to serve the public by supplying its demands with the kind of service or commodities such utility is equipped to furnish. The utility is primarily interested in the investment necessary to enable it to furnish the service and in the protection of that investment, and that it be permitted to earn a fair return upon such investment. The public is interested in securing adequate service commensurate with the price it pays for the service. Investment, return and service epitomize the problem.

The public also is or should be interested in securing such reasonable regulation and rates as would insure proper protection to the investing public and at the same time provide adequate service and a fair return upon the investment. The subject of regulation cannot be approached from any angle without coming to the conclusion that fair play is necessary to establish such principles of procedure as may be applicable to all properties. No formula or fixed general rule can be adopted applicable to all properties.

One cannot read the decisions of the Supreme Court regarding the valuation of public utility property without concluding it is a much involved and complicated subject. Those who are entrusted with the work of determining value assume a very important responsibility because they are dealing with other people's property with no exact rule to follow although there are definite rules applicable to the determination of the cost new of physical property. There are other factors enumerated by the court and admitted by all students of the problem, the consideration of which principally calls for the application of good judgment. This, of course, must be based upon experience and a knowledge of the organization, financing, construction and operation of properties similar to the one under consideration. Moreover an appraiser, representing the public, should be so fair and just in his deliberations that, in case of doubt, he should render his decision in favor of the party who would be most seriously damaged by an error in judgment.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

ORIGINAL COST

With respect to original cost, I do not concur fully with the author's expressed views that where a long period of time has elapsed, original cost can have but very little, if any, appreciable weight in determining the question of value. In many instances of construction temporary work has to be done, sometimes, involving large expenditures of money to care for other utilities or to underpin buildings or to perform innumerable other necessary work. Such costs are legitimately a part of the necessary investment but very likely would be entirely omitted from a present value reproduction cost based solely upon an inspection and inventory in the field. Any original cost figures showing detail would very likely include these extraordinary expenditures. It is in this sense, I believe, that the courts have wisely ruled that all these different factors should be considered.

NET REVENUE

Net revenue has a material effect upon value, particularly sale value. It is quite impossible to conceive of a person purchasing a property that by a fair analysis of its gross earning and expenditure did not show a fair return upon the contemplated investment. With respect to interdependence between earnings and rates, however, the established principle of a fair return upon a fair value should preclude the reduction of value for rate making by reason of the fact that the net earnings were low or nil.

While we are on the subject of net revenue return it might be well to discuss to some extent the economic side of the problem. We have investment and a return upon the side of the utilities and service upon the side of the public. The utility is expected to furnish the investment necessary to enable it to give reasonable service, and it expects, and everyone must admit, that it is entitled to a fair return upon such investment. The public regulation of rates is for the purpose of so adjusting the rates that provision can be made for reasonable and necessary operating expenses, including repairs, renewals, taxes, any franchise obligations and, in addition, a fair return upon the investment. With most utilities subject to regulation, it should only be necessary to prove what such an operating rate should be.

With urban street railways the question of rate is fixed by ordinance and, in most cases, includes free transfers. Such ordinances generally cover service and other obligations, and contain forfeiture clauses. In this connection it is needless for me to recite that increased wages, increased cost of supplies, improved equipment, higher service standards, extensions and other improvements in the service, all necessary and desirable, have tended to increase the operating ratio. In fact, it has been necessary for many companies to apply extreme efficiency measures in every department to offset increased service demands and pay interest obligations, but despite these, annual deficits are the rule in many cases.

Many students of the utility problem believe the gross receipts should be applied only to the cost of furnishing service. This cost should include the up-keep of the property, the provision of such reserve funds as may be desirable, the welfare of the employees, and a fair return upon the investment, rather than divert some of it to impair service and a fair return in the form of contributions from the receipts to the cost of street paving, street cleaning and other municipal expense or by paying compensation to the municipality. Let us either have municipal ownership or not have it. The people want service, the best they can get for the rate paid. They should not be required to contribute toward municipal expense or toward a purchase price in the interest of municipal ownership, at least not until they have received adequate service.

I think that economists have gone to the extreme in many of these matters. Utility companies must be permitted to earn a fair return upon their investment or it will be impossible to influence capital to invest in extensions and improvements necessary to enable the companies properly to take care of service demands. The distribution of the nickel should be confined to furnishing service, the up-keep of the property, a fair return upon the investment and the welfare of the employees. If any portion of the nickel is diverted or utilized for other purposes, the three graces, investment, service and return, must suffer, and the public will pay the bill.

FRANCHISES AND GOING VALUE

Franchises should be considered, their obligations and concessions, if any, being taken into account. Many different theories have been advanced with respect to the consideration that they should receive in determining value. Some claim that when franchises are valued without direct or implied compensation other than the performance of service, the utilities should not be permitted to capitalize them because they would be creating a value for which they made no real money investment. Others estimate that franchise value is equal to the respective net profits of the utility operating under it. Again, it is claimed that franchise value is a part of going value, and Mr. Guernsey says that it is worth at least what it would cost to obtain other like franchises.

It is quite evident in case of sale from a willing seller to a willing buyer that the character and length of the unexpired term of the franchise would be factors in determining the purchase price. It would seem that, in the cost to reproduce new, it would be quite as proper to include in value the estimated net earnings, or a portion of them, for a reasonable period covering preliminary and construction work, as to include any other carrying charge. Or it would also seem proper, in the case of condemnation, to allow a period equal to the time it would require to litigate and obtain possession through the courts.

Care must be taken, however, not to include such items more than once through an inclusion of franchise value in going value, or in percentages applied to cover contingencies or omissions, etc.

Going value is probably one of the most elusive elements with which we have to deal in the valuation estimate, but it is one of the factors that must be considered. It is generally confused with or considered a part of other factors in the problem. I do not consider it an important or controlling item.

DEPRECIATION

In determining present value of any utility, cost to reproduce new must first be found and then an estimate made of the remaining wearing life in each piece of depreciable property in per cent, or the converse must be done, in order to determine the present value. This procedure is necessary in order to be able to determine properly further charges to renewals and to serve as a guide in establishing adequate renewal reserve. The reproduction value figure thus furnishes both amounts: reproduction value undiminished by depreciation and less depreciation. Therefore it is not a fundamental factor in valuation work, which basis is the proper one to adopt in determining value for rate making or for capitalization. Cost new to reproduce, plus all reasonable factors covering probable past investments, should approximate the capitalization, it being understood that the total value figure includes bond discount, cost new undiminished by depreciation, etc., and should be the "real equivalent" of the utilities investment.

The protection of the legitimate investment is a fundamental economic principle, and the investor is entitled to the privilege of maintenance of its integrity, and he should also be permitted to earn a fair return upon every dollar of it until it is returned to him. Thus it would seem that cost new undiminished by depreciation should be the figure used to determine value for rate making. Certain analysts of the problem say that depreciation is a reduction of capital value and that any correctly managed property carries a renewal or depreciation fund, consequently the investor has returned to him the value of this depreciated capital, and its equivalent amount should be deducted from capital in rate making. I do not agree with that theory. Depreciation is a lessening of property value but not a reduction in capital value. That is a feature of what is sometimes called "going concern." For instance, a track may be depreciated three-fourths of its wearing value, but it is able to carry as many car wheels, car-miles or wheel-tons as when new. It has not reached its failure point in its depreciation, but the laws of safety and economy provide that the track shall be renewed before it fails. During all stages of its depreciation while in service the track contributes as much toward producing the gross earnings as when new.

Depreciation is an operating expense and should be taken care of out of earnings, and replacements should not be capitalized except for betterments, but the original investment, including the value of all extensions and betterments undiminished by depreciation, should be considered as value to be supported by a fair return and should be the value considered in rate-making.

DATE OF VALUATION

The date of the valuation, as well as the date that will govern unit prices, are matters to be determined in each case after the purpose of the valuation and the surroundings governing attendant facts are considered. Ordinarily valuations are considered as of the present, as if the work of creating a real property was to start coincident with the valuation. However, in some instances, time may have elapsed since some event occurred that caused the valuation, making it advisable to date back the valuation, and when frequent and substantial fluctuations in unit prices occur in the period preceding the date of valuation, average prices are sometimes adopted, particularly for copper and like important and high-priced fluctuating items covering a reasonable period of time. Set rules governing these matters cannot be followed other than the general golden rule—that prices should be fair and just.

What Constitutes Utility Value?*

Many Illustrations Are Given by the Author to Show the Practical Problems Involved in Determining the Value of a Utility-Agreement on Fundamental Definitions Is Advocated —Special Attention Is Given to the Subject of Depreciation

By PHILIP J. KEALY
Member Board of Control Kansas City (Mo.) Railways

MR. GUERNSEY'S paper is a splendid exposition of a most important topic and is what might be expected from one who has had the experience of Mr. Guernsey in valuation work.

One method of determining value upon which the author dwells at length is the cost of reproduction. This theory, if consistently applied without the trained, seasoned judgment to which he refers several times, will sometimes lead to erroneous if not ludicrous results. This is, indeed, the situation regardless of what premise or theory is adopted in determinging the fair value of a property furnishing public service.

P. J. KEALY

Many modifications of this cost-of-reproduction theory are necessary in determining unit prices. It is sometimes thought that present-day prices should prevail. Again, the fair value is sometimes determined by using average prices. There may be used, as was done in the Chicago telephone appraisal, average trend prices or, as in several large appraisals lately completed, the unit prices may be ascertained by obtaining a weighted average covering the prices and amounts of material during the time while the major portion of the work was being installed. Similarly, in making an inventory, many perplexing questions arise which require a departure from the cost-of-reproduction theory, if a logical conclusion is to be drawn.

Recently, during one of the conferences between the steam roads and the valuation committee of the Interstate Commerce Commission, the question arose as to whether in valuing grading, the same topographic conditions should be assumed to prevail at the time of making the appraisal as at the time of the original construction of the road. A case in point was where a gravel pit, since exhausted, was on the right-of-way of the Union Pacific Railway, whereas now a haul of several hundred miles would be necessary to obtain gravel. Therefore, even the cost-of-production theory has many variations, and numerous modifications must be made to arrive at an answer that is at all tenable.

On the "investment" theory, i.e., the cash and securities actually invested in the plant, the method of determining the cost of the property is assumed by some to be a method of determining the value of the present physical property, and by others the actual investment that has been made during the life of the property.

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*Abstract of an address delivered at the mid-year meeting of the American Electric Railway Association on Feb. 4.

Again, many objections have been made to the "accrued-deficit" theory, and many well versed in valuation work assume that it will never hold in law because its conclusion is that the more prosperous the company has been, the less is its value as a going concern.

As to the element of going value, particularly that part of going value that is intended to cover the cost of attaching business, it has been frequently argued that this should not be considered an element of value for rate-making purposes for the reason that this cost has generally been paid for out of earnings.

This objection is not proper, no more so than had half of the legitimate capital charges been paid for out of earnings. The real question is whether, after these two items had been charged to the expense of operation instead of being capitalized (as properly they should have been), the net income has represented a fair return on the money invested. This immediately leads to the determination of the basis of fair return on the accrued deficit, or, as it is sometimes termed, the "antigo basis," a method frequently used by the Wisconsin commission in determining the amount to be allowed for going value.

As modifications must be made, not only in the methods of determining the inventory proper and the unit prices applicable, so likewise in determining the depreciation which has accrued in the physical property, several methods must be used if a proper result is to be obtained. Mr. Guernsey has criticised the plan of ascertaining the amount of depreciation by age, life or mortality tables, claiming that an actual inspection is a more proper way. That may be true in many instances, but his suggested method is in many others entirely impracticable.

A recent appraisal with which I was connected entailed the determining of the present value of 30,000 wood poles. There was no practicable method by which the present condition of these poles could be determined by actual inspection. The life of a pole depends largely, if not entirely, on butt rot, and without digging up the poles this condition could never have been ascertained. However, by investigating the accounting records of the company and determining the average number of pole renewals over a period of some ten years, and considering the known additions, it was a comparatively simple matter to determine what the average life of a pole was. This was done by means of age or life tables entirely, and it could not have been done by inspection. On the other hand, inspection is probably the only way in which the conditions of a rail or of a pavement can be ascertained.

Recently a street railway valuation was made which was subsequently adopted in a franchise grant, ratified by a vote of the people and approved by a state commission, wherein all of these methods were employed and wherein all of them led practically to the same result. I refer to the appraisal and report made on the value of the Kansas City street railway system by Bion J. Arnold in 1912. This, in its way, is probably the most comprehensive valuation report which has yet been made on an American utility. The report has been frequently discussed in the technical press.

Mr. Guernsey has well brought out the different viewpoints as to what constitutes value. It is simply appalling to attempt to read the mass of material which has been written on this subject within the last two years, the impetus probably being the tremendous amounts involved in the valuation of steam roads now being made and the importance of that work. Mr. Guernsey's paper is unique in one respect, however, for it is the first paper on valuation or any kindred topic that I have read in some little time which has not introduced a "pet phrase" to describe something which we have all been accustomed to discuss under some other name.

Those who attended the conference held last November in Philadelphia under the auspices of the Public Utilities Bureau, or who have had the opportunity to read the proceedings of that bureau, must have been struck with the confusion in practically every article in the use of terms. The same term was used to express different ideas or different terms used to express the same idea. This hopeless confusion is rapidly getting into the court records. This is but natural for, as C. A. Prouty of the Interstate Commerce Commission has well pointed out, the subject is really an economical one, this determination of value. Yet we have the usual spectacle of accountants, engineers, consultants, financiers and lawyers arguing before juries, attempting to arrive at the solution of what we all agree to be an economic problem. Each uses his own pet phrases to convince the other fellow and the result is that the court becomes hopelessly confused, as a perusal of the judicial decisions to date will well prove. Thus we find a court in Idaho setting out at great length the reason for a decision which is absolutely contrary to the decision of a New York court set forth with even more lengthy reasons.

No valuation paper or discussion thereof is complete without a reference to the Supreme Court decision in the Knoxville case. To this date there have been articles written, whose aggregate length would be several hundred times the length of that court decision, attempting to prove or disprove what that court meant when it used the words, "depreciation which has come from age and use." We find one state commission using this decision as a precedent for an adverse decision, whereas the plaintiff in the proceeding was using the same case in his brief as a reason why the decision should be in his favor. Now, why does all of this confusion exist and how can it be corrected? It never can be cleared up until the various engineers, societies and consultants and, if you will, the American Bar Association, meet together in a national conference and agree on a definition of the terms usually employed in this work, leaving the theories to those who will employ them.

At the recent meeting of the valuation committee of this association held in New York on Jan. 25, it was suggested that the executive committee should take this matter up with the valuation department of the Interstate Commerce Commission and that a conference should be held and participated in by all organizations at interest to agree, if possible, upon a code of definition of terms generally used in valuation work. When this has been done I am satisfied that practically three-fourth of the differences now existing among engineers, lawyers, accountants and the courts, on the subject of valuation, will be eliminated. Until such definitions are arrived at there will be no possibility of clearing up the confusion which now exists. I sincerely hope that, as a result of this discussion, the executive committee of the American Electric Railway Association will take the initiative in this matter. Even if it fails in accomplishing all that is desired, a step in the right direction that will be approved by all who have any direct or indirect connection with valuation work will have been taken.

Proceedings of the Mid-Year Meeting

Chicago Meeting Highly Successful—Banquet a Brilliant Affair—Plan for Effecting Closer Relations with Manufacturers' Association Adopted—Several Important Executive Committee Meetings Held in Connection with Convention—Appointment of National Defense Committee Authorized

THE mid-year meeting of the American Electric Railway Association was held in the Florentine Room of the Congress Hotel on Feb. 3, and the morning session was opened at 10.45 a. m. with President Henry in the chair. An opening address was to be presented by Mayor Thompson, but he was unable to attend, and President Henry asked James H. McGraw, chairman committee on resolutions, to present resolutions on the death of Calvin G. Goodrich of Minneapolis. Mr. McGraw read the following resolutions, and they were unanimously adopted by the association.

"Calvin G. Goodrich, president of the Twin City Rapid Transit Company, died on Dec. 21, 1915. In his death the American Electric Railway Association loses one of its great men, a pioneer of the industry under whose leadership a magnificent electric railway system has been built up in and about Minneapolis and St. Paul. His influence has been felt not alone in the business which he developed but in the affairs of this association and in those public relations with his own community which he so well served. Mr. Goodrich brought to his task those qualities of broadmindedness and an innate sense of justice combined with a charming personality, a generous heart and a sympathetic nature which endeared him to all with whom he came in contact. Beloved by every member of his staff, he had their fullest co-operation in the furtherance of his policies and ideals. He had, as well, a host of friends both in and out of the industry who will cherish their friendship with him as one of the most precious of their remembrances. In spite of the many demands upon him as the active head of a large railway system, Mr. Goodrich was always willing to give as much of his time and energy as was necessary to further the interests of this association, whose welfare was close to his heart.

"He was a member of the executive committee of this association during the critical time of its reorganization and then, as well as later as second vice-president, first vice-president and president, his wise counsel, loyal support and active leadership were of the greatest assistance in solving the difficult problems which confronted the association at that time. It is in appreciation of this man of the electric railway industry and of his work that this association hereby resolves that this record of his contribution to his business to the association and the public welfare be spread upon the minutes of this association and that a copy be sent to his family.

JAMES H. MCGRAW, chairman,
JOHN J. STANLEY,
GEORGE H. HARRIES."

President Henry then said that presentation of the report of the committee on recommendations and the address of the president would be postponed until later and asked Mr. Guernsey to present his paper on valuation, which appears in abstract on another page. In the presentation of this paper Mr. Guernsey did not follow the text closely but explained and discussed points made in the paper and mentioned examples to describe the various elements which would be considered by a purchaser of any piece of property. He pointed out that regulatory commissions are not courts but legislative bodies and that they can properly apply to this question the same broad principles which would be applied by business men in studying a business question. Such men would take into account all of the factors of value that he had mentioned. The report of Mr. Guernsey's paper that is published elsewhere is an abstract of the paper as prepared in advance of the meeting and distributed to the press.

At the conclusion of Mr. Guernsey's address George Weston, engineer Board of Supervising Engineers Chicago Traction, presented a discussion upon it.

At the conclusion of Mr. Weston's paper Mr. Kealy presented his paper. The association then adjourned for lunch.

At 2:15 o'clock the association was again called to order. President Henry introduced Harry B. Miller, city prosecutor of Chicago, representing Mayor Thompson. Mr. Miller presented an address of welcome on behalf of the municipality. He spoke in highest terms of the fairness of the management of the Chicago elevated and surface lines. As an instance, he said that the city health commissioner had recently informed him that the surface railways were preparing to spend $200,000 for improved ventilation on their cars alone. That spirit was appreciated by the people of Chicago. He felt sure that whatever work the association did would redound to the benefit of the public.

The discussion on the rate of return was then opened with Mr. Mortimer's paper, read in his absence by F. W. Doolittle, formerly director of the bureau of fare research of the American Association. This was followed by a paper by D. J. McGrath of the Massachusetts Institute of Technology, who, in the absence of Professor Jackson, described the work of the department of fare research of that institution. These papers appear in abstract elsewhere in this issue.

L. S. Storrs, vice-president of the Connecticut Company, then read "Competition with Other Investments," by Orlando B. Willcox, also abstracted elsewhere.

Arthur W. Brady next introduced his amendment of the proposed amendment to Sec. 3, Art. 3, of the constitution and Act. 14 of the by-laws, whereby manufacturers would have equal privileges with the electric railway members. Mr. Brady's amendment broadened the term manufacturers to include engineers, publishers, etc., and also amended the dues so that companies with gross receipts from railway business under $50,000 would pay $25; companies between $50,000 and $1,000,000 in receipts, $125; companies of $1,000,000 to $6,000,000 in receipts, $325; companies of $6,000,000 to $10,000,000 in receipts, $525; companies with more than $10,000,000 in receipts, $750.

Mr. Brady said that the problems of the industry were of different character than in past years. Questions like valuation and rate of return left no line of cleavage between the manufacturer and the railway. Although the two associations had worked together as closely as two independent bodies could, it was better to have them work as one. The plan meant no interference with the Manufacturers' Association, but simply that all manufacturers who so desired could become members of the American Association upon the basis of equality with the railway members.

W. F. Ham, vice-president of the Washington Railway & Electric Company, approved the plan, but from what a number of the manufacturers had said to him he judged it would be wise not to hasten matters unduly.

Gen. George H. Harries said there was some misapprehension in the proposal of the association. It was an invitation to manufacturers to become members individually and had no reference to the Manufacturers' Association as an organization. The proposal had been favored from its earliest stages by Messrs. Lovejoy, Tripp and other representatives of large manufacturers. It was a question for the American Association to decide whether the great forces of the manufacturing end should be allied with the railways in the larger problems that now engaged their attention. In the past the association had failed to utilize fully the brains of the manufacturers.

Miles B. Lambert of the Westinghouse Electric & Manufacturing Company favored further consideration of the subject, and asked whether the present privileges of the Manufacturers' Association would be affected by the proposed plan.

President Henry, in reply, said the amendment had been more misunderstood and more misstated than the quarrel in the Garden of Eden. The real question was whether or not all the great industries, represented in the Manufacturers' Association, now 371 in number, should be invited to go share and share alike with the railways. For years the work of the Manufacturers' Association had been confined to the convention exhibit and entertainment. The amendment simply proposed to make law what the association had done as a matter of expediency for the last three years in placing representatives of three great manufacturing industries on the public relations committee.

If the manufacturers thought it wise to maintain the present Manufacturers' Association, there was nothing to prevent it, but to try to keep the present proposal from going through was like trying to prevent the sun from moving. There was a time when the manufacturers themselves had asked to come in, but their application had been rejected. The manufacturers had even been refused admission to the meetings.

Mr. Ham, who resumed the floor, said that the manufacturers did not object so much to the nature of the plan, but to the way in which it had been presented to them. In reply, Mr. Brady reiterated that there was no intention of subordinating the Manufacturers' Association.

James H. Drew of the Drew Electric & Manufacturing Company, Indianapolis, Ind., said that he would prefer personally to have the original dues proposed, for under the Brady amendment he would have to pay $100 a year because he was above $50,000 but below $500,000. He would be glad to accept the honor of American Association membership without relinquishing membership in the Manufacturers' Association, but it would be a burden to belong to both.

B. A. Hageman, New York, said the invitation of the American Association was a compliment to the manufacturers, but it was not clear in his mind what the status of the Railway Manufacturers' Association would be. That association had done great and admirable work for many years. If the Manufacturers' Association was to be allowed to keep up this work he would be fully satisfied to co-operate, but he would not care to see its independent position sacrificed.

In reply General Harries repeated that the amendment simply covered an invitation to individuals from the American Association and had nothing to do with the Manufacturers' Association. On motion the amendment with the changes proposed by Mr. Brady was adopted unanimously. On motion also the remaining papers on rate of return were not read, but were ordered printed. The meeting was then adjourned.

Executive Committee Meetings

AMERICAN ASSOCIATION

The meeting of the executive committee of the American Electric Railway Association was held at the Congress Hotel, Chicago, on Feb. 3. Those present were: Charles L. Henry, president; L. S. Storrs, first vice-president; John J. Stanley, third vice-president; T. P. Kilfoyle, president Accountants Association; John Lindall, president Engineering Association; R. E. McDougall, first vice-president and acting president Claims Association; Arthur W. Brady and George H. Harries, past presidents; J. R. Lovejoy, member of special committee on recommendations in president's address; H. C. Donecker, former secretary, and E. B. Burritt, secretary and treasurer.

The subjects discussed at the morning session included the proposed consolidation of the Manufacturers' Association, company membership and means of getting new members. The secretary reported the organization of two new sections and that work was progressing on the organization of other new sections. The design of a company section emblem to be sold for $1 or less was approved. On motion of General Harries the committee approved the appointment of a special committee to co-operate with the War Department in regard to matters of national defense and the part which electric railways might play therein. General Harries will recommend the personnel of the committee. A committee on resolutions, consisting of James H. McGraw, George H. Harries and John J. Stanley, was appointed.

The final report of the director of the bureau of fare research was received and a committee consisting of James D. Mortimer, H. C. Donecker and E. B. Burritt was appointed to determine the price at which the book compiled by the bureau of fare research should be sold.

The executive committee approved the application of five new member companies as well as 395 applications for individual membership. The president was authorized to appoint a committee to select the place of meeting for the 1916 convention. This committee will consist of five members and will be announced later.

The various affiliated associations presented progress reports of their various committees, and similar reports were submitted of the work of the committees of the American Association.

ACCOUNTANTS' ASSOCIATION

A meeting of the executive committee of the American Electric Railway Accountants' Association was held at the Congress Hotel, Chicago, on Feb. 3. Those in attendance were T. P. Kilfoye, Cleveland, president; L. T. Hixson, Indianapolis, Ind.; G. G. Whitney, Washington, D. C.; M. R. Boylan, Newark, N. J.; H. B. Cavanaugh, Cleveland; F. R. Sillick, New York, and F. E. Webster, Haverhill, Mass. The resignation of H. A. Culloden, Los Angeles, Cal., as second vice-president, was received, and J. A. May, auditor Connecticut Company, New Haven, was appointed in his place.

The president then submitted the following list of committees of the association for the coming year:

Standard classification: H. L. Wilson, Boston, Mass., chairman; W. F. Ham, Washington, D. C.; W. H. Forse, Jr., Anderson, Ind.; R. N. Wallis, Fitchburg, Mass.; P. S. Young, Newark, N. J.

Education: George G. Whitney, Washington, D. C., chairman; F. J. Pryor, Philadelphia, Pa.; F. B. Lasher, New York; N. E. Stubbs, Baltimore, Md.; G. H. Caskey, Hampton, Va.

Representatives to convention of railroad commissioners: W. F. Ham, Washington, D. C.; C. S. Mitchell, Pittsburgh, Pa.; I. Fullerton, Detroit, Mich.

Accounting definitions: E. D. Gault, Reading, Pa., chairman; James Adkin, St. Louis, Mo.; George A. Harris, Gloversville, N. Y.; S. C. Stivers, New York; J. Gerry Dobbins, New York.

Passenger, express and freight accounting: Walter Shroyer, Anderson, Ind., chairman; E. L. Kasemeier, Springfield, Ohio; H. H. Reed, Boston, Mass.; R. J. Clark, Kansas City, Mo.; T. B. MacRae, Chicago, Ill.

Claims-accounting, as representing the Accountants' Association: H. J. Davies, Cleveland, Ohio, chairman; George B. Cade, Asbury Park, N. J.; H. S. Swift, Pittsburgh, Pa.

Engineering-accounting, as representing the Accountants' Association: F. H. Sillick, New York, chairman; C. E. Murray, Toledo, Ohio; Charles H. Lahr, Akron, Ohio; J. C. Collins, Rochester, N. Y.; H. A. Gidney, Boston, Mass.

Life of railway physical property, as representing the Accountants' Association: R. N. Wallis, Fitchburg, Mass., chairman; A. R. Patterson, Boston, Mass.; J. N. Smith, Toronto, Ont.

Transportation-accounting, as representing the Accountants' Association: A. E. Dedrick, Youngstown, Ohio, chairman; George W. Kalweit, Milwaukee, Wis.; W. O. Ingle, Rochester, N. Y.

These appointments were approved by the executive committee. The committee also took up the question of subjects.

CLAIMS ASSOCIATION

A meeting of the executive committee of the Claims Association was held at the Congress Hotel on the afternoon of Feb. 3. The chief purpose of the meeting was the selection of an acting president to serve in the place made vacant by the resignation of George Carson of Seattle, who was elected at the San Francisco convention but who has since severed his connection with the Puget Sound Traction, Light & Power Company. The executive committee, which has power to elect an acting president, did so by the choice of R. E. MacDougall, claim agent New York State Railways, Rochester Lines, the first vice-president of the association.

The executive committee also appointed H. D. Briggs, assistant claim agent Public Service Railway, Newark, N. J., to take the place on the executive committee made vacant by the resignation of P. C. Nickel, formerly claim agent New York Railways. The other most important action of the executive committee was the receipt of the report of the subjects committee, of which H. G. Winsor, of Tacoma, is chairman. Other subjects had been suggested by individual members and were considered by the committee.

The Banquet

The banquet in the evening was held in the Gold Room of the Congress Hotel, which was attractively decorated for the purpose. The main floor and the galleries were occupied with tables, so large was the demand for tickets. At 9.30 p. m., after the repast of the evening, Charles L. Henry, president of the American Association, arose and made the opening speech on the present and future of the Association. This appears upon another page in this issue. He then introduced Thomas Finigan, president of the Manufacturers Association, who presented a brief address in part as follows:

"It has been said of Mr. Henry that he is the father, or originator, of the use of the word interurban as applied to electric railways, and I am sure that he is proud of the distinction. But I also know that you will agree with me that he is to be complimented for having acted as a father by presiding at what has proved to be one of our most successful midwinter meetings. The joint committee on arrangements is also to be commended for its untiring efforts, particularly for making it possible for us to be honored by such distinguished guests from whom we are to hear later. It has been said that 'of all inventions the alphabet and printing press alone excepted, those which abridge distance have done the most for civilization,' and this is truer to-day than ever.

"The industry you control and represent, that of supplying transportation facilities, is so great that few men outside of the railway business comprehend the magnitude of its problems and its service. Even those who are engaged in the work are amazed at the creditable way in which you solve many intricate problems. You are advancing the character of the service being rendered, and doing your work well, although the way is seldom clear of difficulties. The youngest among us can readily see how more and more perplexing your problems are becoming.

"The business of supplying transportation is not a stable, settled industry. True, as in other lines of endeavor, success in this business depends largely upon clear thinking, followed by hard work, but do you know of any other industry in which success so largely rests upon co-operation? Happily, there has been and is co-operation in the industry of which we, the manufacturers, are a part. Co-operation has done much to clear away the cobwebs that otherwise might have interfered with a full, clear vision of the best methods for jointly solving the intricate problems of the American electric railway transportation industry.

"Now, the field widens! With the progress of the years it has become evident to all of us that each can render greater service to the other. The relation now is more binding than that of buyer and seller. We are partners, working for the sucess of an industry that has achieved much, but yet has more to do.

"The railway man is welcome to every aid that the hearts and hands of the manufacturers can render. We gladly share your belief that co-operative methods are best in spreading the gospel of fair play and fair returns for public utilities. Closer relationship will mean much to the manufacturer. It will mean more than increased sales. It will mean that that manufacturer who earnestly helps the railway fight its battles will, as a result, be a better man to fight his own battles.

"Mr. President and Gentlemen, I am sure I speak for every manufacturer of the electric railway industry when I say that we are anxious to make our co-operation a real co-operation; that we earnestly desire to assist the railways to the fullest extent of our power, and that we stand ready to assume our full share of the battle for the full rights of the industry."

The third speaker was Judge Jacob M. Dickinson, former Secretary of War, who introduced the guest of the evening, Senator Underwood, in a short address. Judge Dickinson touched upon the crisis now before the nation and the need for united purpose, regardless of party. He also spoke of the familiarity of Senator Underwood with the important problems of the country. The address of Senator Underwood, which followed, appears in abstract elsewhere in this issue. Although this speech referred in part to steam railroad conditions, many of the points made were equally applicable to electric railway conditions, and the Senator's remarks elicited great applause. The banquet closed at 11.15 p. m., all of the diners singing "America."

The Public Service Repair Shops*

The Author Describes the General Characteristics and Special Equipment of Various Classes of Repair Shops

BY R. H. HARRISON
Mechanical Department Public Service Railway of New Jersey

THERE are three different types of shop in the mechanical department of the Public Service Railway, which, it may be said, is the result of the combination of some seventy distinct transportation companies, each of which originally had its own shop equipment. These shops may be classed as (1) general repair, (2) overhauling and inspection, and (3) inspection. At the general repair shops all car-body overhauling is done, and all heavy accident repairs are made. All cars, automobiles and wagons belonging to the railway company are painted at these shops, which are equipped with the necessary wood-working machinery to do all the mill work for the system. Wheels and gears are bored and mounted on axles, armatures and fields are wound and repaired, and all extraordinary work is taken care of. On the Public Service Railway one of the two general repair shops does no inspection work and very little ordinary overhauling, but on the other hand, it does a large amount of manufacturing work and extraordinary overhauling which is not done at any other location. During the last four years, on the average, forty cars per year have been built, and trucks, motors and compressors are stripped and rebuilt. Also, old passenger cars are converted into service cars, and there is done all miscellaneous work for which the other shops are not equipped or which can be done better and more economically at the larger shops.

Shops of the second type are used for overhauling and inspection, and all cars operating from the particular carhouse at which the shop is located are inspected once each week and any necessary light repairs are made. When it is found on the weekly inspection that a car is in need of a thorough overhauling, this work is also done in the shops. Within the last few years a number of new shops of this class have been built by the Public Service Railway, and for these a standard equipment has been adopted. This consists of a wheel grinder, wheel changer, electric car hoists, jib cranes with pneumatic hoists, pit jacks, forge and anvil, power hammer, lathe, shaper, commutator slotter, pinion puller, bolt cutter, carborundum grinding wheel and the necessary benches and small tools. There is also a compressed air system and a system of overhead traveling hoists over the lathe, slotter and pinion puller, this providing means for handling armatures and other heavy parts on which work is to be done. Storerooms are also provided for storing oil and supplies.

The third type of shop, used for inspection only, has little or no equipment as a rule. At these places cars are inspected weekly, but only very light repairs are made, such as replacing trolley wheels, controller fingers, etc. All heavy work on the cars served by such shops is done at the overhauling shops.

Among the special equipment installed in the overhauling and inspection shops the car hoist is worthy of comment. On the Public Service Railway the electric car hoist that is used has the advantages of being out of the way when not in use and acting as a permanent support for the car body when the trucks are removed. At the same time, it is simple to operate and requires little attention. It consists of two steel beams, one on each side of the car, which are raised by four steel screws electrically operated through a combination of bevel gears and worm wheels. Two pieces of old T-rail, one at each end of the car, rest on these beams and raise the car body. As near as I have been able to ascertain, the first hoist of this particular type was designed and built by the mechanical department of the Public Service Railway in 1905. Since then, a number of other companies have adopted this machine with slight modifications.

Another machine which has proved very useful is the car-wheel changer. With this the time necessary to change a pair of wheels has been greatly reduced, as it is only necessary to run a car over the machine, remove the axle caps and pedestal tie rods, block up the motors and trucks, and lower the wheels into the pit. Here they are replaced with a new pair of wheels, which are then raised into position. The standard car-wheel changer that is installed in a number of the Public Service Railway shops was designed and built by the mechanical department. In this machine two short pieces of rail supported by four screws are raised and lowered through a system of gears by an electric motor. This is located in the pit, and the pieces of rail fit into places where pieces of equal length have been removed from the track in the shop floor, so that a car may be run over the machine as though the track were continuous. Track is provided also in the pit, so that wheels may be stored there.

The car-wheel grinder is another great labor-saving machine that has been installed in a number of Public Service Railway shops. The company has a great number of flat wheels during the year because of improper braking and other causes, and these flat spots must be removed. Many railway companies take their wheels out of the car to grind them when they become flat, others try to true them up in service by the use of a special abrasive brakeshoe, others apparently let them run until they get square and then scrap them. The Public Service Railway has found that the most economical method is to run the car over a grinder and make the wheels round again. With this machine the car motor is jacked up, raising the wheels off the track. A short piece of track under the wheels to be ground is then removed and the car motor is used to turn the wheels while a carborundum wheel is brought up from below to do the grinding. This wheel grinder was also designed by the Public Service Railway Company's mechanical department, although it is built outside and sold under a trade name.

The hospital and health board of Kansas City, Mo., has called in nine badges being used by various persons as free street car transportation, the special ordinance providing that only fifty such badges shall be so used. About sixty are said to be out for such purpose. The persons holding the badges have commissions from the police department.

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*Abstract of a paper presented before the Public Service Company section of the American Electric Railway Association, Jan. 20, 1916.

Award of the Anthony N. Brady Safety Medal

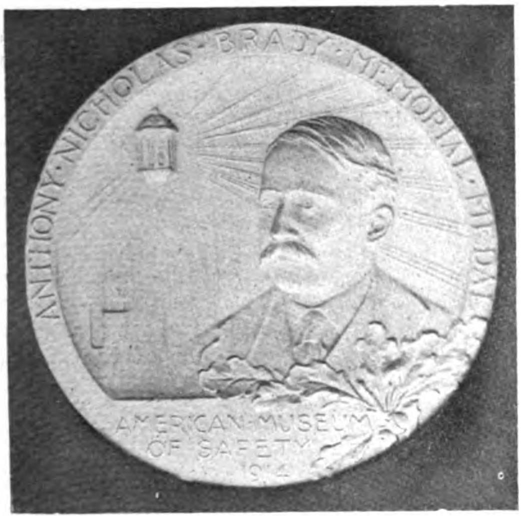
Union Traction Company Receives Medal with Honorable Mention for the Elevated Railroads of Chicago—Design of New Medal Is Shown

At the annual meeting of the American Museum of Safety, held in New York on Feb. 3, the Anthony N. Brady gold medal was awarded to the Union Traction Company of Indiana. On recommendation of the company the silver replica of the medal went to H. A. Nicholl, general manager, as the individual who had contributed most to the success of the company along safety lines, and the bronze replica to John E. Hancock, a motorman, who had also signally contributed to this success. The medals were presented by Arthur Williams, general inspector New York Edison Company, president of the American Museum of Safety.

H. A. NICHOLL

JOHN E. HANCOCK

The conditions of award of this medal were prescribed by a committee of the American Electric Railway Association, consisting of Arthur W. Brady, Anderson, Ind., chairman; Wilbur C. Fisk, New York; C. S. Sergeant, Boston, and W. H. Tolman, New York. The committee on the award comprised Bion J. Arnold, Chicago; Will J. French, San Francisco; James H. McGraw, New York; George F. Swain, Cambridge, Mass.; Frank R. Ford, New York, and W. H. Tolman, New York.


ANTHONY·NICHOLAS·BRADY·MEMORIAL·MEDAL
AMERICAN·MUSEUM OF SAFETY 1914

ANTHONY N. BRADY MEMORIAL MEDAL

The appearance of the face of the medal is indicated in the accompanying illustration. A preliminary design for this medal was reproduced in the issue of the Electric Railway Journal for Jan. 30, 1915, page 239, but this design was not satisfactory to the Brady family and consequently there were no medals struck last year.

In connection with the award of the medals honorable mention was accorded to the Elevated Railroads of Chicago, Britton I. Budd, president, a close second in the contest. Special mention was also made of the safety work of the Peninsular Railway and San José Railroad, Paul Shoup, president, and of the Columbus (Ga.) Railroad, Charles F. Wallace, president.

Commissions Give Valuation Views

Oppose Finding of Ultimate Value—Argue for Original Cost and Declare Reproduction Cost to Be Discredited—Call Claims for Intangibles Absurd

Disagreement with the steam railroads in regard to federal valuation was the common ground on which the various state commissions met at the valuation conference in Washington on Jan. 26-28, called by the Interstate Commerce Commission. The discussion was based on the brief recently filed by the National Association of Railway Commissioners, those of four state commissions, California, Oregon, Kansas and Minnesota, and the answering brief of the carriers.

As summarized by Max Thelen of California, at the close of the conference, the main contentions of the states are: (1) That the valuation act does not require an ultimate finding of value, but merely classified statements of the evidences of value; (2) that original cost to date must be found, estimates being made where exact figures are not available; (3) that reproduction cost new must be found on a national basis (the states disagreeing with each other as to the national basis, but agreeing that the carriers' basis is irrational); (4) that accrued depreciation must show in reproduction cost less depreciation; (5) that the reproduction cost of land cannot exceed the normal market value, and (6) that intangibles should be discussed further when the carriers have stated how they shall be valued.

At the opening of the conference Mr. Thelen stated that the framers of the valuation act had not sought to have the report of the Interstate Commerce Commission show more than the elements or evidences of value; that value depended upon the purpose for which it was to be used; that value for rate-making purposes depended on much that no inventory could show, such as the value of the service, past earnings and many other elements, and that with no rate before it and no standard, which the Supreme Court must set, to measure the relative weights of even the known evidences of value, no value could be found. In regard to intangibles Mr. Thelen held that the claims of the railroads to date under this head were absurd, and they did not agree among themselves as to the definitions of these elements and had not suggested how they were to be determined.

A. E. Holm of Kansas deplored the efforts he thought the railroads had made to evade and conceal original cost. He held that whatever could not be found exactly by the records should be estimated. He contended that reproduction cost had been definitely rejected by the Supreme Court in the Minnesota rate case; that capitalization could not be the basis of value, and that original cost was the only thing left and all that should be considered. Like some of his confreres he thought reproduction cost was a useless figure, which would not have been called for if the valuation act had been passed after the handing down of the Minnesota decision.

To prove that the state commissions are right in their contention that accrued depreciation must be taken into account in reproduction cost less depreciation, E. C. Niles of New Hampshire quoted from numerous decisions of the state commissions themselves. Even so there appeared to be much division of opinion. In fact, as W. C. Brantley, counsel for the carriers, later pointed out, seemingly the main deduction to be derived was that the question of depreciation in the minds of courts and commissions is in a chaotic state.

For the railroads G. S. Patterson insisted that they were in agreement with the states on many of the issues raised. He held that the carriers desired the recording of expenditures for additions and betterments made from earnings, surplus or depreciation reserves, and that they had never opposed the ascertaining of original cost, relying within reason upon estimates. The carriers, he said, also recognize the importance of attaching the proper weights to the elements of value, and think this can await the completion of the inventories. S. Robinson commented on the fact that the state commissions had in the last year changed their views regarding overhead expenses in reproduction cost. He insisted that the Minnesota rate decision did not condemn reproduction cost, but only that particular presentation of it.

George Westinghouse Tablet

Veteran Employees of the Westinghouse Company Present Memorial of Their Founder

THE Veteran Employees' Association of the Westinghouse Electric & Manufacturing Company, at its third annual banquet, held on Saturday evening, Jan. 29, in the Fort Pitt Hotel, Pittsburgh, presented to the company a handsome bronze memorial tablet of the late George Westinghouse. This organization is composed of those who have been in the employ of the company for twenty years or more, and about 450 veterans were present.

The memorial tablet is approximately 4 ft. x 3 ft., made of solid cast bronze, and weighs about 300 lb. It shows a bas-relief likeness of Mr. Westinghouse, seated in an armchair, and bears the inscription, "George Westinghouse, Master Workman, Inventor, Founder, Organizer, 1846-1914." It will be placed in the reception room of the East Pittsburgh works of the Electric Company.

Addresses were made by a number of veterans, former associates of Mr. Westinghouse. Guy E. Tripp, chairman of the board of directors, in accepting the tablet on behalf of the company, said in part:

"History is little more than a biography of great men, and admiration and emulation of them is the real foundation of advancing civilization. History has been enriched by the life of George Westinghouse, and if we, his associates, have not received some benefits in our lives, if we have not been encouraged by his example of the courageousness, if we have not been incited to new efforts by his perseverance, then we should regret having neglected our opportunities. It was an opportunity to have observed his unfettered methods of work—unfettered because he could labor at the details without being swallowed up by them, and he could deal comprehensively with the whole without vagueness. He instinctively knew the essential point and swept all other matters aside as of minor importance."

In addition to its regular steam service, the Florida East Coast Railway, Jacksonville, Fla., is operating a gasoline-electric car in regular service from Jacksonville to Pablo Beach, through Atlantic Beach and Mayport.

Removing Restrictions on Foreign Trade

At New Orleans National Foreign Trade Convention Delegates Discussed Need of Government Cooperation in Developing Foreign Trade

THE removal of legal restrictions now hampering foreign trade development was a recurring theme at the third national foreign trade convention, held in New Orleans on Jan. 27-29 under the auspices of the National Foreign Trade Council. It was shown that the three chief agencies needed for the extension of our foreign trade—American investment and banks in foreign lands, co-operation between manufacturers and a merchant marine—are each prevented from playing their full part by adverse federal laws.

In the meeting which discussed foreign banking, the handicap imposed by the federal reserve act, which prevents member banks from subscribing to the stock of other banks even though formed for operation in foreign lands, was discussed, and the delegates present indicated plainly that they favored an amendment which would remove the restriction. The legislation adversely affecting co-operation between manufacturers who desire to extend their export business was the theme of an able paper by M. A. Oudin, manager foreign department General Electric Company. He showed that the anti-trust laws do not discriminate between foreign and domestic business in prohibiting co-operation. Finally, Capt. Robert Dollar told graphically how the seamen's law has driven American shipping from the Pacific and how the high operating costs entailed by it prevent the development of a merchant marine. The sentiment of the delegates was that the restrictions affecting all three necessary features for foreign trade development should be removed.

Aside from these three outstanding features of the convention, the function which a large foreign trade plays in stabilizing domestic industry was repeatedly pointed out. Mr. Oudin, for example, said: "Co-operative foreign efforts would help keep our factories running at 100 per cent capacity." This stabilizing feature of foreign trade was very keenly appreciated.

Frank A. Vanderlip, president of the National City Bank, New York, gave another angle to the importance of foreign trade. He pointed out that this country is piling up tremendous gold reserves, while at the same time European gold reserves are being depleted. After the war the foreign countries will direct their attacks on the reserves here. The best way to safeguard them is by building a huge foreign credit here, and that can be accomplished only by a large volume of foreign trade. Mr. Vanderlip, as well as other speakers, pointed out that the present is the psychological moment for foreign trade expansion, not only because of the adverse conditions affecting European nations, but because of the need of preparation here for what depression may come after the conclusion of the world conflict.

In discussing foreign trade James A. Farrell, president United States Steel Corporation, said that it is as much in the interest of the workman as his employer that provision be made for a steady sale abroad of the products of the mechanical industry of the United States. In fact, the foreign business in many corporations, since the war began, has been their greatest asset, and the only justification for the operation of their plants on full time. As to investments abroad, Mr. Farrell stated that foreign investment is a commercial preparedness measure, a source of protection for the whole industrial fabric of the country, should the world recede to political-commercial policies of trade restriction. It is an element of strength in the influence of this country as a nation, should a wiser instinct realize that the true guarantee of the world's peace is the provision of equal opportunity for all.

Prof. H. C. Emery made a plea for a "bargaining" tariff and pointed out that anti-dumping legislation would be of no avail, for even if European manufacturers should sell over here at their foreign cost plus a reasonable profit, this country would not, in many articles, be able to compete. Moreover, he defended dumping as a perfectly legitimate trade practice, pointing out that it has been commonly employed in this country.

On the conditions here after the close of the war there were diverse views. Alba B. Johnson, president Baldwin Locomotive Works, expects a very severe depression. On the other hand, Mr. Farrell expressed the opinion that the wave of prosperity in the United States is too powerful to be easily rolled back or resisted. He does not look for a crash in this country at the conclusion of the war, for while Europe will undoubtedly make an effort to re-establish her foreign trade she will find herself handicapped in so many unexpected ways that it will take years to overcome the difficulties.

Advertising Electric Railway Service in Buffalo

The International Railway Is Carrying Out a Comprehensive Daily Newspaper Advertising Campaign with Good Success

A COMPREHENSIVE campaign of daily newspaper advertising is being carried out by the International Railway, Buffalo, N. Y., to educate the public as to various phases of its activity. Much display space is being devoted to the facilities offered by the company's freight and express service between Buffalo, Tonawanda, North Tonawanda, Lockport, Niagara Falls and Rochester, and the results accomplished have surpassed the expectations of the executive officials.

Double-column display advertisements 2 in. deep are being carried once a week in the daily newspapers of Buffalo, Niagara Falls and Lockport, and in addition to this the company is using four-line and five-line reading notices scattered throughout the paper every day. The greatest amount of space is being used to educate shippers as to the value of the express service between western New York cities and towns on the lines of the International Railway and the Buffalo, Lockport & Rochester Railway. The text of three typical advertisements on this service is reproduced herewith.

It is the company's belief that it can handle a large amount of the package express business which has been received by local express companies, and since the advertising campaign has been started a number of Buffalo wholesale houses have given the railway a large percentage of their package business. "I never knew you handled a package express business" is a familiar expression among wholesalers whose attention has been called to this phase of the railway's activities by these advertisements. Owing to the increased business in this field, the company is operating a package express service three times daily between Buffalo and Rochester, and intermediate points via Lockport. W. J. Whiteside, traffic agent of the International Railway, is handling the package express service. In all the advertisements the company is featuring "service" and "promptness." This appeal to business houses has resulted in a highly satisfactory return on the advertising investment.

Not only is the express and freight service featured but the company keeps the public informed from time to time by means of display advertising in the daily newspapers of changes in route, causes of delay, temporary rerouteing and the reasons for it and, in fact, anything in connection with the service over the city or interurban lines. The company also urges the more general use of private and chartered cars by organizations. By advertising this phase of its service much congestion is relieved from the regular service and organizations have the privacy of their own cars at little more than the regular fare. The use of the funeral cars has been more general since this service has been advertised in the daily newspapers.

Successful Men Misrepresented

It is usual to represent successful men as having grasped at the stars, while the truth is that they saw but the things at hand and had the wisdom to make use of them.

The successful Buffalo merchant has an eye to the facilities for trade in Buffalo territory. He knows one of them to be the package express service of the International Railway Company and makes use of it.

You can do the same. Inquire of W. J. Whiteside, traffic agent, Main and Court Streets.

International Railway Company

Preparedness—The Watchword

A business man to be successful must be both prepared and alert to grasp trade opportunities.

An opportunity for trade development is given to Buffalo business men and merchants by the package express of the International Railway Company.

It serves a score of communities and cities between Buffalo and Rochester.

Quick Delivery Low Rates

Inquire of W. J. Whiteside, traffic agent, Main and Court Streets.

International Railway Company

Profit to Business Is Like Health to the Body

Exercise keeps the body healthy. Enterprise brings profit in business. Enterprise makes use of every available trade channel.

One of the best trade channels is the service given three times daily by our package express to Rochester and intermediate points, via Lockport.

Inquire of W. J. Whiteside, traffic agent, Main and Court Streets.

International Railway Company

TYPICAL ADVERTISEMENTS ON PACKAGE EXPRESS SERVICE APPEARING IN BUFFALO NEWSPAPERS

E. G. Connette, president of the company, is a firm believer in printer's ink and display advertising. He holds that since the company is supported by the public the public is entitled to know all phases of the service offered by the company. Daily newspaper advertising, Mr. Connette believes, is a good investment.

An interesting feature of the Great Falls hydroelectric power plant of the Montana Power Company, which supplies electric current for the Chicago, Milwaukee & St. Paul electrification, is that the Missouri River is free of ice for the year round at this locality. This condition is due to the Giant Spring, which flows into the Missouri River at a point about a mile above the company's Rainbow Dam. The spring, probably the largest fresh water spring in the world, has a capacity that is estimated at 36,000 cu. ft. per minute, the temperature remaining constant at 51 deg. Fahr. This steady supply of relatively warm water raises the temperature of the whole river for some distance below the spring sufficiently to prevent the formation of the so-called anchor or frazil ice, a consideration of material benefit to the hydroelectric project.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

The Adjustment of Drum Controller Fingers

BY W. J. OVERMAN
Railway Equipment Department General Electric Company, Schenectady, N. Y.

One familiar with the maintenance of the drum controllers of car equipments will appreciate the fact that the most frequent source of trouble lies in the contact fingers. This trouble is greatly augmented by the lack of uniformity in adjustments.

Drum controller fingers are designed to drop approximately 3/32 in. on leaving the controller segments—that is, the point of contact on the finger tip should be 3/32 in. nearer the center of the cylinder when off the segment than when on the segment (see Fig. 1). This adjustment is obtained by means of the adjusting screw which bears on the finger block, and the drop should never be allowed to exceed ⅛ in. If it exceeds this amount the operation of the controller becomes more difficult and the phosphor bronze spring is subjected to a stubbing and buckling action which greatly shortens its life.

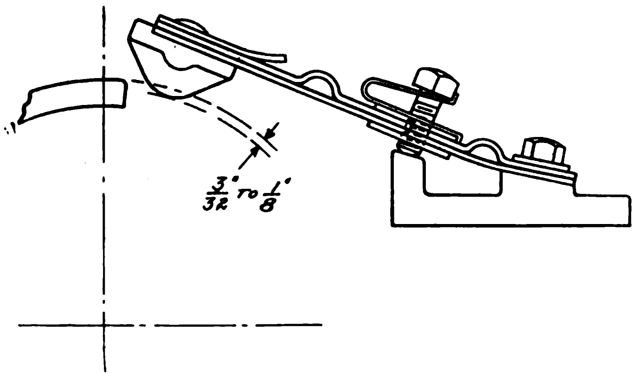


FIG. 1—PROPERLY ADJUSTED DROP FOR CONTROLLER FINGER WITH NEW SEGMENT

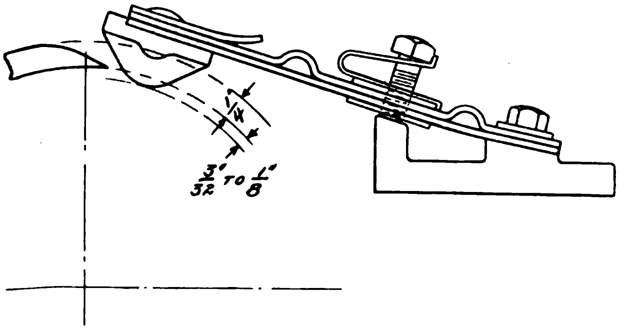


FIG. 2—EXCESSIVE DROP OF CONTROLLER FINGER, DUE TO WORN SEGMENT TIP

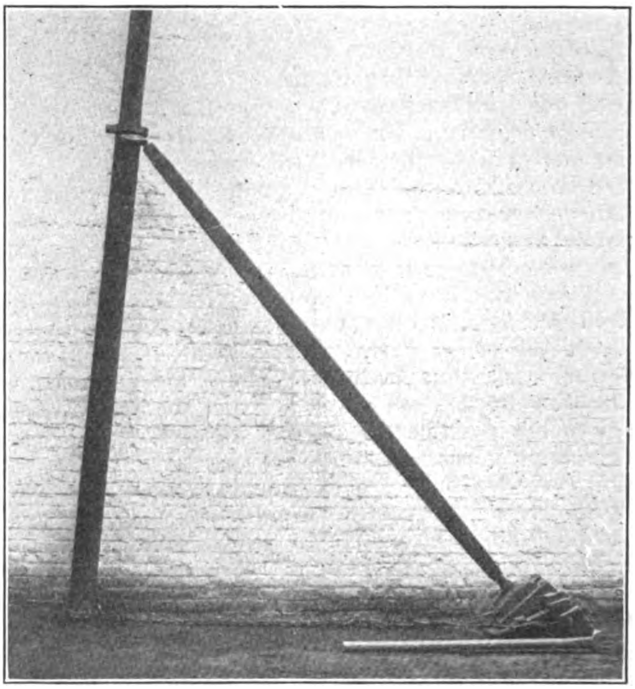
Fig. 2 illustrates what is believed to be the direct cause of a large percentage of finger troubles. Here the segment tip is shown badly worn and the finger is adjusted to drop 3/32 in. on leaving it. Referring to the illustration it will be seen that the finger, when going on the segment, is raised 3/32 in. plus the thickness of the segment, thus making the total movement of the tip almost ⅜ in. This bending of the finger spring is very excessive and in a short time will result in the breaking of the phosphor bronze spring or the copper shunts. Segment tips should be renewed when so badly worn that the proper adjustment cannot be obtained on the fingers.

Fingers should be adjusted by twisting to make contact all the way across the controller segments. Failure to do this may result in the overheating of the segments and fingers, causing the spring to soften and lose tension.

Tool for Plumbing Leaning Iron Poles

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco

For straightening up iron poles that have been pulled out of plumb, whose concrete setting has been undermined by curbstone installing operations, washouts, etc., or which were set originally with too much rake or too little rake, the device shown is used by the United Railroads of San Francisco without disturbing the concrete settings of the poles.



POLE STRAIGHTENING JACK IN PLACE

Its action is clearly shown in the illustration. The house-mover's jack set at an angle of 45 deg. is kept from sliding along the pavement or sidewalk by being attached to the base of the pole by a chain. The crescent-shaped wrought-iron end of the 4-in. x 6-in. tapering oak strut is prevented from slipping upward on the pole by an iron band bolted around the pole.

It occasionally though rarely happens that an iron pole is broken off before it is quite straightened. In such a case a short piece of rail is inserted as a splice for the pole, the voids between rail and tubular interior of the pole filled with concrete and the pole left looking the same and as strong as before it was broken.

The efficiency of this simple device was most clearly demonstrated when it was utilized to straighten about 500 heavy tubular poles that were to be provided with highly ornamental castings on the main streets of San Francisco. Those designing the ornamentations insisted for best effect that the poles should be absolutely vertical. This was readily accomplished by this jacking-over method.

The device has been found effective under many other conditions and is much superior in simplicity and cheapness of manipulation, exactness of control and rapidity of action to the old block and tackle method of straightening up leaning iron poles.

Where iron poles are actually bent one or more ways or distorted, as occurred in San Francisco's great 1906 fire, otherwise than by a simple leaning over from the ground line, another United Railroads device, described and illustrated in the ELECTRIC RAILWAY JOURNAL of Feb. 6, 1909, page 227, is used with equal effectiveness, speed and cheapness to gradually remove all the various bends one after the other.

Portable Crusher Eliminates Stone Hauling

BY D. P. FALCONER
Engineer Maintenance of Way New York State Railways, Rochester, N. Y.

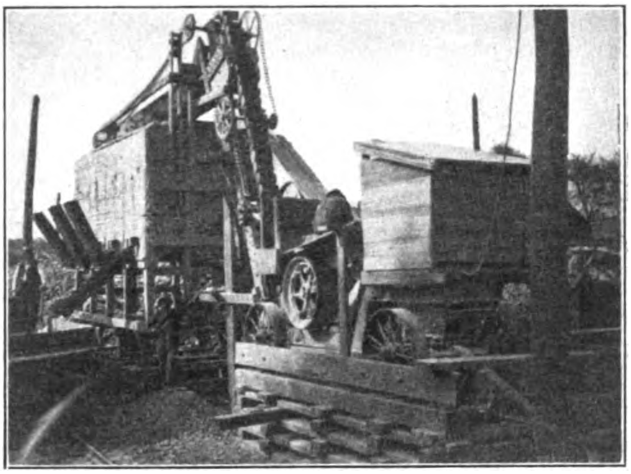
In these days of rigid economy in the electric railway field it is necessary for the engineer in charge of track construction and maintenance to utilize as much as possible of the materials which are removed from worn-out track. During the past four years the New York State Railways have endeavored to carry out this general idea, and the accompanying illustration shows a piece of equipment which has been purchased for the utilization of what formerly was scrapped.

Medina block paving stone is commonly used throughout Rochester as a pavement in car tracks. This paving stone originally was 7-in. stone and was suitable for laying with 9-in. rail. During recent years, however, 7-in. T-rail has been laid, and in order to effect an economy the 7-in. Medina stone has been recut into 5-in. stone on the street during the progress of the reconstruction work, thus saving the stone and eliminating the hauling of this old material from the job. When this was not possible the paving stone was hauled to the receiving yards and stored in a pile. This pile has been sorted, and those stones which are too small to be recut have been thrown into a pile along with the concrete which has been excavated from tracks during reconstruction. As a result of this there has been a large accumulation of stone suitable for crushing.

About two years ago a stone crusher was rented and installed for a few months and the pile of stone which had accumulated at that time was crushed and used as ballast and for the making of concrete. This experiment proved so successful that it was found advisable to design some special equipment to meet the requirements. This equipment consists of a 30-ton bin with screen and elevator and a stone crusher. The bin is divided into four compartments: one for the screenings, one for ½-in. to ¾-in. stone, one for ¾-in. to 2-in. stone and one for the tailings. This bin has a side discharge so that it can be placed next to the track and the crushed stone loaded directly into the work cars. It is also provided with the usual type of elevator and screen. The crusher, however, was designed especially for the work in question and was built by the Wheeling Mold & Foundry Company. It consists of a standard crusher mounted on wheels and connected by means of a belt drive to a motor mounted on the same truck with the crusher. The truck is designed with a gooseneck and provided with broad-tired wheels so that the crusher may be hauled over pavement and transported to various points. The gooseneck is provided with a locking device, and a duplicate set of wheels with standard car wheel flange has been designed so that they can be substituted for the road wheels and the crusher hauled directly on the track.

The method of mounting the motor on the same truck with the crusher makes a very compact machine which can be transported from place to place, the idea being that concrete excavated from the streets need not be hauled to the yards for crushing, but can be piled alongside the trench; when the new track is laid on the subgrade the crusher can be placed on this track, omitting the bin and elevator, and old paving stone and concrete crushed and dropped directly between the ties. The crusher can be moved forward from time to time, taking care of the old concrete which has been distributed along the track and providing at the same time adequate crushed stone which can be used for ballast.

With this equipment it will be possible to eliminate hauling a large portion of the material excavated from tracks which are being reconstructed, and at the same time provision will be made for recovering this material at a price of approximately 25 cents per ton, the cost of the crushing. Where conditions are such that it will be impossible to operate the crusher on the track in the street, the concrete excavated can be hauled to the yards where the crusher can be used as illustrated.



PORTABLE STONE CRUSHER FOR ELIMINATING STONE HAULING IN TRACK RECONSTRUCTION

The motor on this crusher is of 35 hp. operating at 550 volts, so that the power can be taken directly from the trolley wire at all times. The crusher is provided with 9-in. x 16-in. opening and manganese steel jaws.

This equipment has been in operation for only a few months but even in this short period it is evident that it will much more than pay for itself in a very short time. It will be noted, too, that this complete outfit has the flexibility of the average contractors' plant and in addition provides for the special requirements of electric railway work.

According to the British Consul at Nagasaki, Japan, extensions of the electric tramway at Nagasaki are contemplated. The system of electric railways radiating from Osaki is now more or less complete and construction work in the near future is likely to be confined to connecting lines. Operating results of several of these railways have not been very satisfactory. The passenger traffic has suffered from trade depression.

Electrical Repairs on Controllers and Motors in Los Angeles

BY J. L. CLARK
Superintendent Electric Repairs, Los Angeles (Cal.) Railway Corporation

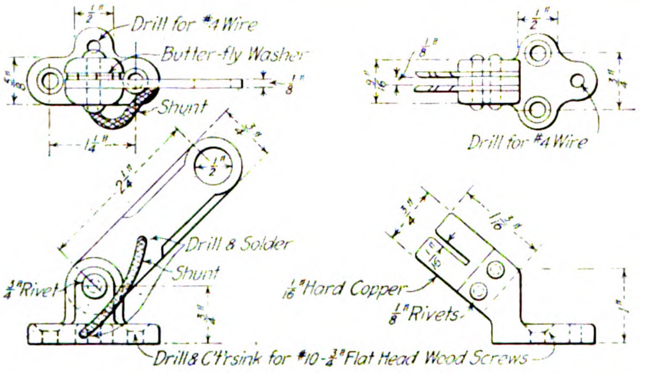
The electrical repair department of the Los Angeles Railway Corporation has been making advantageous use of a number of repair schemes and devices, described and illustrated herein, which have originated through the co-operation and skill of our foreman and other shop employees in this department.

The first Type K controllers received with our car equipments were the K-2 style with L-1 and L-2 connections for the old shunted-field scheme of control. All these and several other K-2 controllers were acquired with some second-hand equipments from another street railway, making a total of about 180 that have been rebuilt to our standard K-11 style.

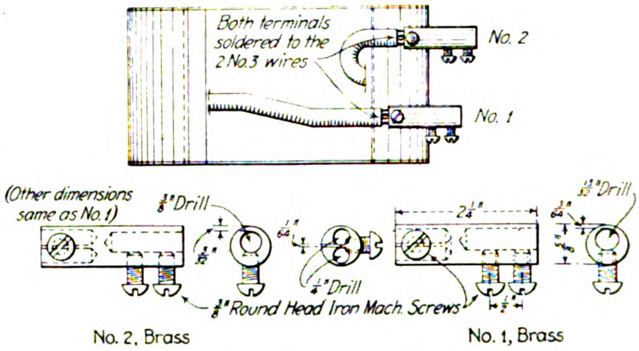
To remedy the not infrequent trouble of loose and burnt wire connections at the rear of the binding posts on the connecting board of Type K controllers, and also the loosened connections at that point with the cable wires, we abolished the connecting board with its binding posts. In place of this we extended the controller wiring leads for a length of 2 ft. below the base of the controller and then spliced the leads with a wrapped soldered joint to the cable wires underneath the car platform. This method has completely eradicated the former troubles, as their cause has been removed.

In order to eliminate the burning of cut-out switches which was a rather frequent controller occurrence several years ago, owing to insufficient contact at the hinges of switches, we provided a flexible copper braid shunt across the hinged joint of each switch blade. This use of arrangement, illustrated herewith in detail, has entirely eliminated the cause of this class of controller failures.

Several years ago this company first experienced swollen blow-out coils in the K-11 type controller, our standard type for passenger cars. The expansion of the copper ribbon-wound blow-out coil frequently resulted in bridging the short air gap between the coil and the operating cylinder, with consequent liability of short-circuiting. Formerly, to remedy this condition, we removed the blow-out coils and pressed them back to shape, and in some cases rewound the coils. This


Drill for #4 Wire
Butter-fly Washer
Shunt
Drill for #4 Wire
Drill & Solder
Shunt
1/4" Rivet
1/16" Hard Copper
1/8" Rivets
Drill & C'trsink for #10-3/4" Flat Head Wood Screws

COPPER SHUNT FOR PREVENTING BURNING OF CUT-OUT SWITCHES


Both terminals soldered to the 2 No. 3 wires
No. 2
No. 1
(Other dimensions same as No. 1)
3/8" Drill
1/4" Drill
13/32" Drill
3/8" Round Head Iron Mach. Screws
No. 2, Brass
No. 1, Brass

DETAILS OF REWOUND BLOWOUT COIL

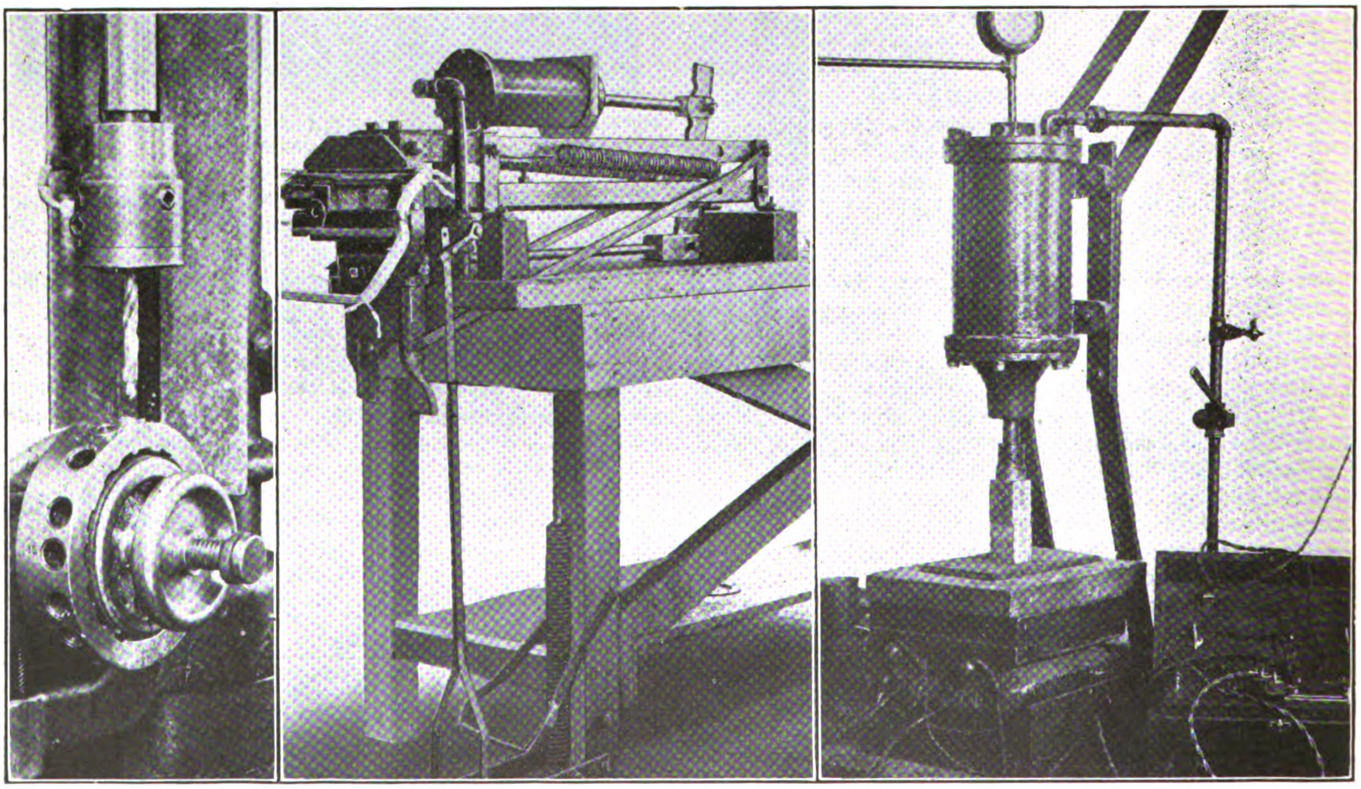
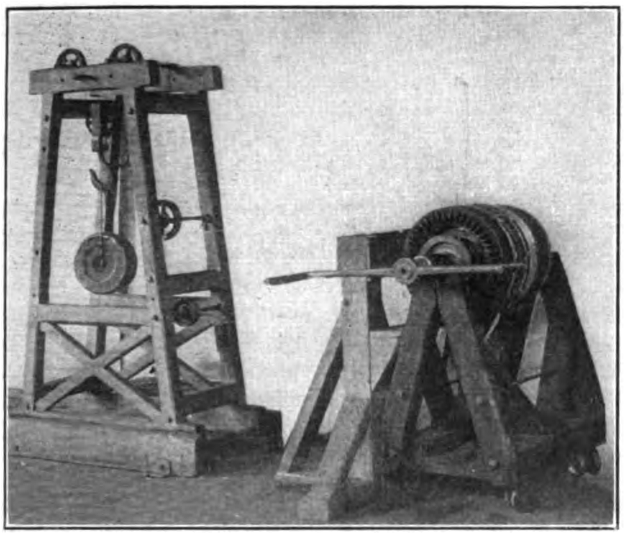


Fig. 1 Fig. 2 Fig. 3

FIG. 1—JIG FOR DRILLING K-11 CONTROLLER CONTACT SEGMENT; FIG. 2—PNEUMATICALLY OPERATED ARMATURE COIL PRESS; FIG. 3—FIELD COIL TESTING PRESS

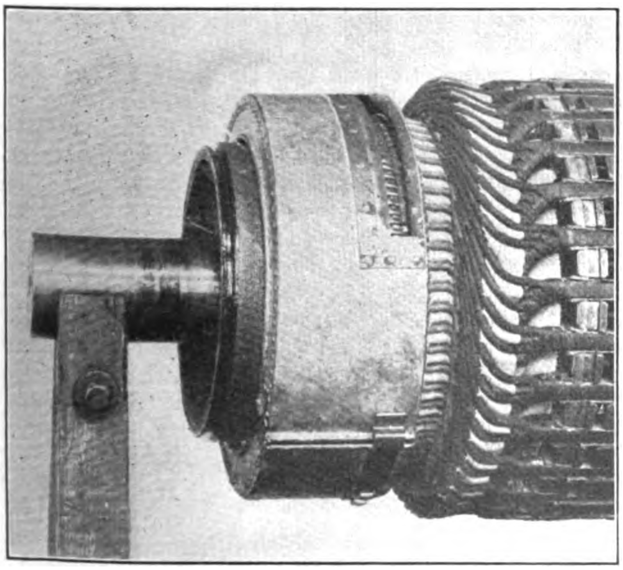


CONSTANT TENSION ARMATURE BANDING DEVICE

practice, however, was without permanent results. Therefore, we decided to rewind the coils with two parallel No. 3 B. & S. solid copper fireproofed magnet wires. Out of many controller blow-out coils so rebuilt, not one has proved a repeater. This style of blow-out coil has also been specified and furnished with all new K-11 controllers purchased during the past several years. An accompanying diagram shows our method of arranging the blow-out coil terminals and connectors.

Controller cylinder contact segments are rolled and finished complete in our shop for all car controllers. To facilitate this work we use a steel jig of the design shown in an accompanying illustration. This jig is arranged to drill and countersink accurately at one operation all styles of K-11 cylinder contact segments.

An accompanying illustration shows one of the four pneumatically-operated presses used by the Los Angeles Railway Corporation in the construction of armature coils. The press is controlled by a pedal connected to an air valve. It has two compressions, one for coil thickness and another for coil width. It is also provided with compression plates of different gages whereby we can press all styles of armature coils, such as the Westinghouse 38-B, 49, 101-L and 306-L motors; also the compressor motors of Westinghouse D. I. B. G. and National A-5 and AA-1 styles. The first two of these air presses were made several years ago by the electrical repair department. They are so quick and positive in action and have proved so efficient that two additional presses of the same model have recently been completed.



METAL BASKET FOR CATCHING CUT ENDS OF ARMATURE LEADS

The tension device, also illustrated herewith, has been used by us for many years. Its main feature is that any predetermined tension will remain absolutely constant from the first to the last turn in applying bands. This banding device is used for any style of armature from 1-kw. to 1000-kw. size.

Another illustration shows a metal basket, hinged to fit around the necks of armatures of various styles, which is used to catch all the copper wire ends of armature coil leads when they are cut off flush with the commutator slots after the armature is entirely connected. We find that this basket offers an easy and quick way to save copper.

All field coils are treated in varnish before receiving asbestos tape wrapping as follows: The coils are heated for twenty hours in an electric oven at 190 deg. Fahr. They are next immersed in Armalac insulating varnish until air bubbles cease to rise, and are then suspended above the varnish to drain. Afterward this entire treatment is repeated once. The service results with our field coils have proved this method of impregnating in cold liquid insulating varnish is entirely satisfactory for our car motor conditions.

When giving the shop test for short-circuits in wire-wound field coils, we always subject them to approximately 60 lb. per square inch test pressure, using a Century field testing machine. We have found this method of testing coils is very reliable and quick in application. The air press and testing machine are shown herewith. We also use the field tester for periodical tests of motors.

Track Material Ordered by Detroit United During 1915

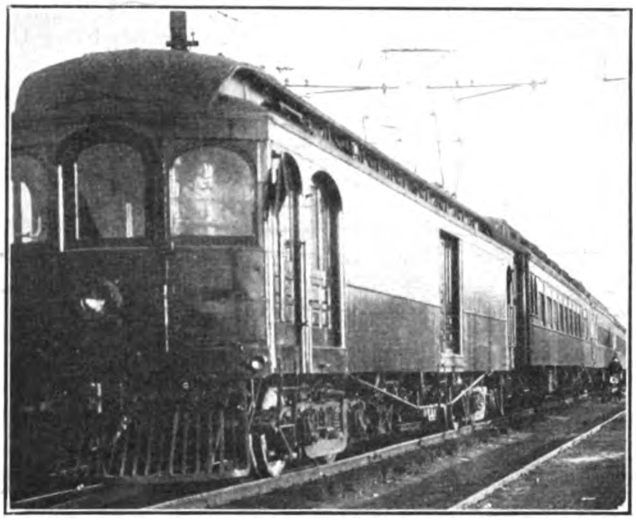
A recent issue of the Detroit (Mich.) United Railway's company publication, *Electric Railway Service*, contains a general statement of the large supplies of material needed by that company for its last year's track work. Steel rails ordered in 1915 for new construction, reconstruction and maintenance on the Detroit United lines amounted to nearly 7700 tons. Cement was a big item in the list of construction materials.

Last year 173,000 bags of cement were ordered, weighing approximately 7600 tons. Sand and gravel were required in tremendous quantities for track work, 11,000 cu. yd. of sand and nearly 30,000 cu. yd. of gravel being ordered. Cedar and oak ties were also big items. Last year approximately 140,000 ties of all classes were ordered. For paving work nearly 2,000,000 paving bricks and more than 750,000 granite nose-blocks were ordered. The brick weighed approximately 9800 tons and the block weighed more than 12,000 tons. The orders for track spikes amounted to about 2500 kegs, or a total of about 750,000 spikes.

It is reported by an English contemporary that on eighteen occasions during the year 1914-1915 the fenders which are carried by the West Ham (England) street railway cars were brought into use. In every case their efficiency was proved and serious accidents were avoided. Seven persons were picked up uninjured, nine slightly injured and one badly injured. In the remaining case a bicyclist was picked up without serious injury.

Profitable Work for Annapolis Short Line Electric Locomotive

The Maryland Electric Railways recently came in for a share of the business of transporting a large body of midshipmen between the Naval Academy and New York. The Baltimore & Ohio Railroad made a contract involving the movement of ten steel passenger cars, and this necessitated the use of one of the two electric lines into Annapolis. The "Short Line" track is too light for the heavy B. & O. steam locomotives, but the train was handled satisfactorily by means of a 52-ton electric locomotive of the box-car type. This is equipped with Westinghouse No. 562-AX motors and HLF unit-switch control and is used by the "Short Line" in a very extensive freight business.



ELECTRIC LOCOMOTIVE COUPLED TO B. & O. TRAIN ON ANNAPOLIS SHORT LINE

Reducing Hazards Due to Falls

In a paper presented recently before the American Museum of Safety H. W. Mowery called attention to the large number of casualties due to slipping, tripping or falling, and cited as an example the fact that in New York City, during 1914, 170 deaths occurred from falls on stairs and sidewalks, and only sixty-five deaths from fires, fifty-three from surface cars, twelve from subway cars and twelve from elevated cars.

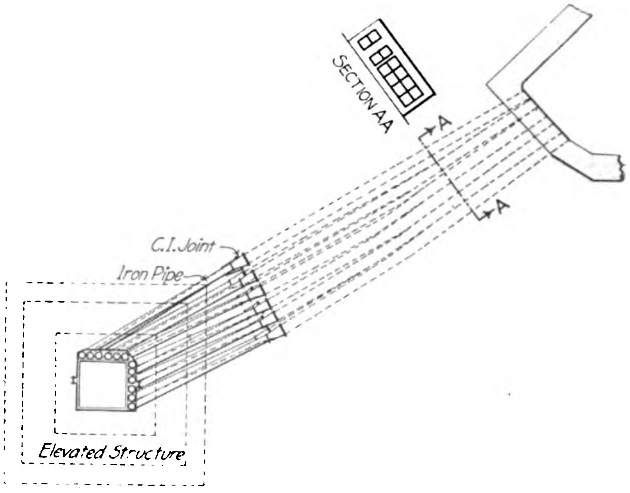
Anti-slip material, chief among which is "Feralun," is the most important in connection with the treads of stairs, and if accidents are to be prevented the nosing edge along the entire length of the tread must provide a positive, durable slip-proof surface. An overhang for the nosing is also essential. Grooves parallel to the nosing have a tendency to catch the heel of a shoe, and make it difficult to distinguish where one step ends and another begins. The design of the stair is also important, and approved dimensions range from 7¼ in. to 8 in. for risers and 10¼ in. to 9¼ in. for treads.

In the Broad Street Station of the Pennsylvania Railroad at Philadelphia the installation of an abrasive-metal tread having an anti-slip nosing and no grooves parallel to the nosing reduced the casualties on the stairs from twenty-one in a period of six weeks to zero during a period of three months. In another case a rapid transit company had practically no casualties in train accidents during a year, but in other than train accidents there were 138 persons injured, of whom 127 were passengers. Investigation disclosed the fact that 39 per cent of the total were injured on station stairways. Since the lighting of the stairways in general is good, hand rails are plentiful, and the treads have a standard nosing overhang with standard tread and riser dimensions, the accidents can only be ascribed to the fact that the treads have smooth metal nosing edges and are grooved parallel to that edge.

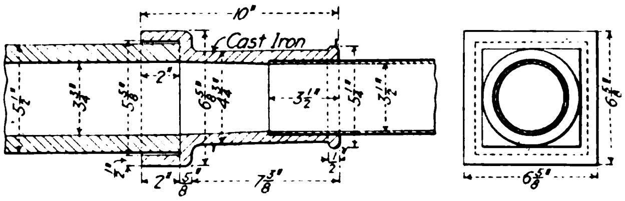
Cast-Iron Junction for Iron Pipe and Clay Duct

The cast-iron fitting, shown in the accompanying cut, has been devised for conduit use at locations where the distance from the base of the pole or structure is considerable, and would require the use of long lengths of pipe.

The writer has in mind the use of this fitting at a location where more than 100 runs of conduit were installed at a substation, and where the conduits had to be continued so as to make connection with the elevated structure. By using these joints a length of 20 ft. of 3½-in. iron pipe was saved on each run, or a total of 2000 ft. This saving, at $4 per run, amounted to approximately $400. The above saving does not include the maintenance expense obviated by the use of the clay duct which is really imperishable, whereas it is well known that the iron pipe will not last much longer than fifteen years, even though it be galvanized or otherwise treated.



LAYOUT SHOWING REDUCTION IN LENGTH OF IRON PIPE EFFECTED BY USE OF JUNCTION



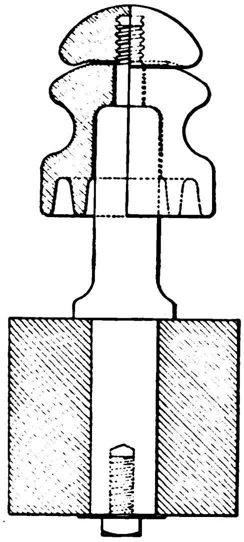
SECTIONAL AND END VIEW OF CAST-IRON CONDUIT JOINT

The joints cost $1 each. It will be noted that the distance from the end of the flange to the end of the fitting is 7⅜ in., but this may be considerably reduced and the joints obtained at less cost.

The Dublin & Blessington Tramway Company has introduced the first gas-electric car used in Ireland. This is well appointed, lighted by electricity both inside an doutsde and has seating accommodations for seventy-five passengers. The current is generated a 65-kw. gas-electric set in the motorman's compartment.

Novel Feeder Insulator for Use on Curves

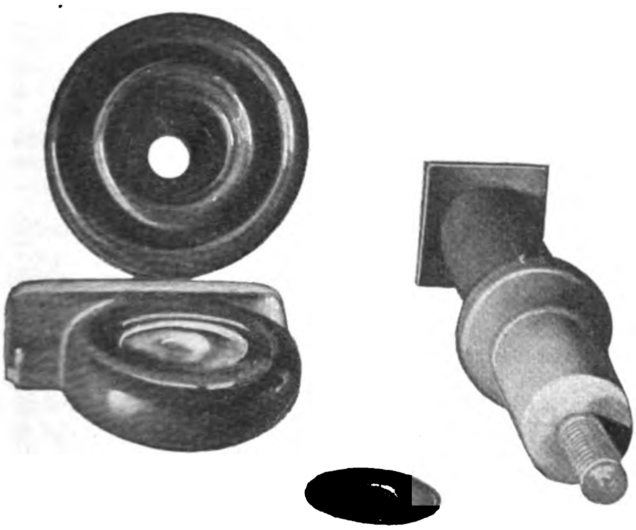
In feed wire installation the usual practice is to run out from ¼ mile to ½ mile of wire, string it loosely over the cross-arms beside the insulator pins, then to pull up the wire tightly to take out most of the sag between adjacent poles, and finally to tie the wire securely to the insulators. If the entire length of wire to be pulled up lies on a straight portion of the feeder line, the pulling-up operation is completed while the wire rests on the cross-arms beside the pins. But where a curve is included in the length to be pulled up it is necessary, because of the severe side strain on the insulator pins at the curves, to have the wire placed in the groove at the side of the insulator where it later will be secured before the pulling-up operation is completed.



SECTION OF INSULATOR

Usually a comparatively light tension is first put on the wire; then it is put in the grooves of the insulators, its lateral pressure on the insulators being sufficient to hold it there; then the wire is pulled up to its final tension. During this final process the drag of the wire against the sides of the insulators causes them to rotate, and if they are threaded on their pins the insulators often either become unscrewed or screwed down on the pin so tightly that they become broken. It often becomes necessary for some of the line crew to hold some of the insulators against turning while the wire is being pulled up to its final tension.

To obviate these difficulties, the insulator illustrated in the accompanying halftone and drawing has been designed and patented by Frank M. Spicer, general superintendent of lines, Bay State Street Railway, Boston, Mass. The insulator pin is secured in the cross-arm in the usual way, but is reduced in diameter near its upper end to form a shoulder, above which the pin is threaded for a part of its length. This pin is usually of metal. The insulator is in two parts—the insulator proper and a cap piece. The former slips over the insulator pin and rests on the shoulder, thus being able to rotate freely on the pin. The cap has a threaded socket, and a rubber washer is interposed between the insulator and the cap to form a cushion and keep out moisture.



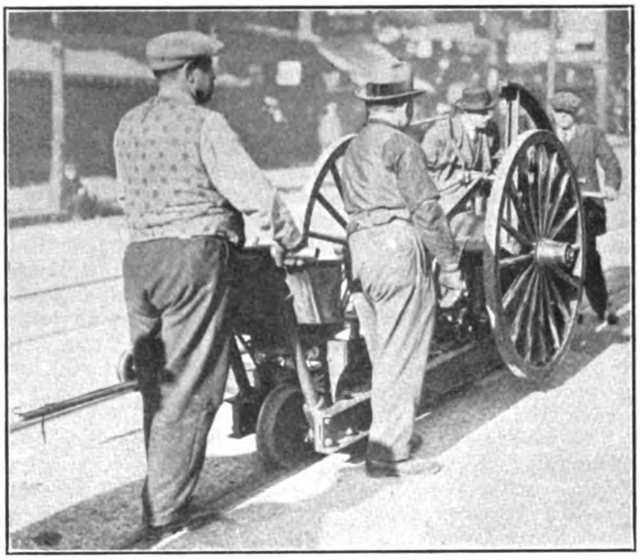
FEEDER INSULATOR DISASSEMBLED

With this insulator the cable is seated in the groove before the pulling-up operation begins. The cap is screwed only part way upon the extension so that it will not interfere with the free rotation of the insulator. While the wire is being pulled up the drag against the side of the insulator will cause it to rotate, but as it has no threaded connection with the pin, it does not move up or down or present much friction to the drag of the wire. After pulling up is completed, the cap is screwed against the washer and the wire is tied.

The insulator is being manufactured by the Albert & J. M. Anderson Manufacturing Company of South Boston, Mass. About 200 are in service on the Massachusetts Northeastern Street Railway, which has been giving the design a two years' test.

Grinding New and Old Rail at Worcester, Mass.

One of the rail-grinding machines of the Railway Trackwork Company, Philadelphia, has recently been in service on the Worcester (Mass.) Consolidated Street Railway, as illustrated. In thirty days about 0.25 mile of double track has been gone over with this machine, the work including the grinding down of joints and cups and the removal of corrugations on straight rail. The maximum depth of corrugation is from ⅛ in. to 3/16 in., and about three hours are required to grind down ⅛ in. Incipient low joints are also smoothed down with this equipment, and all the track recently built between Lincoln Square and Chandler Street, on Main Street, has been gone over at the joints, to insure the best results in service. Most of the work is done at night. The accompanying illustration was obtained with great difficulty on account of the density of traffic in the district where the view was taken.



TRACK GRINDER AT WORK IN WORCESTER, MASS.

It is reported that a company of Chinese and Russian capitalists has been organized under the name of "Energia," which plans to undertake the construction of a street railway system and power plant for Harbin, China. In a statement to the Municipal Council the company proposes that a joint stock company be organized and that the municipality be permitted to participate on the condition that a proper franchise be granted.

LONDON LETTER

Effect of War Still Serious Problem in Some Places—Recovery Apparent but Slow

(From Our Regular Correspondent)

The first of a series of efficiency meetings arranged for the officials of the operating department of the Underground Railways and London General Omnibus group was held last December. A paper, "Mess Rooms and Their Organization," was read by S. G. Rodway, mess room superintendent of the London General Omnibus Company. The chairman, H. E. Blain, on opening the meeting, said that the series was being arranged to enable officials to discuss, from an efficiency standpoint, the methods adopted in the operation of the railways and buses, with a view to further improvement. Sir Albert Stanley, managing director of the group, paid a tribute to the manner in which the work of the department had been carried on during the exceedingly trying conditions since the outbreak of war, and referred to the desire of the companies and the directors that every member of the staff should feel that his suggestions would be valued and appreciated. Mr. Rodway's paper detailed the mess room organization connected with the London General Omnibus Company, Ltd. In all garages built recently it was the policy to erect large and comfortable rooms available as mess room and institute, where the catering was provided at the lowest possible price and where facilities for billiards, etc., were afforded. The first of these institutes was opened at Hendon Garage on May 1, 1913, since which date sixteen others had been opened. The food, etc., was sold to cover cost and the wages of the mess room working staff, but the account was not debited with any portion of the cost of construction, maintenance, or lighting of the institutes. Attention was directed to the increased cost of foodstuffs, but by the careful selection and introduction of modern devices for saving labor and material, it had not been necessary to raise the mess room tariff, except very slightly in connection with tea.

The Ilford Urban District Council has decided to permit the carriage of parcels and folding carriages accompanying passengers subject to certain conditions.

Particulars have been issued to the proprietors of the London Electric Railway, the City & South London Railway, the Central London Railway, the Metropolitan District Railway, and the London General Omnibus Company, of a proposed agreement for the pooling of the surplus profits of those undertakings. The agreement provides that after the payment of standing charges, preference interest, and due provision for depreciation and reserve, described as revenue liabilities, the surplus earnings of all the companies shall be paid into a common fund, which is to be distributed as follows:

	Half-Year to Dec. 31, 1915	Succeeding Half-Year
City & South London	2 per cent	6 per cent
Central London	20 per cent	20 per cent
London Electric	26 per cent	30 per cent
Metropolitan District	12 per cent	12 per cent
London General Omnibus	40 per cent	32 per cent

If a company's earnings are insufficient to meet the charges specified, the deficiency is to be made up from the fund before distribution. The London General Omnibus Company has in recent years earned a much larger surplus than any of the other concerns, but as it is entirely owned by the Underground Company, there are no individual shareholders to suffer. The arrangement is likely to produce greater efficiency in the working of the individual undertakings, and will simplify their administration, in that it will obviate the necessity for adjustments with regard to through fares and charges.

The Erith Urban District Council is making the attempt to secure the distinction of being the first local authority in or near London to run a service of motor omnibuses. Application is being made for a provisional order to get the necessary powers, and as the Council already owns a 4¾-mile tramway system there seems to be no reason why it should not be authorized to operate omnibuses. A great part of the traffic on the Erith tramway system consists in the conveyance of men to and from the works of Vickers and other firms. The Erith omnibuses will run into adjoining districts, including Woolwich.

For the first time in the history of the Sheffield Corporation Tramways system the running of cars was entirely suspended on Christmas. The drivers and conductors have been working at high pressure, largely owing to the demands made upon them by the thousands of munition workers in the city and the decision of the committee to give the employees the holiday was very acceptable to them, especially as many women conductors are engaged on the system. Those who should have worked on Christmas received a day's pay.

C. W. Shepherd has resigned as general manager of the Edinburgh & District Tramways Company. The board accepted the resignation with regret, and asked Mr. Shepherd to continue his services as secretary of the company. J. D. R. Cox of Babcock & Wilcox has been appointed general manager and engineer to the company. Mr. Cox is thirty-five years of age.

There are now in use or on order in Great Britain nearly 700 electric vehicles, whereas a year ago the number was only 150. One of the biggest users of electric vehicles in London is Harrod's Stores, which employs more than sixty delivery vans driven from storage batteries. The Glasgow Corporation Electricity Department is credited with having seven electric vehicles. Electric vehicles are coming much into favor for street cleansing and watering. The experience of Blackpool, for example, is that one electrically driven street-sprinkling machine does the work of six horse-drawn watering carts.

At a recent meeting of the Belfast Corporation, it was intimated that a resolution had been received from a local branch of the Amalgamated Union of Labor protesting against the proposed employment of women as conductors on tramcars. The chairman of the tramways committee said it was a melancholy spectacle that any body of presumably respectable men should adopt such an attitude during the present national crises. This protest was strangely at variance with the course pursued by the working men of England.

In response to the Bradford tramway committee's appeal to public spirited citizens above military age who were willing to assist in the running of the tramways, 150 applications have been received. Those who pass the necessary medical examination are to be trained as auxiliary drivers on lines which have proved very successful at Birmingham. In consequence of the decision of the tramways committee to engage women as conductors, 100 applications have been sent in for appointment, and an experiment with twenty women conductors is to be made. In this connection, it is interesting to note that already 689 men have left the Bradford tramway department for service with the army, and 550 of the remaining 818 of military age have been attested under Lord Derby's scheme. The present staff of 1281 employees is necessary if the present service is to be maintained.

The service of electric trains inaugurated on the Wimbledon Park line of the London & South Western Railway in October last is giving satisfaction, and the traffic is showing a marked increase. It had been announced that the Kingston circular and Shepperton line electric services would commence on Dec. 6 last, but as a result of an application to the court by the Postmaster General in connection with alleged interference with the Postmaster's telephone circuits in the neighborhood of one of the sections, it became necessary to postpone these services for a time. It is anticipated, however, that the difficulties will be quickly overcome and electrical working brought into operation very shortly. Good progress is being made with the electrification of the Hounslow line.

Recommendations that the wages of motormen and male conductors and certain other workers in the Glasgow Corporation tramways department be increased by 2s. a week, and that women conductors who have six months' service should receive an advance of 1s. a week were carried after considerable discussion at a meeting of the Town Council. The Council also agreed, except in five cases specified in the minutes, to stop allowances granted to members of the municipal service who are holding commissions in the Army.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

MR. HEDLEY BEFORE THE INVESTIGATING COMMITTEE

The Thompson joint legislative committee, appointed to investigate the Public Service Commissions of New York, resumed its sessions on Jan. 31, with Mr. Bainbridge Colby as counsel, as the successor to Merton E. Lewis, Deputy Attorney-General. The principal witness was Frank Hedley, vice-president and general manager of both the Interborough Rapid Transit Company and the New York Railways and an officer of the Rapid Transit Subway Construction Company. Mr. Hedley said his salary is $50,000 a year, $6,000 of which comes from the Subway Construction Company, $12,000 from the New York Railways Company, and $32,000 from the Interborough Rapid Transit Company, controlling the subway and elevated lines of Manhattan and the Bronx. Up to eight months ago his salary had been $40,000. Mr. Hedley felt that he was worth more then and that he is worth more now.

Mr. Colby inquired into Mr. Hedley's inventions, a number of which are in use on the lines in New York of which he is an officer. Mr. Hedley explained that in every case he paid personally the experimental charge and counsel and patent fees. In several cases the Interborough Rapid Transit Company voluntarily voted to pay him for devices, but in a number of instances the company used the devices without pay. J. S. Doyle, superintendent of car equipment of the Interborough Rapid Transit Company, was joint inventor in a number of these cases. Some of the inventions had been put on the general market by the Railway Improvement Company in which Mr. Hedley said that he and Mr. Doyle had at one time held an interest, but that this interest had been disposed of in February, 1915, under options which had been given in December, 1914.

Mr. Hedley enumerated among his inventions the following: automatic control and sanding device, governing device for fluid pressure, stepless street car, double-deck street car, coasting record device, current registering mechanism, conductors' collection counter, conductors' valve and emergency switch, two electric car-heating systems, two car-control systems, auxiliary control device, stepless car truck, three lifeguard attachments for street cars, three safety platform devices, two electric coupling devices, three street sweeping machines and two anti-climber devices.

NEW SUBWAY FRANCHISE INTRODUCED IN PITTSBURGH

A new ordinance which would grant a franchise to the Pittsburgh Subway Company has been introduced in the Council of Pittsburgh, Pa., and will be considered by the committee on public service and surveys in connection with other plans for improving city transit. The principal feature of the plan represented by the ordinance is that it provides for construction by the city of a downtown subway loop, if the city should so desire, which loop the company will use in conjunction with other transit companies. The route of the proposed subway is not given more definitely than that it is to extend from the Point district to East Liberty and Schenley Park.

Councilman John H. Dailey, who introduced the ordinance, made the following statement in reference to the measure: "Owing to the fact that the question of transportation has been brought to the attention of Council in the form of ordinances for street railway franchises and through an agitation for the construction of a downtown subway loop by the city, I believe that now is the time to consider also the question of rapid transit in its larger form—that is, a subway system from the downtown section to East Liberty. The Pittsburgh Subway Company, which has sought a franchise at the hands of City Council for many years, has prepared the ordinance, which I have introduced. I have ascertained that the subway company can still be induced to construct a rapid transit subway, and I believe that Council should give serious consideration to this matter. I am not ready to say that I will favor the ordinance exactly in the form I have introduced it, but as I believe the people want a subway it appears to me that this is the way to get the discussion started."

An ordinance providing for the services of a street railways expert as an adviser to the Council, in its consideration of transportation measures, has been offered by Councilman W. Y. English and referred to the finance committee.

ALLEN & PECK TO MANAGE ANOTHER ROAD

Management of the Auburn & Syracuse Electric Railroad, Syracuse, N. Y., was taken over on Feb. 1, by Allen & Peck, Inc. Announcement to this effect was made on Jan. 26, following a meeting of the board of directors of the railroad. A year ago last fall the company suspended dividends on its preferred stock, which had been at the rate of 1¼ per cent, quarterly. No dividend ever was declared on the common stock.

At the meeting on Jan. 26 W. O. Morgan, New York City, legal adviser of the Roebling interests, was elected a director to fill the vacancy caused by the recent death of E. D. Metcalf of Auburn. After routine business had been transacted a resolution was adopted authorizing the officers of the company to enter into a contract with Allen & Peck for the management of the Auburn line. In addition to Mr. Morgan, the directors of the road are Mr. Beebe, Mr. Nottingham, former Senator H. S. Holden, W. A. Holden, F. K. Hiscock of North Yakima, Wash.; H. G. Metcalf of Auburn, Joshua Bachman, Syracuse, and F. W. Roebling, Jr., Trenton, N. J.

Ernest Gonzenbach, general manager of the Empire United Railways and associate lines, which has included the Auburn road, will devote his entire time and attention to the operation of the Empire United Railways. C. Loomis Allen, president of Allen & Peck, Inc., with former Senator Holden, is receiver of the Empire United Railways, Inc.

ILLINOIS ELECTRIC RAILWAY TO BUILD 60-MILE LINE

The Southern Illinois & St. Louis Railway Company, Chicago, Ill., will actively begin the construction of its 60 miles of road connecting Harrisburg, Marion, Pittsburg, Johnson City, West Frankfort and Herrin early in March this year. The same interests that control the Southern Illinois Railway & Power Company, Chicago, Ill., which operates an electric plant and a 15-mile interurban railway in Saline County, Ill., have financed and will have charge of this new project. They have acquired the Marion & Eastern Railroad, a steam line between Marion and Pittsburg, Ill., 7 miles, and will electrify it. This steam road and the 60 miles of new electric line are included in the construction program for this year. Eventually it is planned to continue the Benton extension on to St. Louis and the Ohio River. The proposed line will pass through the rich coal fields of Saline, Franklin and Williamson counties, which now produce 25 per cent of the coal mined in Illinois, and it will give an outlet to some deposits of coal not yet reached by railroads. Contracts have been made with the Illinois Central, the Chicago & Eastern Illinois, the Chicago, Burlington & Quincy, the Iron Mountain and the Big Four railroads whereby the new electric line will deliver the coal to them out of these new fields. The Southern Illinois & St. Louis Railway has authorized $2,500,000 of first mortgage twenty-five year 5 per cent bonds, $500,000 of 6 per cent cumulative preferred stock and $3,000,000 of common stock. Of the preferred stock $250,000 is outstanding. The remaining $250,000 will be held in the treasury for use in obtaining funds for future improvements.

PHILIP J. KEALY PROPOSED PRESIDENT KANSAS CITY RAILWAYS

Frank Hagerman, vice-president of the Metropolitan Street Railway, Kansas City, Mo., announced on Feb. 2 that the stockholders would elect Philip J. Kealy, now a member of the board of control in charge of that property, president of the Kansas City Railways, the successor company, and that the election was favored by the bondholders and Judge Hook of the Federal Court at Kansas City. Mr. Kealy will probably act both as president of the company and as a member of the board of control. He will succeed John M. Egan as president of the company, Mr. Egan retiring in accordance with plans outlined some time ago in the ELECTRIC RAILWAY JOURNAL.

1916 ELECTRICAL PROSPERITY CAMPAIGN

The board of directors of the Society for Electrical Development, Inc., at its annual meeting on Jan. 24, held at New York, decided upon another so-called electrical week, the official name and date to be decided later. Results of the electrical prosperity week campaign were shown as evidence of the success of the 1915 undertaking, and greater possibilities for the 1916 campaign.

J. M. Wakeman, general manager, read his annual report, which was approved by the board. A committee was appointed to prepare plans for the 1916 work of the society. The present officers, executive committee, general manager and secretary-treasurer were reappointed. Mr. Wakeman submitted a budget for the work of the society for the coming year which allows for $150,000 in expenditures, $50,000 of which is provided for the 1916 electrical week campaign. The budget was approved.

Upon the motion of Anson F. Burchard, a vote of appreciation was extended to the general manager and staff of the society for their work during electrical prosperity week.

Several of the directors spoke of personal observations of the society's work for the past year, especially in regard to the success of electrical prosperity week. James H. McGraw, president of the McGraw Publishing Company, Inc., publisher of the ELECTRIC RAILWAY JOURNAL, said the week was the greatest object lesson that had ever been given to any industry, and that it was an indication of what might be accomplished with the right kind of publicity. He congratulated the society upon its direction of the campaign and in reaching the public instead of directing all of its efforts to work among members.

BANQUET TO FOSTER HANNAFORD, DEPARTING MANAGER

Foster Hannaford, formerly general superintendent of the Galesburg Railway, Light & Power Company, Galesburg, Ill., and recently appointed superintendent of the St. Paul (Minn.) division of the Twin City Lines, was tendered a farewell banquet by the Galesburg Club, at which the leading citizens toasted him and wished him godspeed and good luck in his new work. Although Mr. Hannaford had been in charge of the Galesburg property only three years, improvements in service as well as in the relations between the company and the community were so marked that he won his way into the good graces of all those with whom he came in contact. Mr. Hannaford is only twenty-six years old, and the general superintendency of the Galesburg property was his first important position. His response to the eulogies directed to him from around the banquet table follows in part:

"It would appear unnecessary for anyone occupying the position I do to-night to say that he was thankful for the courtesies that are now being extended. There are, however, two reasons why one in my positon should appreciate this godspeed. The first one, purely personal, is unnecessary to dwell upon. Every man appreciates the approbation of his fellow men. The second reason, however, to me is more significant, and I believe worthy of some notice. It is rather an unusual spectacle for the citizens of a community, the patrons of its public utility, to wish godspeed to the representative of the public utility which is serving them, and it is most gratifying to me personally that this friendly relationship should exist between us. This gathering is representative of the citizenship of Galesburg. I in no way accept it as a personal compliment, but consider it as a tribute and appreciation of the effort I have made during the past three years in furthering an ideal which I desired to support if ever the opportunity afforded itself. That ideal was to establish relations of a most cordial nature between the citizenship and its servant. I am satisfied that the ideal I chose to support was the correct one, and I am deeply grateful to you and all the other citizens of Galesburg."

SECOND OHIO SAFETY CONFERENCE HELD

The second industrial safety exposition of Ohio, held in the Central Armory, Cleveland, during the week ended Jan. 29 was a decided success in point of interest and importance, although the attendance was not quite as great as had been anticipated. The display of the Columbus Railway, Power & Light Company was the only one made by the electric railways of the State. It consisted of photographs illustrating the many ways in which people have been injured by cars, copies of bulletins and booklets issued by the company and its officials bearing on safety ideas and rules, a large sheet illustrating the dangerous practices of automobile drivers, and a board containing colored cards distributed to children showing how accidents occur to them.

Charles Koshalko, Johnstown, Pa., exhibited a model of an automatic fender and snow sweeper invented by him.

The displays of emery wheel guards and inclosed wheels were very interesting to the master mechanics and shop men in general. The Safety Emery Wheel Company showed a number of wheels equipped with its collars. The William Platz Iron Works and the Norton Company showed several wheels equipped with their guards. The Safety Engineering Company showed its adjustable eye guard. Guards for circular and band saws were exhibited by the Surety Guard Company, Chicago; Humason Brothers, Youngstown, Ohio; J. A. Woodford & Company, Youngstown, and others.

The Cleveland Automatic Signal Company; the Automatic Signal & Appliance Company, Cleveland; Safety Service & Engineering Company, and the Nichols-Lintern Company, Cleveland, showed signals of various kinds.

Inclosed switches and switch cabinets were shown by the Krantz Manufacturing Company, Brooklyn; the Detroit Fuse & Manufacturing Company, Detroit, and the Thompson Electric Company, Cleveland. The Cleveland Electric Illuminating Company and a number of other exhibitors displayed this type of switch as a part of the safety appliances used by them. The Brown Hoisting Machinery Company, Cleveland, and the Yale & Towne Manufacturing Company, New York, displayed hoisting apparatus, with photographs of moving cranes and other products of their plants.

The department of investigation and statistics of the Ohio Industrial Commission gave the visitor an excellent idea of the number and cause of accidents through its data sheets and the cost of compensation for these accidents. The division of industrial hygiene of the State Board of Health furnished similar information on occupational diseases. Photographs showing the effects of these diseases formed a feature of this display.

There were regular programs of addresses and discussions each day. The subjects pertained to safety and the care of employees. Many of the speakers were physicians in charge of the medical departments in factories, safety engineers and directors and others who are giving special attention to these features.

SERVICE AT 25 CENTS NOT JITNEY

The Public Service Commission for the Second District has decided two of the complaints of the Western New York & Pennsylvania Traction Company against two persons alleged to be operating jitney bus lines in Olean without authority of the local officers or the commission and in violation of the Thompson law. The commission finds the two person complained of are really operating a taxicab business and do not come under the scope of the law.

DECISION AGAINST COMPANY IN CLEVELAND TAX SUITS

Following the refusal of County Treasurer P. C. O'Brien of Cleveland, Ohio, to acept a check of $253,009 from the Cleveland Railway for taxes for 1915 on Jan. 19, suit was brought to enjoin him from collecting a larger amount placed on the tax duplicate. This is the third suit of the kind brought against the county treasurer, but soon after the third suit was filed Judge Vickery of the Common Pleas Court dismissed the suits filed to prevent the collection of the amounts the county claims for 1913 and 1914. The court criticised the methods used by the Tax Commission in fixing the amount, but said the result reached was fair. The company has insisted that the commission explain its method of arriving at the valuation placed on the books, but was never able to obtain satisfaction on this point.

The taxes claimed for 1913 and 1914 aggregate about $600,000. The amount the county claims for 1915 is $349,536. The company contends that the tax value should be not more than $16,000,000. The commission's valuation is $22,000,000.

An appeal will be taken to a higher court by the company.

LECTURES ON MILITARY ENGINEERING

A course of seven free lectures on military engineering practices will be given under the auspices of a committee representative of the four national engineering societies, by Captains Robins, Coiner and Ardery, Corps of Engineers, U. S. A. This course will be under the direction of Major-General Leonard Wood, and is designed to assist those who desire to enter the engineering battalion which will be formed at Plattsburg next summer. All engineers interested in preparedness will be welcome, but attendance at these lectures does not imply obligation to subsequent camp duty. The lectures will begin on Monday, Feb. 14, at eight o'clock, and will continue every Monday thereafter until the completion of the course. It is hoped that Major-General Wood will be able to address the first meeting.

Decision in Compensation Case.—The Court of Appeals of New York has decided that a workman employed by a firm in that State and injured while working for the firm in another State was a proper beneficiary under the New York compensation law.

Holyoke Arbitration Hearings.—Hearings in the wages arbitration case of the Holyoke (Mass.) Street Railway were continued during the week ended Feb. 5, the principal witness being Arthur Sturgis, Brookline, Mass., who testified for the employees' union upon the increased cost of living. It was announced on Feb. 1 that an effort will be made to cut down the number of witnesses in the endeavor to shorten the work of the board of arbitration.

Seventh Avenue Subway Nearing Completion.—The Public Service Commission of the First District of New York announced on Jan. 29 that there is every indication that the new Seventh Avenue subway will be completed and in operation in twelve months and that the section between Thirtieth Street and Times Square, on which the work is being rushed with all possible speed, is to be opened to the public during the latter part of the present year.

A. A. of E. Monthly Makes Début.—The first issue of *Monad*, a monthly magazine devoted to the commercial interests of all technical engineers and their profession, and serving as the official organ of the American Association of Engineers, Chicago, Ill., has been published. It is dated February. The issue contains sixty-eight pages, and it is largely a report of the annual convention of the association held on Dec. 10, 1915. It also contains news of the association's work and prospects and several editorials.

Wage Increase at Fitchburg, Mass.—Following a recent conference with employees, the Lowell & Fitchburg Street Railway has increased the wages of motormen and conductors from a minimum of 20 cents an hour to a new minimum of 25 cents, and has raised the maximum from 25 to 30 cents an hour, effective on Feb. 1. A new schedule has also been established on the Fitchburg & Leominster Street Railway under which platform men will receive 25 cents an hour for the first six months, and 26 cents an hour for the second half year. Second-year men will receive 27 cents, third-year men 28 and 29 cents, and fifth-year men 30 cents an hour. A working agreement has been signed by the employees' union and the company.

Professor Bemis Removed From Chicago Traction Board.—Because Prof. E. W. Bemis was not a graduate engineer, nor an engineer of long practical experience, he has been removed by Mayor W. H. Thompson as the city's representative on the Board of Supervising Engineers, Chicago Traction. The Mayor is said to have based his decision upon the fact that Professor Bemis could not qualify as an engineer before the Illinois Public Utilities Commission, at a recent hearing. F. L. R. Francisco, formerly chief engineer of the American Tobacco Company and recently selected as the personal advisor of Commissioner of Public Works Moorhouse in handling the electrolysis problem in Chicago, is mentioned as Mayor Thompson's choice as successor to Professor Bemis.

Michigan Railway Elects Officers.—At a meeting of the board of directors of the Michigan Railway, Jackson, Mich., B. C. Cobb, New York, president of the Michigan United Traction Company, was elected president of the Michigan Railway. H. H. Crowell, Grand Rapids, former president of the Michigan Railway, was elected vice-president. John F. Collins was made vice-president and general manager, as announced in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1916. Frank Silliman, Philadelphia, was also elected vice-president; John Glendening, treasurer of the Michigan United Traction Company, was elected treasurer of the new company, and George B. Dobbin, Jackson, was elected secretary of the new company. George W. Meacham resigned as vice-president but was retained as a member of the board of directors of the new company.

Appointments to Chicago Traction Commission Confirmed.—Chicago's Traction Commission, which will investigate local transportation problems and recommend improvements, received practically a unanimous vote of confirmation by the City Council at a meeting held on Jan. 31. As previously mentioned in these columns, this commission is made up of William Barclay Parsons and Robert Ridgway, New York City, and Bion J. Arnold, Chicago. The ordinance provides that the commission shall investigate and recommend improvements in connection with the unified operation of the elevated and surface lines, general plans for subways, universal transfers and physical connections between all three forms of service, etc. The ordinance creating the commission carried with it an appropriation for $220,000, which is estimated as the approximate cost of the work.

Committee to Consider Long Island Operation.—The Public Service Commission for the First District of New York on Jan. 27 received a detailed report from Chief Engineer Alfred Craven relative to the operation of the Long Island Railroad tracks through Flushing and Whitestone and adopted the following motion: "That the report of the chief engineer be filed and that a committee to be named by the chairman, be empowered to confer with the transit committee of the Board of Estimate, the Long Island Railroad and the operating companies under Contracts Nos. 3 and 4, looking toward the amendments to said contracts so as to provide for the operation covered by said chief engineer's report, and to report back to the commission." Chairman Oscar S. Straus thereupon appointed Commissioner Henry W. Hodge; Daniel L. Turner, deputy engineer of subway construction; Travis H. Whitney, secretary, and LeRoy T. Harkness, assistant counsel, as such committee.

Praise for the Street Railway in Portland, Ore.—The Portland (Ore.) *Spectator* said recently: "Snowstorms are sufficiently infrequent in Portland to merit a word of comment. But because we are unused to snow, the mere flurry, as our Eastern friends called the storm, caused us some inconvenience, and if it had not been for the excellent resources and untiring energy of the Portland Railway, Light & Power Company the business of the city would have suffered. The burden of making roads for the city's business was thrown on the Portland Railway, Light & Power

Company, and President Griffith assumed it and made it possible for Portland to go its accustomed ways on Thursday. President Griffith has thanked his great army of men for the splendid ability and tireless energy—some of them worked twenty-four hours—they displayed in keeping open Portland's arteries of trade. The people of Portland should second those thanks, and should extend them to Mr. Griffith, who was one of the most tireless and energetic workers on the city's behalf."

Otto H. Kahn on the Railroads.—Otto H. Kahn, in discussing the needs of the American railroads in an article in the February number of *World's Work*, suggests the following: (1) Creation of a strong, effective and controlling central federal commission in Washington, with regional commissions according to geographic groupings. (2) The commission to be relieved of much detail work and of certain essentially conflicting functions which should be conferred upon a separate body. (3) The jurisdiction of State bodies in railroad matters should cease as far as it relates directly or indirectly to interstate commerce. (4) The function of rate making should be left to the railroads, with full power, however, in the commission on its own motion to reduce or increase rates for cause. (5) Pooling arrangements should be permitted subject to approval by the commission. (6) In determining rates due weight and consideration should be given to all factors that go to enhance the cost of operating railroads, such as legislative enactments, increased taxation, advances in wages, etc.

PROGRAMS OF ASSOCIATION MEETINGS

Iowa Street & Interurban Railway Association

The Iowa Street & Interurban Railway Association, the Iowa Districa Gas Association and the Iowa Section of the National Electric Light Association will hold a joint convention at the Julien Hotel, Dubuque, Iowa, on May 10, 11 and 12.

Chambers of Commerce of the United States

The revised program has been issued for the fourth annual meeting of the Chamber of Commerce of the United States to be held in Washington on Feb. 8, 9 and 10. The sessions on Feb. 8 and 9 will be held at the New Willard Hotel. The session on Feb. 10 will be at the building of the Pan-American Union. The annual banquet will be held at the New Willard Hotel on the evening of Feb. 10.

New York Electric Railway Association

The twenty-first quarterly meeting of the New York Electric Railway Association will be held at the Ten Eyck Hotel, Albany, on the evening of Thursday, Feb. 24, and on Friday, Feb. 25, as previously announced in the ELECTRIC RAILWAY JOURNAL. The Thursday evening session will be opened with an informal dinner at 7.30 o'clock, after which several prominent speakers will address the meeting. At the business session on Friday the following papers will be presented:

"Modern Shop Methods," by P. V. See, superintendent of car equipment of the Hudson & Manhattan Railroad, New York City.

"Heating and Ventilation of Urban Cars," by Horace A. Abell, assistant engineer of the Schenectady Railway.

"Methods of Fare Collection," by William J. Harvie, engineer with Allen & Peck Company, Inc., Syracuse, N. Y.

"Mutual Indemnity Insurance as Applied to Workmen's Compensation Act," by E. L. McManus, Jr., general manager of the Brewers' Mutual Indemnity Insurance Company, New York City.

It is especially requested that members write three-minute discussions on the subjects listed above and come prepared to read such discussions.

All requests for hotel accommodations should be made to A. H. Rennie, manager of the Ten Eyck Hotel, Albany, N. Y., or to F. C. Gillespie, manager of the Hampton, Albany, N. Y.

A cordial invitation is extended to all to attend the dinner and to participate in the discussions of the subjects to be presented on the following day.

Financial and Corporate

ANNUAL REPORTS

Detroit United Railway

The statement of income, profit and loss of the Detroit (Mich.) United Railway and its subsidiary companies for the years ended Dec. 31, 1914 and 1915, follows:

	1915	1914
Gross earnings from operation:		
Passenger	$12,381,828	$11,464,625
Express	800,527	717,128
Mail	12,161	11,979
Special car	41,033	46,270
Total gross earnings from operation	$13,235,551	$12,240,003
Operating expenses	9,331,803	8,702,660
Net earnings from operation	$3,903,747	$3,537,343
Other income	286,814	273,728
Gross income less operating expenses	$4,190,562	$3,811,071
Interest on funded and floating debts and taxes	2,229,801	2,166,071
Net income for the year before providing for depreciation or contingencies	$1,960,761	$1,645,000
Deduct:		
Amount credited to depreciation reserve	$750,000	$294,000
Amount credited to contingent liability reserve	......	50,000
Dividends paid—6 per cent	750,000	750,000
Total	$1,500,000	$1,094,000
Balance transferred to surplus account	$460,761	$551,000

During the fiscal year ended Dec. 31, 1915, the total earnings from operation increased $995,548 or 8.1 per cent as compared to the preceding year. The largest volume of increase came from passenger revenue, which showed a gain of $917,203 or 8.0 per cent, while the express revenue increased $83,399 or 11.6 per cent. The operating expenses also increased $629,143 or 7.2 per cent, so that the net earnings from operation rose $366,404 or 10.3 per cent. Other income increased slightly, and interest and taxes gained $63,730 or 2.9 per cent, with the result that the net income before depreciation, etc., increased $315,761 or 19.2 per cent. An amount of $750,000 was transferred to the depreciation reserve in comparison with $294,000 for the preceding year, with a decrease from $50,000 to nothing for the contingency reserve, and the balance to surplus decreased $90,239.

During the year the company carried 275,576,409 revenue passengers, 98,541,214 transfer passengers and 8,076,135 employee passengers, a total of 382,193,758 passengers. This was an increase of 36,013,358 over 1914. The receipts per revenue passenger were 0.0449 in 1915 as against 0.0453 in 1914, and the receipts per passenger were 0.0324 as against 0.0331 in 1914. Cars of the company operated 46,327,634 miles in 1915 as against 44,882,720 miles the previous year. The net earnings per car mile in 1915 were 0.0843 as against 0.0788 in 1914.

The total capital expenditures for the year on all of the company's properties, including its Canadian system, amounted to $1,295,436. On Jan. 1, 1915, the depreciation reserve stood credited with $2,707,227. This reserve is credited with $19,200 charged against operating expenses and $750,000 out of the income of 1915, leaving a balance Dec. 31, 1915, of $3,476,427. Within the year the company added about 18 miles to its track mileage, making a total of 838 miles in operation at the close of the fiscal year.

Christchurch Tramway

The revenue account of the Christchurch (New Zealand) Tramway for the year ended March 31, 1915, showed that the gross earnings from operation had amounted to £142,941 and operating expenses to £78,072. After deducting interest charges of £26,924, sinking fund of £2,833, reserve funds of £28,057, and after taking into account rates of £2,933 collectible from special areas, the net surplus for the year amounted to £9,986. If the whole deficiency on extensions in the special areas could have been collected, the surplus would have been £1,466 more. This is said to be the best results obtained in the history of the tramway board.

Several factors operated to produce this showing for the year. In the first place, owing to the arbitration court having suspended operation on account of the war, a wage increase of about £2,250 was not obtained, although this increase would have been enjoyed during the last year if the union had accepted the board's offer when the case was before the conciliation commissioner. In the next place £1,144 profit was obtained from the sale of current to the government. While the revenue showed an increase of £5,373, equal to nearly 4 per cent more than the year before, the proportionate increase was hardly so good as that for the previous year, if allowance be made for the profit on the sale of current and for the Easter week traffic. The operating receipts per car mile fell from 15.265d. to 15.099d., or 0.166d., but this drop was more than met by the decrease in operating expenses of 0.216d. per car mile.

The last figures available show that it costs the tramway board 0.99d. to carry a passenger a mile. The board has often been urged to reduce the price charged for service, it being asserted that the greater business at the lower price would give a more satisfactory result. The board states that this would be so if the reduced price allowed a reasonable margin of profit, but the tram fares at 1d. per mile allow practically no profit at all.

Chosen Light Railways and Tramways

According to the report of the railway bureau of the government-general of Chosen (Corea) for the year ended March 31, 1914, the open lines at the end of the year were 23.7 miles in length, with a single track mileage of 37 miles. Of this latter total, 7.4 miles were operated by steam, 3.2 miles by hand, and 26.4 miles by electricity. The passengers carried during the year numbered 11,565,325, while the receipts therefrom amounted to yen 343,454. The total traffic receipts totaled yen 359,681 and expenditures yen 179,265, leaving a balance of yen 180,416 as profit. The traffic receipts of the Nikkan Gas-Electric Company, which owns the 26.4 miles of electrically operated track previously mentioned, amounted to yen 327,128 and the total expenses were yen 159,918, so that the balance for profit totaled yen 167,210.

NEW JERSEY FRANCHISE ASSESSMENTS

The 1914 assessments levied by the State Board of Assessors of New Jersey upon 320 corporations and five individuals under the municipal franchise act amounted in the aggregate to $1,465,584. This was an increase of $95,429 over the 1913 tax. The taxes paid by the various utilities are shown by the following table:

Number	Classification	Gross Receipts	Tax
33	Street railways	$15,983,813	$799,191
114	Water	3,899,007	77,980
117	Gas and electric light	21,816,492	436,330
42	Telephone and telegraph	7,289,068	145,781
4	District telegraph messenger	72,065	1,441
15	Sewer and pipe line	243,047	4,861
325		$49,303,492	$1,465,584

ELMIRA STOCKHOLDERS APPROVE CHANGES

At the special meeting of stockholders of the Elmira Water, Light & Railroad Company, a subsidiary of the United Gas & Electric Corporation, held on Jan. 18 at Elmira, the propositions to increase the capital stock by $200,000, to classify the new stock as second preferred, to increase the board of directors, to amend the by-laws and to authorize the company to issue certain securities and take the steps necessary to acquire the physical properties of the Elmira & Seneca Lake Traction Company, the entire capital stock and bonds of which were already owned, were all approved.

After considering financial requirements of the Elmira Water, Light & Railroad Company for capital improvements already made and those extending over the next five months, it was determined that the obligations of the company and of the Elmira Transmission Company, which, with the approval of the Second District Public Service Commission is to be merged with the former corporation, incurred to Oct. 31, 1915, should not be capitalized entirely by the issue of bonds. It was decided to sell $125,000 of 7 per cent first preferred stock, $200,000 of 5 per cent second preferred stock and $100,000 of first consolidated 5 per cent bonds, application for authority to issue and sell these securities having already been made to the commission. Proceeds from the sale of $60,000 of the bonds will be applied to extensions and betterments subsequent to Oct. 31, while proceeds of $40,000 of the bonds and the proceeds of the stocks will be applied to liquidation of obligations incurred prior to that date for capital expenditures.

REPORT OF VIRGINIA COMMISSION

Lines in 1914 Showed Revenue Increase but Larger Operating Expense Increase—Net Income, however, Gained 20.49 Per Cent Because of Outside Income

The total transportation revenue of the twenty-one electric railways under the supervision of the State Corporation Commission of Virginia amounted to $5,587,218 for the fiscal year ended June 30, 1914. This total was made up of the following items: Passenger revenue, $5,179,172; special car revenue, $17,593; mail revenue, $10,019; express revenue, $15,913; milk revenue, $24,871; freight revenue, $323,586, and miscellaneous revenue, $16,062. As compared to the preceding fiscal year, the passenger revenue showed an increase of 2.52 per cent, special car revenue 11.09 per cent, freight revenue 3.98 per cent, and total revenue 2.16 per cent. Mail, express, milk and miscellaneous revenue, however, showed a combined loss of 3.36 per cent. Revenue from operations other than transportation totaled $79,356 for the year, a gain of 19.69 per cent, so that the total operating revenues amounted to $5,666,574. The earnings per mile totaled $12,054, an increase of 3.07 per cent.

The total operating expenses for all of the companies amounted to $3,501,705, an increase of 4.2 per cent over the preceding year. Of this amount $513,479 was spent in maintenance of way and structures, an increase of 13.11 per cent; $405,235 in maintenance of equipment, an increase of 18.15 per cent; $50,518 for traffic, a decrease of 9.66 per cent; $1,903,162 for conducting transportation, an increase of 1.47 per cent, and $629,309 for general and miscellaneous, a decrease of 0.45 per cent. The expenses per mile of track amounted to $7,449, an increase of 6.05 per cent. The income from rail operation for all the companies totaled $2,164,869, a decrease of 0.79 per cent as compared to the preceding year. The income from other sources equaled $2,168,206, an increase of 17.3 per cent, so that the gross income amounted to $4,333,076. The deductions from income totaled $3,186,214, with the result that the net income was $1,146,861, an increase of 20.49 per cent for the year.

During the year the companies carried 103,117,967 revenue passengers and 18,754,698 free passengers, while the car-mile and car-hour totals were 22,925,117 and 2,581,851 respectively. Other statistics follow: average fare, revenue passengers, 4.77 cents; average fare, all passengers, 4.04 cents; transportation earnings per car-mile, 22.41 cents; other than transportation earnings per car-mile, 0.33 cent; transportation earnings per car-hour, $1.9883; other than transportation earnings per car-hour, 2.90 cents; operating expenses per car-mile, 13.72 cents; operating expenses per car-hour, $1.2166. As compared to the preceding year the average fare for revenue passengers showed an increase of 0.11 cent, and the average fare for all passengers an increase of 0.09 cent. Other operating statistics, however, showed decreases as follows: Transportation earnings per car-mile, 1.88 cents; miscellaneous earnings per car-mile, 0.13 cent; total earnings per car-mile, 2.01 cents; transportation earnings per car-hour, 8.92 cents; miscellaneous earnings per car-hour, 0.62 cent, and total earnings per car-hour, 9.54 cents.

American Railways, Philadelphia, Pa.—The American Railways has announced that the $2,300,000 three-year 5 per cent secured notes dated Feb. 1, 1916, and yielding at the sale price about 5¾ per cent have been sold. The proceeds of the sale of the notes will be used to pay off the entire floating debt of the company and for other corporate needs. Upon completion of this transaction the company will have in its treasury a sum of not less than $900,000 in cash and unpledged securities of a value in excess of $5,000,000.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—In the course of a long notice to the bondholders the committee representing the holders of the consolidated mortgage 5 per cent gold bonds of the Cincinnati, Dayton & Toledo Traction Company due in 1922 said in a circular to the holders of that issue: "The interest which fell due on Jan. 1 on certain of these $2,300,000 of prior bonds is in default. The principal of one of these issues falls due on July 1 next. We are advised that a protective committee of the Cincinnati & Hamilton first mortgage 6 per cent bonds has been formed in Cleveland and proposes to proceed to foreclose the mortgage, the interest on which was defaulted on Jan. 1. There are outstanding $2,700,000 of Cincinnati, Dayton & Toledo bonds. With such a large amount of prior liens, interest already defaulted on some, and maturity near at hand with others, the danger is that by foreclosure of some or all of the five mortgages the investment of the Cincinnati, Dayton & Toledo bondholders will be entirely wiped out. As prompt action is important the committee will shortly announce a time limit for the deposit of bonds with the Provident Savings Bank & Trust Company, Cincinnati, Ohio, after which no further bonds will be accepted. Many bonds have already been deposited."

Clarksville & Dunbar Cave Railway, Clarksville, Tenn.—The Citizens' Street Railway, organized by business men of Clarksville, has completed arrangements to take over the Clarksville & Dunbar Cave Railway, which the owners had decided to dismantle. Service will shortly be resumed. A five-year agreement has been entered into between the Citizens' company and the Clarksville Electric Company to provide the necessary power. A committee of the stockholders consisting of John J. Conroy, W. E. Beach, C. W. Bailey, W. A. Chambers and M. L. Cross has been named to arrange for the incorporation of the proposed successor company.

Fort Wayne & Springfield Railway, Decatur, Ind.—Judge John H. Aiken, sitting as special judge in the Circuit Court of Jay County at Decatur, Ind., has passed upon all the claims against the Fort Wayne & Springfield Railway. After the allowances were made, the receiver was directed to settle according to the order of the court. A number of the claims, including those of several Fort Wayne and Decatur banks, were settled upon a 90-cent basis. The receiver and his attorneys were allowed $9,500 for their services. A few of the claims were treated as preferred ones and were allowed in full, although the court ruled that should there be a surplus after the claims were paid according to the order of the judge it should be distributed pro rata among those who received less than face value for their accounts against the company.

Georgia Railway & Power Company, Atlanta, Ga.—P. S. Arkwright, president of the Georgia Railway & Power Company, was quoted recently as follows in regard to the year ended recently: "We have had a trying year. Our revenue has suffered from various causes and we have been at unusually heavy expense in some respects. We have got through nicely, however, and have taken care of our bonds, maintenance, improvements, etc., in first-class shape, but there will not be any surplus to speak of. We consider ourselves well off, nevertheless, and look forward to a good year."

Idaho Traction Company, Boise, Idaho.—The railway operating revenues of the Idaho Traction Company for the year ended June 30, 1915, as reported by the Idaho Public Utilities Commission, amounted to $352,141, while the railway operating expenses totaled $248,145, leaving net revenue from railway operation of $103,995. The net revenue from auxiliary operations amounted to $8,037, giving a net operating revenue of $112,033. Taxes assignable to operations amounted to $13,620, so that the operating income was $98,413. The non-operating income totaled $645, and deductions from gross income equaled $99,052, leaving an income balance of $6 for profit and loss. This company carried 3,273,908 regular fare passengers during the year, the total number of passengers carried being 3,485,386. The total car mileage amounted to 1,369,937. The properties of this company, which formerly operated under lease the railway lines of the Idaho Railway, Light & Power Company, are now owned by the Boise Valley Traction Railway, as noted in the ELECTRIC RAILWAY JOURNAL of Sept. 4, 1915.

Interborough Rapid Transit Company, New York, N. Y.—J. P. Morgan & Company, New York, as syndicate managers, announce that they have taken an additional $15,000,000 of the expected total allotment of $160,658,000 of first and refunding 5 per cent mortgage bonds of the Interborough Rapid Transit Company, making the amount taken to date $143,678,000 and leaving $17,000,000 to be taken before Dec. 31, 1916. The bonds were authorized in 1912 in connection with the agreement with the city for the construction of subway and elevated extensions and the interest during the construction period was provided for as part of the cost of the work. Of the $128,658,000 of the issue put out prior to December, 1915, $76,043,000 represented new subways and extension and third tracking of the elevated roads. The Public Service Commission will adopt an order granting the application of the Manhattan Railway for permission to issue $5,409,000 in bonds for the purpose of reimbursing the Interborough Rapid Transit Company, the lessees of its lines, for permanent improvements made thereto, including the lengthening of station platforms. It is the purpose of the Manhattan Railway to issue $3,708,069 at the present time. The bonds are to be issued under a second mortgage, which will also be approved by the commission.

Kansas City (Mo.) Railways.—There seems now no impediment to the successful consummation of plans for the reorganization of the street railways of Kansas City, and the coming into existence of the Kansas City Railways about Feb. 15. It is said that definite decision has not yet been reached as to the personnel of the officials or the titles that the operating officials shall bear, and the work they shall do. It has been announced, however, that the company's member of the board of control will be president of the road and its chief operating official, though possibly an operating official may be selected subordinate to the board of control and to the company member. P. J. Kealy is now the company member of the board, and Robert P. Woods is the city's member.

Marlboro & Westboro Street Railway, Worcester, Mass.—A block of the $160,000 of 5 per cent bonds of 1901 of the Marlboro & Westboro Street Railway is being offered for subscription by Cropley-McGaragle & Company, Boston, at 102.41 to yield about 4½ per cent. The bonds are due on July 1, 1921, but are callable on any interest date at 105 and interest. The issue is secured by a closed first mortgage at $11,500 per mile on 13.43 miles of the main track through Westboro and Marlboro now forming part of the Worcester Consolidated Street Railway, the first refunding 4½ per cent bonds of which are reserved to retire the Marlboro & Westboro Street Railway issue.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—It was announced recently that the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company would on Jan. 31 terminate its lease with the Chicago & Great Western Railroad covering the 57-mile section of line between Randolph and Mankato, Minn. On that date the Chicago & Great Western Railroad was again to take over the operation of this line, the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company to continue to operate its original line between Minneapolis and Northfield.

Monterey Railway, Light & Power Company, Monterey, Mex.—The British Empire Trust Company, Ltd., and the National Trust Company, Ltd., London, as trustees for the 5 per cent first mortgage debenture stock of the Monterey Railway, Light & Power Company, have sent a circular to the holders of these securities explaining the reasons for not taking legal proceedings in view of the default in the payment of interest. The circular states that the management appears to be competent, that there are no creditors' proceedings or preferential payments threatened, and that legal measures might result in disturbing the company's friendly relations with the Mexican authorities.

Northern Electric Railway, Chico, Cal.—John P. Coglan, receiver for the Northern Electric Railway, filed in the federal court on Jan. 27 an account covering the first nine months of the receivership, from Oct. 5, 1914, to June 30, 1915. The total income during this period was $738,190, and total expenditure amounted to $672,639. These expenditures included $113,287 for extraordinary repairs (deferred for several years) and $44,000 for new construction. During the receivership the revenue from the several lines, bonus for car service and miscellaneous receipts totaled $611,261, while gross maintenance and operating expenses amounted to $584,316, the difference, representing operating surplus, being $26,944. When the road was turned over to the receiver, the report states, the cash on hand amounted to only $829, current bills totaled $51,000 and the monthly payroll then due called for $35,000.

Public Utilities Company, Evansville, Ind.—The Public Utilities Company of Evansville, a subsidiary of the Commonwealth Power, Railway & Light Company, has asked the Public Service Commission of Indiana to approve the issue of $320,000 of stock and $1,109,000 of bonds, and also for authority to issue its own bonds for the retirement of underlying securities. The underlying securities which it is desired to retire are $1,200,000 of Evansville Electric Railway bonds, $350,000 of Evansville & Princeton Traction Company bonds, $1,208,000 Evansville & Southern Indiana Traction Company bonds, $1,250,000 Evansville Gas & Electric Light Company bonds and $300,000 Evansville Public Service Company bonds. The company also asked authority to sell the $1,109,000 of bonds at 85, the proceeds to be used in paying for improvements and additions. The Evansville Public Service Company asked authority to issue $450,351 of bonds.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—E. H. Rollins & Sons, Boston, Mass., are offering at par and interest an additional block of $500,000 of first mortgage thirty-year, 6 per cent gold bonds of Salt Lake & Utah Railroad, making the total issued to date $1,250,000.

San Francisco (Cal.) Municipal Railway.—The public utilities committee of the Board of Supervisors of San Francisco on Jan. 26 considered the proposed purchase by the city of the United Railroads lines west of Twin Peaks, but did not reach a conclusion. The purchase was recommended last year by the city engineer, who said the city should buy these lines for the purpose of connecting them with the railroad to be constructed through Twin Peaks tunnel, and the utilities committee of the old Board of Supervisors made a favorable report on the proposition.

Southern Traction Company, Dallas, Tex.—The earnings of the Southern Traction Company for the year ended Dec. 31, 1915, are reported unofficially as follows: total operating revenues, $1,051,417; operating expenses, $605,756; net operating revenues, $445,661; taxes, $41,036; operating income, $404,624; miscellaneous interest and discount, $15,912; balance available for fixed charges, etc., $388,712; interest on first mortgage bonds, $300,000; interest on second mortgage bonds, $25,000; surplus, $63,712. Albert T. Perkins of the St. Louis Union Trust Company, who is a director and member of the executive committee of the Southern Traction Company, is quoted as follows: "The company has more than earned all interest charges on its bonds and other obligations during its two years of operation. Prospects are good that a dividend will be earned on the preferred stock during the present year."

Toledo Railways & Light Company, Toledo, Ohio.—The Interurban Station Company, the Toledo, Ottawa Beach & Northern Railway and the Maumee Valley Railway all re-elected officers at the annual meeting on Jan. 20. R. E. Berger was elected to the board of the Toledo & Western Railroad to succeed F. J. Derge.

Washington (D. C.) Interurban Railroad.—The Washington Interurban Railroad has filed with the Public Utilities Commission of the District of Columbia an application for authority to issue $150,000 of first-mortgage bonds and $150,000 par of common stock, divided into shares of $50 each. It is stated in the petition that the proceeds of the proposed bond and stock issue are to be used for the payment of the purchase price of the property and other indebtedness, including reorganization expenses.

DIVIDENDS DECLARED

Cleveland & Eastern Traction Company, Cleveland, Ohio, one-half of 1 per cent.

Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, common and preferred.

Illinois Traction System, Peoria, Ill., three-quarters of 1 per cent, quarterly.

Lehigh Valley Transit Company, Allentown, Pa., quarterly, 1¼ per cent, preferred.

Lincoln (Neb.) Traction Company, quarterly, 1½ per cent, preferred.

Tampa (Fla.) Electric Company, quarterly, 2½ per cent.

United Power & Transportation Company, Camden, N. J., $1.55.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred; quarterly, 1¾ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE RAILWAY, KENNEBUNK, ME.

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec.,	'15	$22,659	$19,445	$3,214	$607	$2,607
1 “ “	'14	23,721	22,241	1,480	631	849

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

1m., Dec.,	'15	$154,562	$100,705	$53,857	$44,559	$9,298
1 “ “	'14	152,658	103,250	49,408	43,556	5,852
6 “ “	'15	1,024,321	649,951	374,370	270,255	104,115
6 “ “	'14	1,097,376	685,063	412,313	261,265	151,048

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m., Nov.,	'15	$7,872	*$7,763	$109	$1,102	†$993
1 “ “	'14	8,056	*8,721	†665	1,140	†1,805
12 “ “	'15	115,133	*96,204	18,929	13,525	5,404
12 “ “	'14	121,375	*101,495	19,880	13,075	6,805

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

1m., Nov.,	'15	$33,012	*$17,790	$15,522	$6,642	$8,580
1 “ “	'14	30,044	*17,847	12,197	6,601	5,596
12 “ “	'15	350,740	*205,580	145,160	79,330	65,830
12 “ “	'14	356,269	*209,974	146,295	77,252	69,043

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Dec.,	'15	$532,195	$17,788	$514,407	$40,833	$473,574
1 “ “	'14	404,808	12,045	392,763	40,833	351,930
12 “ “	'15	4,479,800	172,856	4,306,944	490,000	3,816,944
12 “ “	'14	3,934,453	116,908	3,817,545	420,000	3,397,545

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

12m., Dec.,	'15	$2,636,364	*$1,505,786	$1,130,578	$792,414	$338,164
12 “ “	'14	2,513,620	*1,457,020	1,056,600	758,859	297,741

EASTERN TEXAS TRACTION COMPANY, BEAUMONT, TEX.

1m., Nov.,	'15	$71,406	*$33,824	$37,582	$8,714	$28,868
1 “ “	'14	56,867	*31,412	25,455	8,606	16,849
12 “ “	'15	709,293	*382,518	326,775	105,163	221,612
12 “ “	'14	672,441	*403,390	269,051	101,110	‡172,811

FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.

1m., Nov.,	'15	$120,580	$90,559	$30,021	$52,994	†‡$22,601
1 “ “	'14	147,015	82,375	64,640	53,130	‡12,154
11 “ “	'15	1,506,883	918,301	588,582	590,903	‡2,102
11 “ “	'14	1,668,508	963,128	705,380	580,711	‡129,052

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

1m., Nov.,	'15	$22,846	*$12,910	$9,936	$5,422	$4,414
1 “ “	'14	19,590	*13,901	5,689	5,613	86
12 “ “	'15	271,259	*159,269	111,990	66,600	45,390
12 “ “	'14	279,980	*180,484	99,496	67,068	32,428

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

1m., Nov.,	'15	$65,480	$32,745	$32,735	$20,283	‡$14,273
1 “ “	'14	61,559	33,353	28,206	19,776	‡10,421
5 “ “	'15	371,507	188,123	183,384	101,895	‡87,446
5 “ “	'14	366,120	192,738	173,382	98,662	‡82,661

SAVANNAH (GA.) ELECTRIC COMPANY

1m., Nov.,	'15	$66,449	*$43,138	$23,311	$23,121	$190
1 “ “	'14	69,870	*43,201	26,669	23,089	3,580
12 “ “	'15	796,988	*519,795	277,193	278,584	†1,391
12 “ “	'14	845,466	*557,273	288,193	274,880	13,313

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

1m., Nov.,	'15	$465,884	$214,260	$251,624	$142,528	‡$117,349
1 “ “	'14	427,352	202,825	224,527	134,235	‡96,868
5 “ “	'15	2,282,517	1,084,646	1,197,871	715,507	‡525,288
5 “ “	'14	2,189,055	1,049,716	1,139,339	677,925	‡495,870

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

MASSACHUSETTS COMMISSION REPORTS ON BOSTON PROBLEMS

Public Service Board Orders Measures for Relief of Congestion at Dudley Street Transfer Station and for Other Improvements

A comprehensive report was submitted to the Massachusetts Legislature on Jan. 26 by the Public Service Commission relative to means of improving service on the Boston Elevated Railway at Dudley Street transfer station and the adjacent Roxbury district served by elevated and surface car lines. The growth of traffic in recent years has caused considerable congestion at the Dudley Street station, one of the most important transfer points in Boston and the original southerly terminus of the elevated system completed in 1901. The Legislature of 1915 requested the commission to investigate traffic conditions at this point, with the practicability of requiring the company to issue paper transfers in place of the bodily transfer in vogue since the opening of the rapid transit lines; to consider the necessity for an additional elevated station at Dale and Washington Streets, the need of a more extended use of the Egleston Square station of the elevated lines, and the general methods of handling traffic in the territory. In its finding the commission sustains the contentions of Matthew C. Brush, vice-president, that the issue of paper transfers at Dudley Street is undesirable, holds that by certain changes ordered on the date of the report in the arrangement of platform facilities, car routing and increase in elevated train capacity congestion at the Dudley Street station will be materially relieved, and points out that the transfer of the Mattapan surface line to Egleston Square in consonance with the use of that station as a supplementary transfer point will facilitate travel in the district, as will the institution of a shorter-interval surface car service south of Dudley Street.

Dudley Street station is still the terminus of many surface lines operating in Dorchester and Roxbury and the principal transfer point between these lines and the rapid transit system. The station was enlarged in 1909, and the method of operation changed. As now operated, there are three levels; the top level serves through south-bound rapid transit trains; the intermediate level serves north-bound trains and certain surface lines using the so-called east and west loops on this level; and the lower or ground level serves certain surface lines routed to or through the station. The station is so designed that a passenger entering on any car or train can transfer, without going outside the station limits, to any other train or car going in the same general or in a lateral direction.

It is estimated that about 85,000 passengers, both inbound and outbound, transfer daily in this station, and about 40 per cent of these transfer in the rush hours. The present congestion is most acute at the east loop, where more than 40,000 passengers transfer daily in each direction. About 10,000 of these transfer to and from the Mattapan line, a through route extending axially to the southern limit of the company's system. This line is to be diverted to Egleston Square station as its terminus, affording quicker and better transportation for the Dorchester district and relieving Dudley Street station accordingly, the usual transfer between trains and surface cars to be in vogue at Egleston Square. It is expected that the necessary changes at the latter point will be completed within six months.

Further relief at Dudley Street east loop will be obtained by using the central circular area inside the loop as a loading platform and outer circular platform for unloading surface cars. Cars coming into the upper prepayment area on the east loop will stop at any point on the loop that traffic will permit and discharge passengers anywhere on the outer platform. When the car has been emptied, doors on the unloading side will be closed and the opposite ones opened to permit loading from the central area. This arrangement will separate inward and outward passengers. It will require only one stop for each car for the loading and unloading operations, shortening the time the car remains in the station, and will increase the available space for cars loading and unloading. The maximum distance from the center of loading area to any car in a loading position will be decreased, various obstructions now leased to concessionaires will be removed, and a better view of cars with consequently greater accessibility for transfer will result.

Under this plan the standing room for passengers waiting to load at the east loop will be increased by about 2000 sq. ft., or about 50 per cent. The car movement will be accelerated, and nearly double the present number of cars may be loaded and unloaded at one time. To further improve the efficiency of operation the board has ordered the company to install an indicator showing the stopping place of each car during the evening rush hours. The commission states that the tendency to lease portions of important station inclosures for mercantile purposes should be discouraged, pointing out that no commercial establishment should be allowed within the areas which interfere with their functions as agencies of rapid transit. Additional switch connections are to be made on the surface level to route surface cars from the north through the station via Warren Street, thus diverting about 60 cars an hour from tracks on this level which are most congested. This will result in a better distribution of both cars and passengers and will better the service materially.

Regarding the crowding of elevated trains during rush hours, the only immediate relief appears to be the increase in the number of cars per train from six to seven in the morning rush and from seven to eight in the evening rush hours. Certain rearrangements of signals and other facilities will be completed to enable this service to be enlarged by about Feb. 5. The completion of the Dorchester tunnel to Andrew Square will further relieve congestion at Dudley Street through resultant diverting of routes.

In discussing the paper transfer as related to the free bodily transfer afforded by the operation of cars in prepayment areas, the board sets forth views of general significance. The legislative resolution required the commission to consider the practicability and advisabilty of requiring the company to issue to each passenger a free transfer ticket enabling him to transfer from any car running into or out of the station or on any adjoining street, to any other car going in the same general direction. The question raised here was the feasibility of issuing paper checks for transfer in place of the bodily transfer now afforded. It was not contended at the hearings that passengers should have the option of bodily transfer or transfer by check, a duplication of facilities which the commission believes would be wholly without precedent in street railway operation. The inquiry resolved itself into a question of the expediency of providing in the case of certain lines for the transfer of passengers upon the streets adjacent to the terminal station through the use of paper transfers rather than within the station by bodily transfer.

The advocates of the use of paper transfers, the board states, failed to show in what respect the use of such transfers as a general policy of railway operation has any inherent advantage for the traveling public as compared with a bodily transfer. The latter facilitates a more rapid and efficient car movement and usually permits a quicker and easier transfer without exposure to inclement weather or danger from vehicular traffic in the streets. The enormous number of paper transfers issued by the company, amounting to more than 100,000,000 yearly, makes it practically impossible to provide effectively against their misuse.

From data presented in great detail by the company it appears that the illegitimate use of the paper transfers deprives the company of a substantial annual revenue which might otherwise be available for needed improvements in its present transportation facilities. The board points out that where paper transfers are necessary in order to provide reasonable facilities, the possibility of their misuse is not an adequate reason for withholding them. In this connection the board states: "At the same time there would seem to be no sound reason for advocating a method of transfer which has proved so wasteful in operation if more economical and equally convenient facilities are available by a bodily transfer."

The report states that the bodily transfer better promotes rapid transit and that the advocates of paper transfers were largely identified with merchants and property owners in the Dudley Street district seeking business and enhancement of property values through stop-over trading. The latter is not the object of transfer privileges.

The commission reviews the evidence relative to the need of establishing a new elevated station at Dale Street. This station, the company figures, would cost $88,000, with annual costs of $28,000. In view of the delay of two minutes a day to the 40,000 or 50,000 passengers using the rapid transit lines south of Dudley Street, the commission feels that the 2500 or 3000 patrons from the Dale Street district cannot justly ask for the building of the new station, especially at a point without intersecting surface lines. An increase in surface car service on Washington Street, south of Dudley Street station, however, will improve the service.

RAILWAY RECEIVER FAVORS NEW JERSEY JITNEY BILL

Judge C. L. Cole, receiver for the Atlantic City & Shore Railroad, Atlantic City, N. J., which was forced into the hands of a receiver recently, due to unrestrained jitney competition, justifies the legislation pending in New Jersey for the regulation of jitneys in all the cities in the State. Without legislative protection, bringing jitneys under fair and reasonable regulation, he asserted, the railway system cannot hope to recover. Judge Cole said that fair play demands that the jitneys should be subjected to adequate regulation. He maintained also that the motor conveyances should be placed under the control and regulation of the State Public Utility Commission.

In the interest of economy and in order to make it possible to keep the maximum number of men on the payroll, Judge Cole has reduced the working time of car crews to nine hours a day. The men are paid on the hourly basis. Another order has stopped the running of cars below Portland Avenue in Ventnor City, a suburb of Atlantic Cit. This curtailment of service was also a direct result of jitney competition.

Jitneys Suspend in Bakersfield, Cal.—About forty jitneys which have been running since October, 1914, have retired from the field in Bakersfield, Cal., owing to the new ordinance passed by the City Council. This measure requires a surety bond of $5,000.

New Jersey Jitney Bill Tabled.—The Kates bill providing for jitney regulation in New Jersey was tabled on Jan. 31, following a demonstration by jitney owners which has been described as "the greatest aggregation of motor vehicles ever lined up in Trenton."

Decision Reserved in Fare Case.—Decision has been reserved by the Public Service Commission for the Second District of New York on the application of patrons of the Warren & Jamestown Street Railway for a reduction in fare between Jamestown and Frewsburg, from 10 cents to 5 cents.

Kentucky Jitney Bill Killed.—The Kentucky Senate has killed a bill which was introduced to provide for regulation of jitney bus lines and for placing them on the same basis as other common carriers. Senator Robertson, author of the measure, contended on the floor that the bill had been denied a full hearing, but he was unable to get the favorable attention of the Senate.

Stock for Rockford Employees.—An arrangement is being worked out by which employees of the Rockford & Interurban Railway and the Rockford City (Ill.) Traction Company will be permitted to purchase on the installment plan stock of the Commonwealth Power, Railway & Light Company, which controls the properties in Rockford, through ownership of the stock of the Union Railway, Gas & Electric Company.

Increased Service Ordered in Hartford.—The Public Utilities Commission of Connecticut has issued an order directing the Connecticut Company to take immediate steps to do away with overcrowding of cars. The order is the result of a petition addressed to the commission on Jan. 14 by the Hartford Board of Health. The commission directs the company to make a report of its progress along the lines of improved service on or before March 1.

"To the Click of the Wheels."—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has reprinted in a booklet 6 in. high by 3½ in. wide, entitled "To the Click of the Wheels," the poems touching safety and many other subjects which have appeared in the company's bulletin. The pamphlets are being distributed through racks in the cars. Each poem occupies a single page and is introduced with a line cut bearing on the subject of the verses.

Express Package Business in Reading. — The Reading (Pa.) Transit Company is so well pleased with the express package business started on Dec. 20, that it has been decided to continue the service, and to prohibit the carrying of express packages on the regular cars, which practice had assumed such proportions that it interfered with passenger service. All express matter will now be carried on regular express cars which will be run at stated intervals on all suburban lines, excepting Temple and Stony Creek. A receiving station has been established at the Third Street carhouse. The company has requested the public to communicate suggestions which if adopted would tend to improve the service.

Fatal Accidents in New York in January.—According to the report of the National Highways Protective Society thirteen children lost their lives on the streets and highways of New York City in January, automobiles killed ten and wagons three. The total number of persons killed by vehicles was thirty-four. Of these, twenty-two were killed by automobiles, seven by electric railways and five by wagons, as compared with twenty-three by automobiles, four by electric railways and four by wagons during the corresponding month last year. Eighteen persons were killed by vehicular traffic in the State of New York outside of New York City during the month. In New Jersey, for the same period, fifteen persons were killed by automobiles and one by wagon, as compared with thirteen by automobiles for a like period in 1915.

Bay State Fare Hearing Continued.—The Massachusetts Public Service Commission resumed hearings upon the fare case of the Bay State Street Railway on Feb. 1. Following the announcement that the company is not as yet ready to present all its witnesses, the hearing was continued until Feb. 8, at the board's offices in Boston. A resolve has been introduced into the Legislature extending the time at which the proposed fare increase shall become effective, counsel for the numerous municipalities affected having found the task of investigating the company's evidence and books too great for completion since the last hearing in November. James F. Jackson, counsel for the company, announced that within a week a schedule of proposed fares for workingmen, supplementing the present suggested tariff, would be filed with the commission.

Effect of Jitney Operation in Seattle.—The department of Public Utilities, Seattle, Wash., of which A. L. Valentine is superintendent, has a traffic division which each day makes observations of the street railway lines, particular attention being given to the morning and evening rush-hour periods. The report of this department for the year ended Nov. 30, 1915, recently filed with the Mayor, is of particular interest because the results of the aforementioned observations threw a clear light on the effects of jitney competition in Seattle. The report shows a summary on one day—Oct. 15, 1914—for all lines during the evening rush hour, to be 27,606. A count taken on the same date of 1915 shows 23,162, a decrease of 4444 in the number of passengers, or exactly 16 per cent. This count is further supplemented by an eighteen-hour count of travel over four drawbridges for 1914, which shows a total of 81,322 persons crossing these bridges, 73,030 being carried on street cars and 8292 in automobiles and other vehicles. A count taken in 1915 shows a total of 81,003 persons crossing these bridges for all conveyances, 60,278 being on street cars, a decrease of 12,752 or 16 per cent, and 20,725 being in automobiles and other vehicles, an increase of 12,433 in the number carried in automobiles. This is said to show that the same number of people (the difference being but 319) passed over these bridges during 1915, but 16 per cent of them had been diverted to automobiles.

Personal Mention

Mr. Frank D. Edmunds, who has been connected with the New York (N. Y.) Railways for some time, has been appointed claim agent of the company, vice Mr. P. C. Nickel.

Mr. Frank W. Frueauff, New York City, who has been a vice-president of the City Light & Traction Company, Sedalia, Mo., has been elected president of the company to succeed Mr. Henry L. Doherty.

Mr. D. D. Price, who has been master mechanic of the Cumberland & Westernport Electric Railway, Cumberland, Md., has been promoted and has assumed charge of track maintenance in addition to his other duties.

Mr. Charles S. Hervey has been nominated by Governor Whitman of New York for appointment to the Public Service Commission, First District, for the one-year vacancy caused by the resignation of Mr. George V. S. Williams.

Mr. Harry Hartwell, who has been connected with the Pearson Engineering Corporation, New York for the last four years as assistant to the vice-president, has been appointed acting general manager of the Winnipeg (Man.) Electric Railway.

Mr. Travis H. Whitney has been nominated by Governor Whitman of New York for appointment to the Public Service Commission, First District, for the five-year term to succeed Mr. J. Sergeant Cram, whose term of office has expired. Mr. Whitney has been secretary of the commission since its inception.

Mr. Frank Irvine has been nominated by Governor Whitman of New York for reappointment to the Public Service Commission, Second District, for a five-year term. It was stated recently that Mr. Irvine expected to retire from the commission to return to his post at Cornell University as dean of the college of law.

Mr. Ralph E. Truesdell, who has been connected with the electrical department of the Empire United Railways, Syracuse, N. Y., and associated lines for the last eight and one-half years, has severed his connection with that company to accept the position of chief electrician with the Halcomb Steel Works, Syracuse, N. Y.

Mr. Harold A. Crane, connected with the banking firm of Bodell & Company, Springfield, Mass., and Providence, R. I., has been elected treasurer of the Connecticut Valley Street Railway and Massachusetts Northern Street Railway, with headquarters at Greenfield, Mass. He was at one time assistant treasurer of the Massachusetts Agricultural College.

Mr. Louis H. Egan, general manager of the Kansas City (Mo.) Electric Light Company, has resigned from the company. Mr. Egan went to Kansas City in 1910 and in addition to his work with the Kansas City Electric Light Company he acted as advisor to his father, Mr. John M. Egan, president of the Metropolitan Street Railway, that city, on technical electrical matters affecting that property.

Mr. R. E. McDougall, claim agent of the New York State Railways, Rochester Lines, and first vice-president of the American Electric Railway Claims Association, was elected acting president of the association by the executive committee at the mid-year meeting in Chicago on Feb. 4. He will serve in the place of Mr. George Carson, Seattle, who was elected at the San Francisco convention, but who has since severed his connection with the Puget Sound Traction, Light & Power Company.

Mr. George W. Shockey, who has been chief inspector of the Capital Traction Company, Washington, D. C., for several years, has been made superintendent of transportation of the company. Mr. Shockey entered the service of the company as a conductor in 1895, and in 1900 was promoted to the position of inspector, being the first open inspector in the employ of the company. In 1910 he received the title of chief inspector. For the last fifteen years Mr. Shockey has been looking after the operation of cars on all the lines of the company and reporting on traffic conditions, taking care of special parties, etc.

Mr. W. W. Wysor, for the last eight years chief engineer of maintenance of way of the Lehigh Valley Transit Company, Allentown, Pa., has resigned to accept the position of assistant chief engineer of maintenance of way of the United Railways & Electric Company, Baltimore, Md. Mr. Wysor became connected with the company at Allentown at the beginning of the rehabilitation program undertaken by Mr. R. P. Stevens, former president of the company, and took an important part in the work that has made the Lehigh Valley Transit Company one of the most substantial urban and interurban electric railways in the country. Mr. Wysor was formerly chief engineer for the Chattanooga (Tenn.) Railways and previous to January, 1908, he was connected with the Norfolk & Western Railway as assistant engineer in charge of location and construction work for a period of about seven years. Mr. Wysor also served for a short while as a mining engineer in the Pocahontas coal fields of West Virginia.

Mr. Charles E. Jenkins has been appointed chief engineer of maintenance of way of the Lehigh Valley Transit Company, Allentown, Pa., succeeding Mr. W. W. Wysor, resigned, who has become connected with the United Railways & Electric Company, Baltimore, Md. Mr. Jenkins has had a long and varied experience with both electric and steam railways and has been engaged in municipal and general engineering work in New York City and Newark, N. J. Early in his career he was connected with the White Plains & Elmsford Street Railway in the construction of its lines between White Plains and Tarrytown, N. Y. He was next associated with the Passaic & Paterson Street Railway in building its connecting link between Passaic and Newark, N. J., and later with the Long Island Railroad in the reconstruction of its passenger and freight terminals in Long Island City, N. Y. For the last eleven years Mr. Jenkins has been engineer of the Easton Transit Company, Easton, Pa., now a subsidiary to the Lehigh Valley Transit Company, and in addition to his new responsibilities will retain supervision of the lines of the Easton company.

Mr. Frank S. Krug, city engineer of Cincinnati, has been chosen administrative head of the proposed Cincinnati Rapid Transit & Interurban Railway project by the Rapid Transit Commission of that city. Mr. King is also to be chief engineer of the commission, and will have charge of the actual construction if the citizens approve the $6,000,000 bond issue for the improvement that is to be submitted to them in April. Following his graduation from Pennsylvania Military College in 1884, with a degree in civil engineering, Mr. Krug obtained a position in the office of the county engineer of Hamilton County, Ohio, and rose to the rank of assistant county engineer. In 1891 he became county engineer, which office he held for fourteen years. In recognition of his work his alma mater conferred the degree of master of engineering on him in 1904. Following his service with Hamilton County, Mr. Krug became associated with the Kirchner Construction Company, Cincinnati, Ohio, as secretary and chief engineer. In January, 1914, he accepted the appointment of city engineer of Cincinnati.

Mr. Elon von Culin, formerly chief clerk in the transportation department of the Capital Traction Company, Washington, D. C., has been appointed superintendent of traffic of the company. All Mr. von Culin's business experience has been in the railway work or in railway construction. From 1890 to 1895 he was in the office of the chief engineer of the Baltimore (Md.) Traction Company and the office of the president of that company. From 1895 to 1897 he was with Mr. Edmund Saxton, street railway contractor, who built the cable railway systems in Washington and part of the underground electric railways in that city. From 1897 to 1898 he was with the Nassau Construction Company, New York City, sub-contractors for a portion of the Amsterdam Avenue and Madison Avenue conduit lines in that city. He was also engaged in 1898 on the construction of the Huntington (L. I.) Railroad, controlled by the Long Island Railroad, for which the Nassau Construction Company had the general contract. Mr. von Culin entered the service of the Capital Traction Company in December, 1898, and for several years thereafter was with the engineering department of that company. He has since been in the operating department.

Mr. John M. Egan, who went to Kansas City in February, 1910, to manage the rehabilitation of the street railways, expecting to remain three years, has tendered his resignation as president of the various companies and as general manager of the Metropolitan Street Railway, effective on Feb. 11, when the companies will go out of existence, and the Kansas City Railways will take charge of the property. Mr. Egan is sixty-nine years old. He will retire, at least temporarily, from active work. Mr. Egan was born in Springfield, Mass. His father was associated with the group of men who went West in 1851 and became the officials of the Illinois Central Railroad. Mr. John M. Egan served as apprentice in a machine shop of the railroad at Amboy for more than three years and then went into the superintendent's office. After serving in various other capacities with the company, he became connected with the division engineer's office of the Illinois Central, until the division engineer's appointment as chief engineer of the old Northern Missouri Railroad, at St. Louis, Mr. Egan going with him as chief clerk. Mr. Egan was promoted to assistant division engineer, division engineer and assistant chief engineer. The superintendent of the St. Louis, Kansas City & Northern, the successor to the Northern Missouri Railroad, was William Van Horn, who later became Sir William Van Horn, under whom Mr. Egan served on the Southern Minnesota Railroad and the Canadian Pacific Railway at Winnipeg. From Winnipeg he went to St. Paul as general superintendent of the old Manitoba road, now the Great Northern. He next went to the Chicago Great Western. Mr. Egan afterward operated an iron ore road in Michigan, and went thence to Savannah, Ga., as vice-president of the Central of Georgia Railroad and the Ocean Steamship Company. In 1904 he took charge of the Armour-Swift-Burlington holdings in North Kansas City. In 1906 he was made president of the Kansas City Terminal Railway and laid the foundation that resulted in the present Union station. In 1907 he went to South America to manage Brazilian railroad properties, but returned to the United States in 1909. Mr. Egan was made president of the Kansas City Railway & Light Company in 1910, and upon the accession of the receivers, he continued as president of the companies, and was made general manager for the receivers.

J. M. EGAN

OBITUARY

Clarence A. Henley, who had been connected with the McGraw Publishing Company, Inc., for several years as a member of the business staff of the ELECTRIC RAILWAY JOURNAL, died on Feb. 1 as a result of injuries received in an automobile accident on Jan. 29 as he was on his way from New York to Washington on a short pleasure trip. Mr. Henley was only twenty-four years old. He was greatly respected and esteemed not only by the staff of the ELECTRIC RAILWAY JOURNAL, but by the staffs of the affiliated McGraw papers as well. He is survived by his mother, a sister and a brother.

Frederick Heber Eaton, president of the American Car & Foundry Company, died on Jan. 28 at his home in New York. Mr. Eaton was born in Berwick, Pa., on April 15, 1863, and after a public-school education went to work in the offices of the Berwick Rolling Mills. Later he went with the Jackson & Woodin Company, and became one of the organizers of the American Car & Foundry Company. Since 1902 he had been its president. At the time of his death Mr. Eaton was a director of the American Agricultural Chemical Company, the American Car & Foundry Export Company, the Columbia-Knickerbocker Trust Company, New York, the Hoyt & Woodin Manufacturing Company, Hale & Kilburn Company, the Susquehanna, Bloomsburg & Berwick Railroad and other companies, and a trustee of the Mutual Life Insurance Company, New York.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Martinez & Concord Interurban Railway, Martinez, Cal.—Incorporated in California to construct a line from Martinez to Concord, 7 miles. Capital stock, $200,000. Incorporators: Clifford McClellan and I. H. Steffan, San Francisco; Irving Peterson and G. F. Peterson, Berkeley, and J. A. Olson, Alameda. [Jan. 15, '16.]

***Youngstown & Suburban Railway, Youngstown, Ohio.**—Incorporated in Ohio to construct a line from Youngstown to Leetonia. Capital stock, $10,000. Incorporators: John T. Harrington, James P. Wilson, J. W. Blackburn, Fred J. Heim and Clyde W. Osborne.

Vercheres, Chambly & La Prairie Tramways Company, Montreal, Que.—Application for a charter has been made by this company to the Quebec Legislature. Capital stock, $500,000. Incorporators: James W. Domville, Rosemere; Alfred Colas, Longueuil; Douglas W. Ogilvie, Ernest Pitt and Edmond Durcharme, all of Montreal. [Jan. 8, '16.]

FRANCHISES

Arlington, Cal.—The Pacific Electric Company has asked the Council for permission to abandon its Brockton line from Tibbetts Station to Magnolia Avenue and its Victoria line from the west end of the Victoria Bridge to the present terminus.

San Diego, Cal.—Bids will be received until March 6 by the Council of San Diego for the franchise to construct a line on University Avenue from Fairmont Avenue to Euclid Avenue requested by the San Diego Electric Railway.

Lawrence, Kan.—The Kansas City, Kaw Valley & Western Interurban Railway has asked the Council for a franchise through Lawrence in connection with its proposed extension to Topeka. The proposed franchise names three optional grants, each providing for a different route out of town to the west, and provides that within one year after its adoption the company shall adopt and accept one of the routes named and that the other optional grants immediately become null and void.

Kansas City, Mo.—The Metropolitan Street Railway has received a franchise from the Council to extend its double track on Broadway from Southwest Boulevard to Twenty-fourth Street.

Reading, Pa.—It is reported that the Reading Transit & Light Company will ask the Council for a franchise to construct a line on Twelfth and Thirteenth Streets, Reading.

Dallas, Tex.—Formal acceptance of the franchise granting interurban rights on Jefferson Avenue between Commerce Street and the river has been filed with the City Commission by the Northern Texas Traction Company. The ordinance was effective Jan. 10. Upon this grant was conditioned the construction of a viaduct over the steam lines entering the Union Depot and work has already been begun on this project.

TRACK AND ROADWAY

Birmingham-Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—This company plans to make extensive improvements on its line between Tuscaloosa and Holt, and also will build a spur to the depot of the Mobile & Ohio Railroad.

Little Rock & Hot Springs Electric Railway, Little Rock, Ark.—Financial prospects indicate a possibility of early construction work on this company's proposed line between Little Rock and Hot Springs. All preliminaries have been finished, right-of-way and depot sites obtained and surveys completed for the line. M. B. Moore, Little Rock, president. [Aug. 22, '14.]

Pacific Electric Company, Los Angeles, Cal.—Plans are being considered to construct a line to serve the north end of Lamanda Park. The line would be an extension of the north loop out on Villa Street to connect with the Sierra Madre line on Santa Anita Boulevard.

Municipal Railways of San Francisco, San Francisco, Cal.—The contract for the construction of the Church Street municipal line from Sixteenth to Eighteenth Streets and from Twenty-second to Thirtieth Streets has been awarded by the Board of Public Works to the Western Motor Draying Company on its bid of $57,455. The contract for furnishing and installing reinforced concrete trolley poles has been awarded to John Spargo for $6,590. The Contra Costa Construction Company is now building the line between Eighteenth and Twenty-second Streets. The city engineer of the San Francisco Board of Public Works has requested the supervisors of that city to set aside $5,000 for preparing preliminary estimates and reports on several proposed extensions to the Municipal Railway system. The following extensions are proposed: Stockton Street line across Market Street to the Southern Pacific depot at Third and Townsend Streets; present Potrero Avenue line to Hunter's Point; Fifteenth Street and Park Hill line, and Townsend Street from the Potrero Avenue line. It is also proposed to construct and purchase various lines in the Sunset district and modify the former plan for a line across Golden Gate Park.

Georgia Railway & Power Company, Atlanta, Ga.—This company is contemplating extending its Atlanta-Lindale transmission line to furnish electrical service to Cedartown.

Southern Illinois Railway & Power Company, Chicago, Ill.—During this year this company plans to build about 60 miles of track to connect Harrisburg with Marion, Johnson City, Herrin and Benton, as noted more in detail on page 283 of this issue.

Southern Illinois & St. Louis Railway, Chicago, Ill.—Orders have been placed by this company for material to be delivered this year to be used in the construction of its line to connect Harrisburg, Marion, Pittsburgh and Johnston City. Actual construction work is expected to begin the middle of March, the financing of the road having been completely arranged for. W. H. Schott, 111 West Monroe Street, Chicago, president.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—Plans are being made by this company to extend its Park Street line in North Liberty Street, Elgin, to the north factories.

Union Traction Company, Anderson, Ind.—This company has been granted permission by the Council of Anderson to raise the grade of its tracks across North Main Street. These tracks must be raised 8 in. in order to conform with the grade of the traction bridge over White River. The company is also lengthening its bridge at Anderson in accordance with federal plans designed to prevent high waters. The fill to the north abutments of the bridge has been removed and a new section has been placed in service.

Evansville, Ind.—Preliminary plans for a vehicle and traction bridge over the Ohio River 5 miles above Evansville, Ind., have been drawn by Laub & Fetterman, contracting engineers of Pittsburgh. These plans were drawn from a survey of the Evansville & Henderson Traction Company, the cars of which are now ferried over the river from the Illinois Central incline near the same point. It is estimated that the cost of the bridge would be about $700,000, exclusive of the cost of the approach. Under the project Evansville would raise $300,000 of this sum, while it is proposed that the remainder be raised in some other manner. Mayor Benjamin Bosse is head of the bridge committee of the Evansville Chamber of Commerce, which would undertake to promote the improvement.

Gary & Interurban Railroad, Gary, Ind.—Plans are being considered by this company to construct a 2-mile extension to the new Gary tin mills. The consent of the Federal Court for the expenditure of the necessary money for the extension must be secured before the line can be built.

***South Bend, Ind.**—A. E. Anderson of the Union Bank of Chicago has obtained an option on a traction line right-of-way between South Bend and Plymouth from Gabriel R. Summers of South Bend.

Hutchinson (Kan.) Interurban Railway.—The stockholders of the Hutchinson Interurban Railway have voted to spend the 1915 earnings for reconstructing and building additions to its line.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—This company has asked the Public Utilities Commission of Maine for its approval of the construction of an extension of its lines from Bowdoin and Summer Streets, along Summer Street to the property of the Wadsworth & Woodman Company, Winthrop.

Detroit (Mich.) United Railway.—Following a conference between the members of the Street Railway Commission and officials of the Detroit United Railway, the commission recommended to the Common Council that permission be granted the company to construct several miles of extensions. The Council has referred the recommendation to its committee on public utilities for a report. The commission recommends the extension of the Warren Avenue crosstown line to the westerly city limits, the extension of the Forest Avenue crosstown line to the easterly city limits, the completion of the so-called workingman's belt line, part of which was constructed a year ago, and the extension east of the Kercheval Avenue line. To these extensions the company has agreed, the same to be built this year under the day-to-day agreement now existing between the city and the company.

Mesaba Railway, Virginia, Minn.—This company has awarded a contract to the Winston-Deer Company for the construction of a 6-mile extension to Sheridan Mine, Hibbing.

Mexico Investment & Construction Company, Mexico, Mo.—It is reported that plans are being considered by this company to construct extensions into Callaway and Monroe Counties in the spring.

International Railway, Buffalo, N. Y.—An order has been issued by the Public Service Commission for the Second District of New York, prescribing the manner in which the International Railway Company's new high-speed line from Buffalo to Niagara Falls is to cross the various streets, highways and other tracks. The commission also granted its approval of the franchise. For the greater part of the way the new line will extend through private right-of-way. Important highways will be crossed on viaducts, as will all main lines of steam roads. The franchises approved include those from the city of Buffalo and town of Tonawanda for crossing Kenmore Avenue. A condition of the order which the company must accept is that if at any time in the future the crossings now provided at grade should be sought to be eliminated the company will hold itself a party to such proceedings as if it were a steam railroad and will pay a steam railroad's share of cost of such a separation of grades and not plead exemption as a surface railway under the law. In addition the commission requires the railway to go to the Supreme Court for an order approving these crossings in the village of La Salle and the towns of Tonawanda and Wheatfield, and to accept and file with the commission the agreement with the city of Buffalo whereby the company is bound to pay its share of any future elimination of the crossing of Kenmore Avenue.

New York City.—Reconstruction of the roadway of the Queensboro Bridge and the transfer of the car track service to the outer brackets of the structure, which was recommended by Bridge Commissioner F. J. H. Kracke, has been approved by Mayor Mitchel. The estimated cost of the new work is $144,000.

Interborough Rapid Transit Company, New York City.—The Public Service Commission for the First District of New York will hold a public hearing on Feb. 14 upon the proposed terms and conditions of a contract for the construction of a railroad yard at 239th Street on the White Plains Road extension of the Lenox Avenue branch of the first subway. The yard is to be built in an open cut, with a two-track approach to it built partly in open cut, partly on embankment and partly on steel construction, upon private property in The Bronx, bounded by White Plains Road, East 239th Street, Nereid Avenue and Baychester Avenue. The work must be completed within ten months from the delivery of the contract. The commission has readvertised for bids for the installation of tracks upon the

White Plains extension of the Lenox Avenue branch of the first subway. This contract was first advertised last November, and bids were opened Nov. 23. The lowest bidder at that time was the Coast & Lakes Contracting Corporation, whose bid aggregated $53,930. The proposal of the next lowest bidder footed up more than $102,000, and the Coast & Lakes Contracting Corporation claimed that it had made a mistake in its figures, and desired to withdraw its bid. The commission, however, awarded the contract to the company at the figure named. Later the Coast & Lakes Contracting Corporation filed a stipulation, agreeing to pay the cost of readvertising for bids if the commission would relieve it of its obligation under the original award, and also agreed to put in a bid under the readvertisement at a figure not to exceed $94,280, which the company says is the amount it intended to bid in the first place. A readvertisement for bids, to be opened Feb. 16, was accordingly ordered.

New York State Railways, Utica, N. Y.—The Public Service Commission for the Second District of New York has issued an order to the New York State Railways to repair its track in Whitesboro. The work must be begun on or before May 1.

***Columbiana, Ohio.**—At a recent meeting of the Chamber of Commerce of Columbiana an electric line from Columbiana to East Palestine was discussed, and it is believed that the road will be built during the summer.

Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio.—An entirely new street lighting system will be installed in Steubenville by this company if the lamps installed on trial prove satisfactory.

***New Hamilton, Pa.**—A municipal light plant and trolley line between New Hamilton and the works of the Ætna Explosive Company was assured at the close of a public meeting recently held at New Hamilton when the first $1,000 was subscribed toward the capital necessary for the project. J. W. White, superintendent of the Ætna Explosive Company, pledged his company to take up one-half of the capital stock to build and equip the new line and would guarantee receipts aggregating $50 per day from the same source.

Pottstown & Phoenixville Railway, Pottstown, Pa.—It is reported that work will be begun in April on this company's extension from Spring City to Linfield.

Rhode Island Company, Providence, R. I.—Work will soon be begun by this company repairing its line on Cranston Street. New and heavier rails will be laid from the city line to School Street. Plans are being made by the company to double track its line on Randall Street from Charles Street to North Main Street next spring.

Brownsville (Tex.) Street Railway.—Plans for an extension of its lines are being considered by this company. It is expected that a franchise for a line across the Rio Grande to Matamoras, Mexico, may be acted upon soon.

Corpus Christi (Tex.) Traction Company.—J. J. Caswell has deposited $5,000 with the Council to guarantee the construction of the proposed electric railway from Corpus Christi to Wards Island, 8 miles. The line is to be completed and in operation within twelve months. [Aug. 21, '15.]

Dallas (Tex.) Consolidated Electric Street Railway.—Work has been begun by this company on the paving and reconstruction of tracks and roadbed on Commerce Street from the Houston & Texas Central Railroad tracks to Exposition Avenue. Steel ties, instead of wooden ones, will be used and will be set in concrete foundation in such a way as to permit their subsequent removal without disturbing the sub-layer of concrete or the gravel that will be placed the ties and the concrete. The company has been directed by the Board of City Commissioners to reconstruct its tracks on Henderson Avenue from Ross to Monarch Street with 90-lb. rail, preparatory to the paving of the street.

Northern Texas Traction Company, Dallas, Tex.—This company has begun the construction of a steel and concrete viaduct across the railway tracks leading into the proposed union station. Double tracks will be laid on the main structure and on both approaches. The floor of the viaduct will be of solid reinforced concrete.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis.—It is reported that this company is considering the construction of an extension from Chippewa Falls to St. Paul and Minneapolis.

Milwaukee Western Electric Railway, Milwaukee, Wis.—A report from this company states that prospects are favorable for beginning construction of its line next spring. The proposed line will connect Milwaukee, Sussex, Pewaukee, Waukesha, Neosho, Hustisford, Juneau, Beaver Dam and Fox Lake. Alvin P. Kletzsch, Milwaukee, president.

SHOPS AND BUILDINGS

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company has removed its offices to the Dukate Theater Building. The building is being remodeled and will contain a passenger waiting room and also a freight room.

Dallas, Tex.—A permit for the new union interurban station to be erected by Stone & Webster has been issued by City Building Inspector H. J. Emmins. The permit calls for the erection of a structure to cost $600,000. This is exclusive of the trackage and other features. Construction of the interurban building began on Dec. 8. The main building will face on Jackson Street, extending from Browder Street on the west to within a short distance of Ervay Street and will be eight stories high. The contractors expect to complete the building and the yard tracks and loops on city streets by Sept. 1.

POWER HOUSES AND SUBSTATIONS

Oskaloosa Traction & Light Company, Oskaloosa, Iowa.—This company will rebuild its power lines in the business district.

Northern Ohio Traction & Light Company, Akron, Ohio.—It is reported that preparations are being made by this company to triple the output of its plant at the Gorge. The plans provide for the installation of two 20,000-kw. turbogenerators and accessories.

Cleveland (Ohio) Railway.—The power department of the Cleveland Railway has recommended the following improvements: Turbine at the Cedar Avenue power plant, $250,000; four 600-hp. boilers at the Cedar Avenue plant, $75,300; power department headquarters at the Cedar Avenue battery building, $10,000; line department headquarters at the Cedar Avenue power plant, $10,000; additional equipment at the West Twenty-fifth Street substation, $17,000; additional return circuit equipment, $52,300; additional feeders, including cables across the new Superior Avenue viaduct, $27,000. These amounts, plus 15 per cent for engineering and contingencies, total $507,840.

Montreal (Que.) Tramways Company.—Considerable additions to its steam generating plants in Montreal will be made by this company, and plans have been prepared providing an ultimate capacity at the Hochelaga plant of about 60,000 hp. The company will install large-sized turbo-generator units, and the first order has been placed with the Canadian General Electric Company for one 12,500-kw., 15,630-kva. Curtis turbine. The contract for boilers has been placed with Babcock & Wilcox, Ltd. The boilers are of the steel-cased marine type, with superposed economizer and equipped with superheaters and chain-grate stokers. Further plans call for the linking up of the Hochelaga power house with all the substations of the Montreal Tramways Company by means of 12,000-volt, high-tension feeders.

Tennessee Railway, Light & Power Company, Chattanooga, Tenn.—Construction has been begun by the Tennessee Power Company, the principal generating subsidiary of the Tennessee Railway, Light & Power Company, on a new hydro-electric station on the Caney Fork River near Great Falls, Tenn. The initial installation at the new station will be 10,000 hp., to be later increased to 40,000 hp. A dam will be constructed across the river and the water will be taken by a tunnel through the mountain to the power house. There has been such an increase in the demand for power in the section served by the company that plans are now being considered for a third hydro-electric plant on the Ococee River in addition to the Caney Fork plant and the 10,000 hp. steam auxiliary station now under construction at Parksville.

Manufactures and Supplies

ROLLING STOCK

Cumberland Traction Company, Edmonton, Ky., expects to purchase motor cars during 1916.

Macon & Birmingham Railway, Macon, Ga., is reported as having purchased an additional motor car.

Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, expects possibly to purchase one car body during 1916.

Lehigh Valley Transit Company, Allentown, Pa., is reported as having ordered twelve cars from the Southern Car Company.

Androscoggin Electric Company, Lewiston, Me., has ordered one flat car and trucks from the Laconia Car Company.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., may purchase one or two single-truck car bodies during 1916.

Bay State Street Railway, Boston, Mass., is reported to be considering the addition of 200 new cars and the remodeling of a number of its present cars for prepayment operation.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., is reported as expecting to order one arch roof steel baggage, smoking and passenger car, and one smoking and passenger car.

Binghamton (N. Y.) Railway is preparing specifications for sixteen all-steel cars, having a 16-ft. body and mounted on a Radiax truck. The order will be placed for this equipment within the next thirty days.

Columbus Railway, Power & Light Company, Columbus, Ohio, is rebuilding in its own shops seventeen open, side running board, motor cars into semi-convertible, fully-inclosed prepayment cars.

Public Service Railway, Newark, N. J., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 29 as being in the market for twenty interurban cars, has ordered this equipment from The J. G. Brill Company.

Fairburn & Atlanta Railway & Electric Company, Fairburn, Ga., has ordered from the Railway Storage Battery Car Company of New York three Edison storage-battery cars to operate over its line from College Park, Atlanta, to Fairburn, Ga. The new installation replaces four gasoline-propelled cars. This service is being adopted to meet the rapidly increasing passenger and freight traffic brought about by the growing condition of this section, which shows promise of becoming a very prosperous residential and manufacturing suburban district. The battery cars will serve this community from 6 a. m. to 11 p. m. in an hourly service. They will be of the standard suburban type, equipped for double-end operation and will seat forty-four passengers. M. C. B., semi-steel construction will be followed throughout. It is expected that the cars will be completed so as to be placed into regular service on this line about June 1.

TRADE NOTES

Edwin G. Hatch, New York City, engineer, has received an order from the Montana Power Company, Butte, Mont., for a large number of seamless copper splicing sleeves for its extensions.

Automatic Ventilator Company, New York City, has received an order to equip with its E-4 type ventilators the forty cars recently ordered by the Des Moines (Iowa) City Railway from the McGuire-Cummings Manufacturing Company.

American Car & Foundry Company, New York City, at a meeting of its board of directors, elected William H. Woodin president, to succeed the late Frederick H. Eaton. Mr. Woodin since 1902 has been a director and assistant to the president.

Bates Expanded Steel Truss Company, Chicago, Ill., has received orders for its expanded steel trolley or transmission poles from the following companies: Tulsa (Okla.) Railway; Oklahoma Railway; Enid (Okla.) City Railway; Midland Water, Light & Ice Company, Dodge City, Kan., and the Public Service Company of Oklahoma, Oklahoma City, Okla.

Nelson P. Hall, who for a number of years represented the Electric Service Supplies Company, has opened a manufacturers' agency at Room 900, 14 East Jackson Boulevard, Chicago, Ill. Among other concerns Mr. Hall will represent the National Brake Company, the Locke Insulator Manufacturing Company and the Coil Manufacturing & Repair Company.

ADVERTISING LITERATURE

Chicago (Ill.) Pneumatic Tool Company has issued a bulletin which contains small illustrations of certain of its many types of pneumatic compressors and Giant fuel oil and gas engines.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 47750, superseding Bulletin No. 4967, which describes and illustrates its various types of switchboard structural devices and accessories.

Reinforced Concrete Pipe Company, Chicago, Ill., has issued a catalog describing its reiforced concrete pipe. A number of illustrations are included, which clearly show the methods and types of construction of this pipe, and its adaptability to various uses. It is stated that this form of pipe is now in use in more than 140 cities in thirty States in the United States and Canada, Mexico and South America.

James G. Biddle, Philadelphia, Pa., has issued an illustrated catalog describing the applications of his Megger testing set, a portable direct-reading meter that registers ohmic values up to 5000 megohms. Among the electric railways stated as being users of this apparatus are the Chicago Railways; Citizens Traction Company; Cleveland Railway; New York Railways; New York, New Haven & Hartford Railroad; New York, Westchester & Boston Railway; Norfolk & Western Railway; Pittsburgh Railways; Portland, Eugene & Eastern Railway, and Transit Development Company.

NEW PUBLICATION

The Experience Grading and Rating Schedule. By E. G. Richards. Published by the National Board of Fire Underwriters. New York. 104 pages.

The section of this book under the above title is designed to be a United States standard for measuring fire insurance costs based upon combined experience averages. The book also contains the "Standard Classifications of Occupancy Hazards and Loss Report Form of the National Board of Fire Underwriters."

ROOSEVELT ON THE RAILROADS

In the course of a speech which he made in Philadelphia on Jan. 20, Colonel Roosevelt said:

"California, under Governor Johnson, has tried to do justice to the railways, as well as to exact justice from them. This effort has been partially nullified by the fact that, in direct contravention of one of the main purposes which the United States Constitution was designed to put into effect, we have permitted interstate commerce largely to pass under the control of the States, instead of keeping it under the control of the nation. When, for instance, California, appreciating the fact that railroads cannot possibly be successfully operated unless they are allowed business opportunities which will enable them to make a reasonable profit, acted accordingly, the action was nullified by certain neighboring State commissions. California's experience has shown that it is impossible permanently to secure good results in dealing with the instrumentalities of interstate commerce, the railroads doing an interstate business, through the commissions of forty-eight different States, and that the only way is to have the whole business of interstate commerce and everything pertaining to it handled by the administrative officers at Washington. I believe in a national incorporation law for corporations of any size engaged in interstate business."

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVII NEW YORK SATURDAY, FEBRUARY 12, 1916 No. 7

PRESIDENT HENRY'S LETTER

We are glad to publish in this issue a letter from President Henry addressed to the members of the American Electric Railway Association and the American Electric Railway Manufacturers' Association explaining in detail the amendments to the constitution adopted at Chicago. As shown by him, their purpose is to provide an invitation to the manufacturers to become full members of the association, and they do not legislate the Manufacturers' Association out of existence. The railway association needs not only the support of the manufacturers but their advice and help in all its councils. The adoption of the amendments makes this possible in the future. If there has been a fear on the part of the manufacturers that their membership in what might be called the "new" association was to be nominal—not real, this idea should be dissipated by President Henry's letter and his plea for united effort in a common cause. These words mean that the proposed co-operation is to be not only by all but for all, and under such a policy results ought to be attained which could not be secured without pooling the interests of all of those concerned in the industry.

THE TECHNICAL COMMITTEES OF THE A. I. E. E.

An interesting discussion as to the relation of the American Institute of Electrical Engineers to societies with activities overlapping its own was a feature of the opening session of the midwinter convention held in New York this week. The Institute is now organized with a number of technical committees, one of them being the railway committee, to which is assigned the duty of bringing out timely papers and discussion in their respective fields. The big problem for these committees and the Institute is so to divide the field with the national societies which devote themselves to specialties that there may be no duplication of effort and that each may perform the function for which it was organized. The A. I. E. E. technical committee on electric railways has devoted most of its attention recently to heavy electric traction. The American Electric Railway Engineering Association has a committee on this subject. Now it is evident that the purposes of these two committees must be different or they will be in competition, which would be an uneconomical condition. There must be a fundamental principle whose application will determine whether a given paper or discussion is appropriate for an A. I. E. E. meeting, or should be incorporated in an A. E. R. E. A. report, or should be published through the technical press. What applies in this example applies equally, of course, in a dozen other fields. The principle was touched upon in the discussion of D. B. Rushmore's paper, the presentation of which provided the occasion for considering the topic at this time. This principle is that the function of the Institute is to consider the fundamentals of electrical engineering rather than the detailed applications, leaving the latter to the societies organized and especially qualified to handle them, and to the technical press. Only by confining attention to the elements more or less common to all branches of electrical engineering can the Institute hope to meet the demands upon it within the limitations of its resources.

CHICAGO COMMISSION IS NON-POLITICAL

It is indeed refreshing to see a large city like Chicago, when confronted with an important transportation problem, select for its solution a non-political commission of engineers of the highest caliber obtainable in this country. Such men as William Barclay Parsons, Robert Ridgway and Bion J. Arnold manifestly could not have been chosen if political pressure had been brought to bear upon their appointment. Just a decade ago Mr. Arnold was employed by Chicago to prepare plans and specifications for the traction settlement ordinances which were reported to the City Council in December, 1905. The choice was a fortunate one, and the Board of Supervising Engineers, Chicago Traction, was the result. For the past five years there has been considerable agitation and committee work on the question of improved local transportation, but in each instance politics entered, with the result that nothing was accomplished. During this five years of consideration, the traction situation, particularly in the downtown district of Chicago, has continued to grow more critical and has reached a point where everyone realized that something must be done and done immediately. At a meeting of the local transportation committee of the Chicago City Council held last fall, Samuel Insull, chairman of the Chicago Elevated Railways Collateral Trust, and L. A. Busby, president of the Chicago Surface Lines, upon invitation, recommended a course which they believed would lead to an early solution of Chicago's transportation problem. The committee followed the recommendations of Messrs. Insull and Busby to the letter and, after a most painstaking inquiry into the qualifications of some sixty engineers, the present commission was selected. Its make-up was unanimously approved by the sub-committee and the local transportation committee, and as a further expression of confidence the City Council passed the ordinance creating the commission by a vote of 57 to 8. A well-balanced commission was what the sub-committee endeavored to select, as well as one of which some of the members would be from outside of Chicago. With Mr. Parsons, experienced in the solution of many important transportation problems in other cities, with Mr. Arnold, thoroughly grounded in the local requirements, and with Mr. Ridgway, the construction expert, pre-eminent balance was obtained, and the findings of such a body will doubtless receive most serious consideration on the part of the city and the transportation companies.

GOOD WORKMANSHIP CANNOT BE HAD BELOW COST

Recent rumors seem to indicate that at least some of those who took rather heartless advantage of the market conditions of the past year and a half have had reason to rue it. Competition for supplying electric railway equipment never was more keen than during this time, for the cumulative effect of the general business depression and competition by jitney bus and automobile created an unprecedented shrinkage in railway earnings with a consequent limitation of purchases. Price cutting was inevitable on the part of manufacturers to keep their plant organizations intact, and the invariable tendency of purchasing agents to play one bidder against another forced many sales at prices which have been commonly termed "below cost."

As a matter of fact, we doubt whether cars are ever sold below cost. If the truth were known concerning all the conditions surrounding the closing of these contracts at abnormally low figures it would be found that the purchasers were extremely liberal in their specifications. Indeed, there were instances where absolute freedom was granted as regards the details, and where competition becomes sharp advantage is bound to be taken of any leeway in the specifications to reduce the amount of the bid. Skimping may, perhaps, be introduced most readily through the substitution of cheap car-body equipment for the material that would normally be expected, because a large percentage of the cost of a car is set aside for specialties such as heaters, brakes, ventilators, destination signs and the like, and there are many types of each on the market. But if, in addition, the manufacturer is forced to cut his price below the normal cost of labor and material, his product must bear the brunt of this cut, either in imperfect workmanship or low-quality materials, and when this is the case it is only to be expected that unsatisfactory service results should follow.

As an example may be cited a recently-discovered case where, in six holes that were punched in a 4-in. cross-bearer, there were only three rivets, and even when the rivets were placed, instead of being upset with button-heads the ends were simply bent over, looking as though the alleged riveting had been done cold and with a hand hammer instead of an air-driven tool with a rivet set. In another case where two trucks had been built to the same specifications but by different companies, one manufacturer had followed the drawings to the letter, while the other had substituted different sections and castings until the two trucks, placed side by side, actually looked like two radically different designs. When the substitutions were made, the tendency was to put in lighter sections and castings, and this circumstance is hardly surprising in view of the fact that the equipment had been purchased materially below the average market price. As we see it, this is a commercial age and manufacturers are in the business for profit—not as philanthropic institutions. When a purchasing agent thinks he can obtain something for nothing he is fooling nobody but himself.

THE STRATEGY OF STOPS

It is well understood among electric railway men that unnecessary stops slow up traffic and that it is desirable to make the minimum number of stops which will thoroughly well serve the patrons of the road. But to meet this requirement in city service demands something more than stops at certain designated streets and reasonable care in selecting the corners which by reason of heavy traffic concentrated there plainly indicate the necessity of a stop. It is necessary to examine somewhat into the habits of the traveling public and the local conditions in order to determine just where a stop will do the most good.

For instance, it is the custom among most companies to halt regularly to receive or discharge passengers on either the near or far corner of the street. Consistency in this respect on any one system up to a certain point is desirable, but it should not be allowed to override every other consideration. On a particular cross street conditions may and often do exist which produce a decided preference for one side or the other of the street as the suitable point for stopping the cars, and that point, irrespective of precedent, should be unhesitatingly chosen. It is not absolutely necessary that cars should systematically stop on a particular side of the street provided the stopping place is, as it should be, so plainly marked that the public can make no mistake. It is important that the stops should be made accurately at the same point and at such point as will give the passengers the best chance to get on and off the cars. Nothing is more inconvenient or annoying to the patrons of a road than to be uncertain within 60 ft. or 50 ft. as to where the car is likely to stop and then probably to find it far off the crossing in a sea of mud. It is worth something in the saving of time, if for no better reason, to have the stop made accurately in a place where the passengers can get on and off promptly.

A little attention to picking out those stopping places which best meet the traffic conditions will save time in the runs, make friends, and probably eliminate some needless stops. As a shining example of what a little judgment may do in this matter we may refer to a change worked out in Boston where the stopping place of the cars emerging from the subway was shifted from the west to the east side of a particularly busy cross street infested with automobiles to an unusual degree. The change was a very simple one, fortunately helped by the construction of a suitable place of boarding the cars, but the result has been altogether admirable in serving the convenience of the public, avoiding as it does for the most part the crossing of a particularly troublesome street at a specially bad point. Another instance is at Thirty-second Street and Broadway, in New York, where the cars stop at the far side instead of the near side of the street as on most parts of the rest of the system. Almost any road can find, with a little judicious foresight, similar cases in which change from one side of the street to the other in the stopping place would be similarly advantageous.

This plan is in line with the main purpose of the skip-stop idea, namely, that stops should be selected at points which will be of the greatest convenience to the majority of passengers and not arbitrarily located at every cross street. So long as the actual traffic conditions indicate a series of stops entirely regular in the geographical sense, very good; when they indicate a departure from this regularity, it ought to be made without hesitation, provided these exceptions are conspicuously marked.

We hope that the time will come when the fetich of a stop at every cross street when passengers wish to board or alight will no longer be believed. It has been respected too long, because it is obvious that if the practice is followed in cities where the blocks are eight to the mile, many unnecessary stops are made when the blocks are twenty to the mile. It is important, it is true, for the intending passenger to know where the car will stop, but this fact can be indicated just as well by signs on the poles or by some other distinguishing mark as it can be by making a stop at every corner. Experience with the plan of reducing the number of stops shows that the convenience of the public is conserved thereby.

INDUCTIVE INTERFERENCE IN HEAVY TRACTION

At the present time one of the most important but little-understood considerations in the field of heavy electric traction is that of the local inductive interference with telephone lines along rights-of-way. The difficulty, of course, is more serious as regards the effect upon commercial wires, which even may not be actually on the right-of-way, than upon the railroad company's wires, because there seems to be a well-defined sentiment in favor of putting the latter in cables underground if only to assure the physical safety of the railway's means for communication. Although underground installation of wires in twisted pairs would likewise reduce the troubles of commercial lines, the fact remains that such circuits are likely to remain overhead for years to come, and for this reason the problem of avoiding interference with them will be a live one until some universal and inexpensive solution is found.

Such a solution is far from apparent to-day, when comparatively little is understood about the real causes and possibilities of remedying the trouble, yet some definite progress at least has been made. In alternating-current installations experience has shown that stub-end feeds must not be made, and that transformer stations must be located at the ends of each line as well as at intervals along it. Thus, a train in any location will always draw current from both directions, the greater current flowing from the nearest transformer station, or from that direction in which the least length of wire exposure exists. The lesser current-flow from the other direction is compensated for by a greater length of wire capable of producing interference, so that in effect, the inductive action of that part of the line ahead of the train is counterbalanced by the action of the line at the rear, the two approximating equal and opposite effects which neutralize each other.

An equivalent result has been reached on the New Haven by the use of a so-called three-wire system which is, however, by no means the same as the old scheme used in direct-current lighting whereby the load is approximately balanced on either side of a central wire. Instead, the rail is divided into short sections connected at the ends through 2:1 auto-transformers to the trolley which is at 11,000 volts above the rail potential, and to a negative feeder whose potential is 11,000 volts below that of the rail. Current flowing in the trolley is offset by an equal and opposite return in the negative feeder, the flow in the rail being bidirectional and practically confined to the section occupied by the train. This plan has the important advantage of transmission at double generator voltage, but it involves the use of numerous large auto-transformers which work at a low load factor unless the traffic is extremely dense. The arrangement has proved very satisfactory under the circumstances existing on the New Haven, although the two most recent a.c. installations, namely: the Norfolk & Western and Philadelphia electrifications, have the simple rail-return scheme in connection with transformer stations at 10-mile intervals and frequent small booster transformers to confine the return currents to the track rails.

Either one of these two general plans appears to produce good results, and the choice between them is practically independent of the question of relative ability to control inductive interference of a.c. lines. Nevertheless, it is patent from the cost and complication that the common principle of neutralization by opposing parallel currents does not constitute the last word in the elimination of such disturbances. These, it would seem, may even appear in connection with d.c. circuits if the potential and current flow are sufficiently high, because reports of interferences with telephones along rights-of-way served by high-voltage d.c. contact wires have recently been in evidence.

In consequence, there is good reason to believe that it is the higher harmonics, rather than the fundamentals of the current waves, which are responsible for interferences, one case of local disturbance having been traced to the influence of the commutators on a lot of air-compressor motors, and this, together with the indefiniteness that surrounds all problems dealing with the indeterminate paths followed by earth currents, indicate the vast extent of the unexplored portion of the field. It is not unreasonable to suppose, therefore, that the development of induction-proof commercial lines, even aside from installation underground, offers just as good an opportunity to mitigate the evil as the elimination of the inductive action of the railway wires. Certainly, if such an improvement should be commercialized, it would work a distinct advantage to electrification, as the cost of induction prevention may easily reach disproportionately large figures when applied to a long line lacking dense traffic.

Additions to Rhode Island Power Plant

The Manchester Street, Providence, Plant of the Rhode Island Company Has Recently Been Extended, the New Equipment Being Typically Modern—Very Large Turbine Blowers Are a Feature

POWER for the operation of most of the electric railway in the State of Rhode Island is furnished from the plant of the Rhode Island Company located in Providence. The history of the plant is typical of the changes which have been taking place in this field during a dozen years past. In the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 23, 1911, horizontal and vertical sections of the station as it then existed were given, and in an accompanying article the chief engineer of the company described the reasoning which led to the conclusion to substitute steam turbines for part of the engine equipment originally installed seven years before. Recently the building has been enlarged and another turbine, with boilers and auxiliary equipment, has been added.

BOILERS

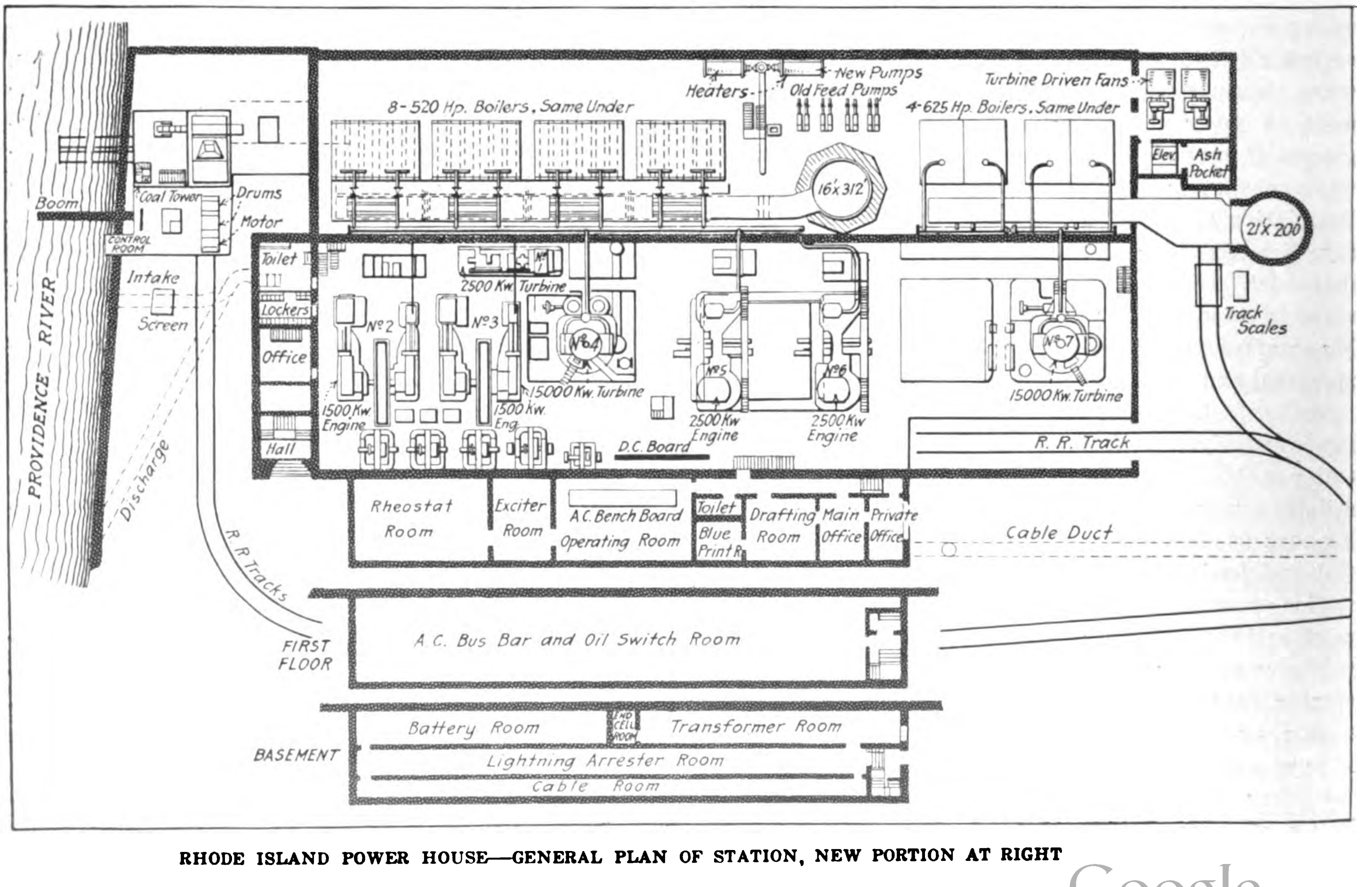
The equipment is housed in a steel and brick structure with concrete foundations and there are now two stacks, one for the original boilers and another for those in the extension. The original sixteen 520-hp. B. & W. boilers are installed on two decks and they discharge their flue gases into a brick stack 312 ft. high and 16 ft. inside diameter. The new installation consists of eight 625-hp. Bigelow-Hornsby boilers, also divided equally between decks and delivering gases into a breeching leading to a chimney 200 ft. high and 21 ft. inside diameter. In the operation of the station the older boilers are now held in reserve, the load being carried mainly on the turbo-driven generators, one of which suffices to operate virtually all the cars in the State except on the service peak. The steam pressure is 200 lb. per square inch and the turbines are run on 125 deg. Fahr. superheat. Above the older boilers is a 3000-ton coal bunker and there is a 973-ton bunker above the new batteries. The eight Bigelow-Hornsby boilers have carried the entire station peak at its maximum of 23,000 kw. The output of the station was 66,731,000 kw.-hr. in 1915.

ELECTRICAL MACHINERY AND CONDENSERS

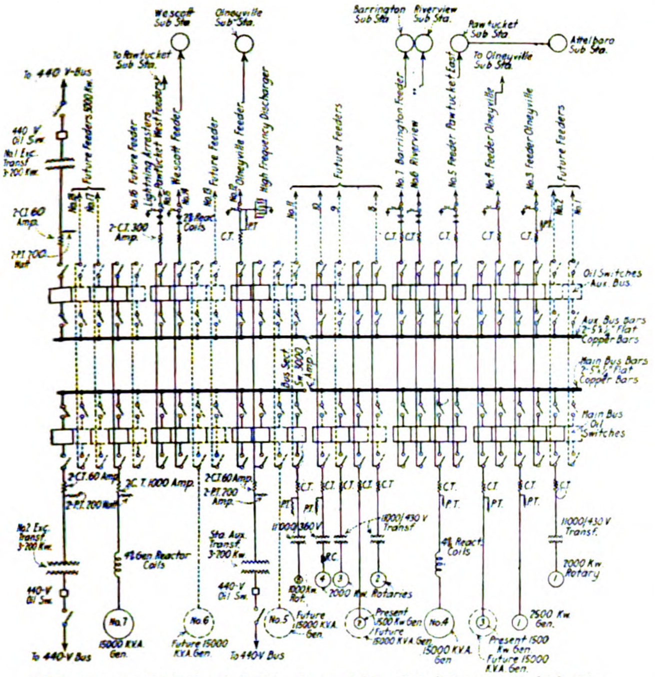
The 15,000-kw. turbines are both of the General Electric vertical type, delivering power at 11,000 volts, three-phase, and 25 cycles. The other generating units consist of two 1500-kw. horizontal engine-driven General Electric generators supplying 11,000-volt power; one 2500-kw. horizontal Westinghouse turbo-alternator wound for 11,000 volts; and two 2500-kw. Westinghouse and General Electric 600-volt d.c. generators driven by vertical engines. All of the reciprocating engines are of the cross-compound condensing type and are held in reserve, except that one generator is frequently used over peaks in winter to help out the rotaries. Minimum loads can be carried on the horizontal turbine set.

Five rotary converters aggregating 9000-kw. rating are installed in the station to supply direct current for local trolley service.

The engines exhaust into Blake twin vertical condensers, an Alberger jet condenser being provided for the 2500-kw. turbine. The two large turbines exhaust into Westinghouse-LeBlanc condensers, and the normal vacuum maintained is 28.5 in. The two horizontal engines are of Filer & Stowell make, the vertical engines


PROVIDENCE RIVER
Boom
Coal Tower
CONTROL ROOM
Drums
Motor
Intake
Screen
Discharge
R. R. Tracks
8-520 Hp. Boilers, Same Under
Heaters
New Pumps
Old Feed Pumps
16' x 312'
4-625 Hp. Boilers, Same Under
Turbine Driven Fans
Elev
Ash Pocket
21' x 200'
Track Scales
Toilet
Lockers
Office
Hall
No. 1
2500 Kw. Turbine
No. 2
No. 3
No. 4
1500 Kw. Engine
1500 Kw. Eng.
15000 Kw. Turbine
D.C. Board
No. 5
No. 6
2500 Kw Engine
2500 Kw Engine
No. 7
15000 Kw. Turbine
R. R. Track
Rheostat Room
Exciter Room
A.C. Bench Board
Operating Room
Toilet
Blue Print R.
Drafting Room
Main Office
Private Office
Cable Duct
FIRST FLOOR
A. C. Bus Bar and Oil Switch Room
BASEMENT
Battery Room
END CELL ROOM
Transformer Room
Lightning Arrester Room
Cable Room

RHODE ISLAND POWER HOUSE—GENERAL PLAN OF STATION, NEW PORTION AT RIGHT


Wescott Sub Sta.
Olneyville Sub Sta.
Barrington Sub Sta.
Riverview Sub Sta.
Pawtucket Sub Sta.
Attelboro Sub Sta.
To Olneyville Sub Sta.
To Pawtucket Sub Sta.
To 440 V-Bus
440 V Oil Sw.
No.1 Exc. Transf. 3-700 Kw.
2-C.T. 60 Amp.
2-P.T. 700 Watt
Future Feeders 5000 Kw.
No.18
No.17
No.16 Future Feeder
Lightning Arresters
Pawtucket West Feeder
No.15
Wescott Feeder
No.14
2-C.T. 300 Amp.
7B React. Coils
No.13 Future Feeder
No.12 Olneyville Feeder
C.T.
P.T.
High Frequency Discharger
No.11
10
9
8
Future Feeders
No.7 Barrington Feeder
No.6 Riverview
No.5 Feeder Pawtucket East
No.4 Feeder Olneyville
No.3 Feeder Olneyville
No.2
No.1
Future Feeders
Oil Switches Aux. Bus
Aux. Bus Bars 2-5 1/2" Flat Copper Bars
Main Bus Bars 2-5 1/2" Flat Copper Bars
Bus Sect. Sw. 3000 Amp.
Main Bus Oil Switches
2-C.T. 60 Amp.
2-P.T. 700 Watt
2C.T. 1000 Amp.
2-C.T. 60 Amp.
2-P.T. 700 Amp.
No.2 Exc. Transf. 3-700 Kw.
440-V Oil Sw.
To 440-V Bus
4B Gen. Reactor Coils
No.7
15000 K.V.A. Gen.
No.6
Future 15000 K.V.A. Gen.
Sta. Aux. Transf. 3-700 Kw.
440-V Oil Sw.
To 440-V Bus
No.5
Future 15000 K.V.A. Gen.
11000/360 V
R.C.
1000 Kw. Rot.
2000 Kw. Rotaries
11000/430 V Transf.
Present 1500 Kw. Gen.
Future 15000 K.V.A. Gen.
4B React. Coils
No.4
15000 K.V.A. Gen
Present 1500 Kw. Gen.
Future 15000 K.V.A. Gen.
2500 Kw. Gen.
11000/430 V Transf.
2000 Kw. Rotary

Full Lines Represent Installation - Dotted Lines Represent Future Installations - Feeder Oil Switches 300 Amp. Gen. Oil Switches 800 Amp. All Disconnecting Switches of Locked Type

RHODE ISLAND POWER HOUSE—ELECTRIC CIRCUIT DIAGRAM

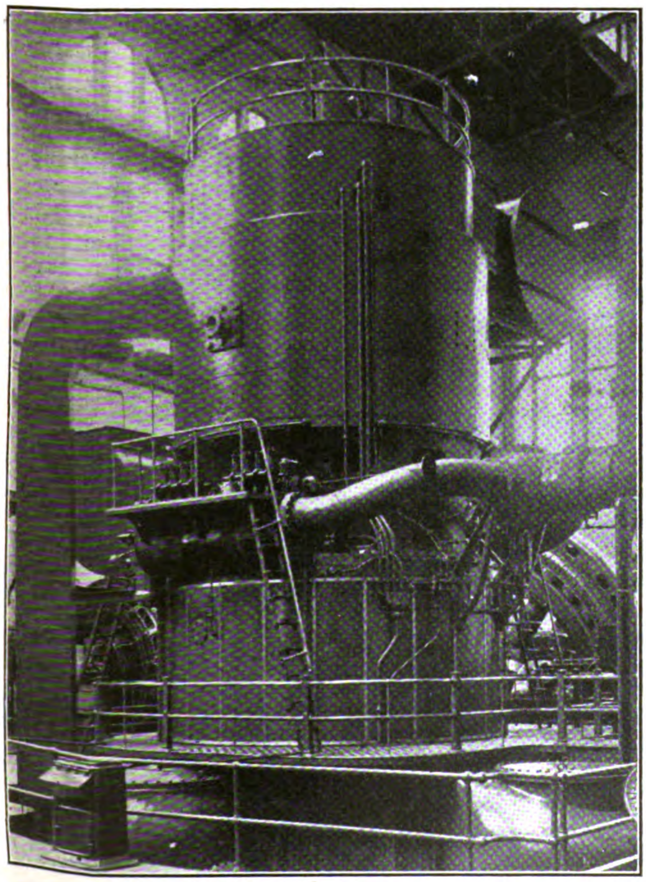
being built by the Westinghouse Machine Company, and all four are operated at a steam pressure of 150 lb. when required.

COAL HANDLING APPARATUS

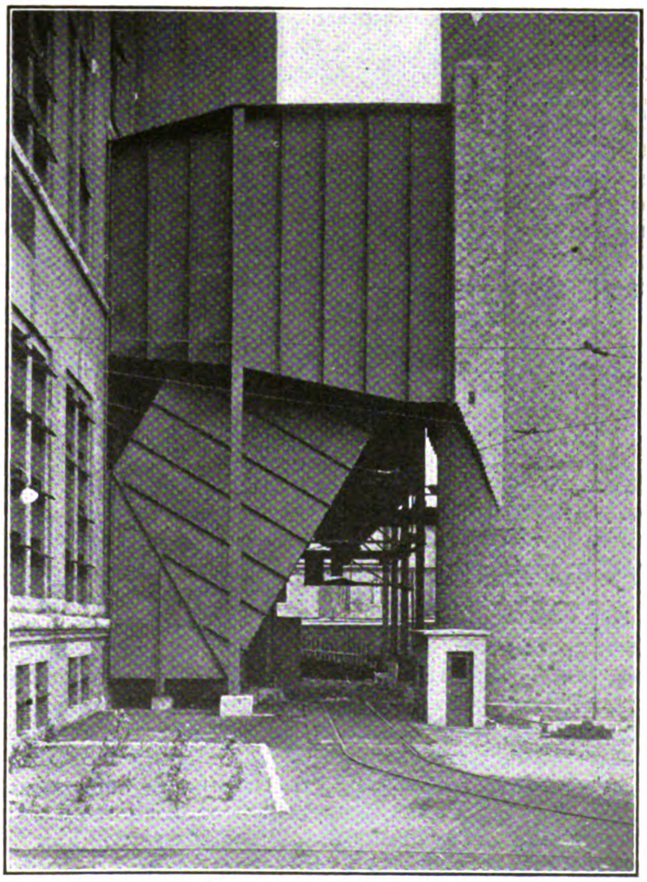
Coal is received at the plant from barges in the Providence River and elevated in a 1-ton bucket to a pocket in a hoisting tower, whence it is discharged through a crusher, falling thence into a chain-driven bucket conveyor. From the conveyor it is discharged into either coal bunker, all being on about the same level. The hoisting bucket is handled by a 22½-hp. motor and the conveyor is driven by a 50-hp. motor. From the bunkers cast-iron chutes deliver the fuel to stoker hoppers in front of the furnaces, the older boilers being equipped with Roney stokers and the new units with Taylor stokers. Ashes are discharged from below the grates into hopper-bottomed cars which are pushed by hand on narrow-gage tracks to an electric elevator at the west end of the building and thence delivered to a receiving hopper, discharging into cars out of doors just at the rear of the new chimney and behind the breeching shown in an accompanying illustration. The ash hoppers are lined with concrete to protect the sides from hot material. Provision for a 10,000-ton open-air coal storage is made in the station yard at the west side of the plant, the present arrangement being delivery by small hand cars from the bunker spouts to a trestle from which the cars are discharged by gravity. Coal from this storage area is taken to carhouses and other premises of the company by trolley, and in case it is needed within the Manchester Street station it is delivered to the hoisting system at the east end of the building. Two coal towers are provided, one being for emergency use. One is of ½ and the other 1-ton capacity per minute. About 200 tons of coal per day are burned, and the standard fuel is Pocahontas run-of-mine, with a heating value of more than 14,750 B.t.u. per pound.

BOILER AUXILIARIES

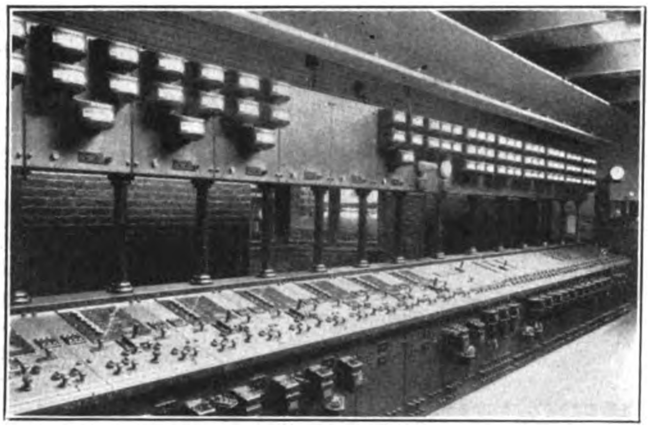
In both boiler installations the batteries are arranged on one side of a firing aisle, which simplifies the steam piping and reduces the necessary width of the building. The supply of air to the Taylor stokers used under the new boilers is from two Sirocco fans, each having a capacity of 250,000 cu. ft. of air per minute. The fans



RHODE ISLAND POWER HOUSE—15,000-KW. TURBO-GENERATOR WITH ROTARY AND LOW-SPEED ALTERNATOR IN BACKGROUND



RHODE ISLAND POWER HOUSE—BREECHINGS TO STACK FROM DOUBLE-DECK BOILER ROOM



RHODE ISLAND POWER HOUSE—BENCHBOARD AND ELECTRICAL INDICATING INSTRUMENTS

are geared in each case to a 600-hp., type "CHS" Terry steam turbine operating at 3370 r.p.m., the blowers each running at 460 r.p.m., under full rating, which includes the delivery of air against a pressure of 5.5 in. static water gage at the fan outlet. The gearing is of the Falk herringbone type, with a 7.35 reduction. The turbines are designed to operate at 200 lb. steam pressure, 125 deg. Fahr. superheat and 16.7 lb. absolute back pressure, and the guaranteed steam consumption under this condition is a maximum of 25 lb. per brake horsepower-hour, including the gear losses. The turbine speed control is automatically effected by a Mason regulator installation. These sets are understood to be the largest of their kind in the world. The air supply is taken from the boiler room and the control is flexible and particularly well adapted to the fluctuations in demand associated with railway service. A partial view of one fan and turbine unit is shown, with an outline drawing illustrating the over-all dimensions of this equipment, which are about 22 ft. length, 9.5 ft. width and 9 ft. 7 in. height. A closed system of oil circulation under pressure is a feature of the turbine equipment.

Feed water is taken from the city mains through two 10-in. independent lines. There are two Platt turbine feed pumps located on the ground floor of the boiler house, each having a capacity of 1500 gal. per minute. Two National open feed-water heaters of 5000-hp. rating each are also provided. Four horizontal, duplex Worthington feed pumps are held in reserve. The feed water is measured by two Simplex V-notch meters, and at present no water treatment is required. One steam flow meter of General Electric make is provided for each Bigelow-Hornsby boiler.

Details of the Generating Units

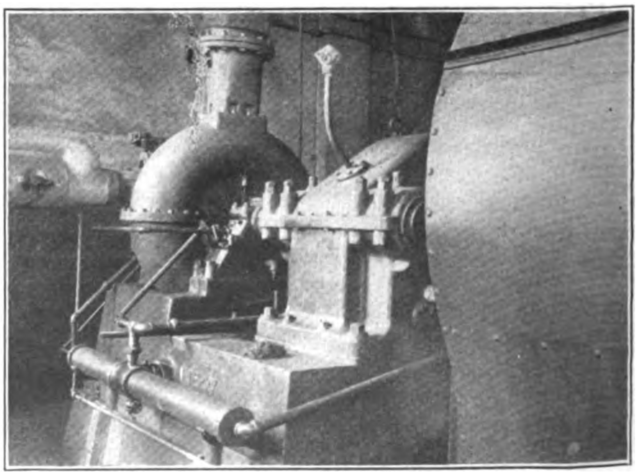
Each 15,000-kw. turbine unit delivers three-phase, 25-cycle current to the station buses, one unit ordinarily being operated about twenty hours daily. The two units are mounted on concrete foundations with floor openings facilitating observation of the auxiliary equipment. Each unit discharges into a Westinghouse-Le-Blanc condenser installed in the basement under one side of the turbine foundations, the latter being supported on piling. The condensing equipment is guaranteed to maintain a vacuum of 28 in. absolute when condensing 250,000 lb. of steam per hour, if supplied with injection water at a temperature not exceeding 70 deg. Fahr., the temperature of discharge being not less than 5 deg. Fahr. below that corresponding to the vacuum carried. At full load one unit requires 8,000,000 lb. of injection water per hour, the lift from the river being about 20 ft. Salt water is drawn from the river through a concrete conduit, discharging into a suction well from which a 36-in. pipe carries it into a manifold located on the basement floor. From the latter two 20-in. main injection pipes lead to each condenser.

The main discharge of each condenser consists of two 18-in. pipes emptying into a chamber of concrete, of 7-ft. by 4-ft. cross-section, located about 2 ft. above the top of the suction chamber. After leaving the building they discharge into the river about 50 ft. above the intake by a conduit leading off at an angle of about 45 deg. A 10-in. pipe leads from the suction manifold on each side of the condenser installation to an air pump of special design, in which a vacuum is produced by the passage of a series of water pistons by the outlet of a 12-in. exhaust pipe leading from the condenser casing to the pump. The air-pump discharge is delivered into the main discharge pipe of the condenser by a 12-in. connection. In the equipment of each condenser there are two main centrifugal pumps, and these, with two air pumps, are direct driven on a single horizontal shaft by a 450-hp. non-condensing turbine running normally at 700 r.p.m. Each main turbine unit is provided with a 36-in. atmospheric, spiral-riveted, galvanized-iron exhaust pipe carried up through the boiler house roof to an appropriate head located about 20 ft. above the latter.

The step-bearing lubrication is provided by duplicate oil pumps of the Deane duplex type, furnishing oil under a pressure of 1100 lb. per square inch to a Wood accumulator, located in the floor opening of the operating room. The step bearing is operated at a pressure of 700 lb. per square inch, the drop being obtained by the use of a screw baffle between the accumulator and the bearing. The supply of oil to the valve gear and to the upper and middle turbine bearings is furnished by Deane duplex oil pumps located in the basement. An oil filter plant is provided for the two units, and there are two priming pumps, one of Platt and the other of Blake manufacture.

Buses, Switches and Connections

The generator leads are carried away from the machine in a 12-in. x 14-in. sheet-iron casing leading to the basement. For each generator circuit 4 per cent reactance is provided. The reactors are installed in a fireproof chamber at the basement level, and from them the leads are carried to a bus and oil-switch room located in a fireproof extension at one side of the station building. The electrical arrangements of the station include two sets of three-phase, 11,000-volt buses, with motor-operated General Electric type "H6"



RHODE ISLAND POWER HOUSE—LARGE TURBINE-DRIVEN BLOWER FOR BOILER AIR SUPPLY oil switches with 10-in. pots, arranged to connect any alternator with either set of buses and any feeder or local transformer circuit with either set, the installation being controlled from a benchboard in a gallery overlooking the operating room. The oil switches are of the non-automatic type except on reverse energy. No step-up transformers are required in the station, outgoing circuits to the substations being of 11,000-volt design.

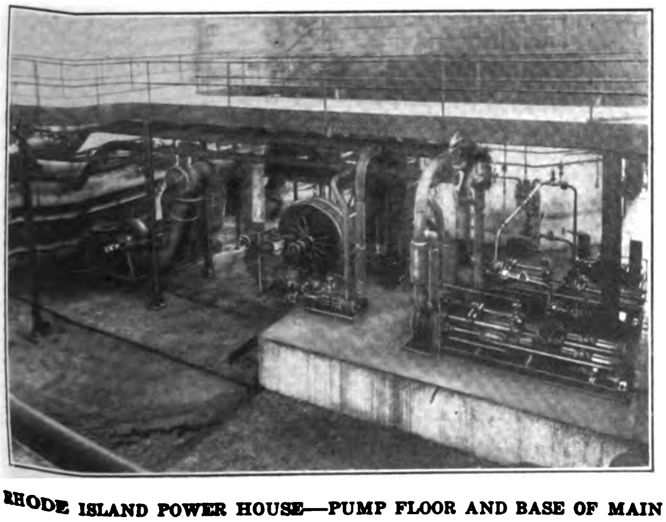
The bus room is 175 ft. long and 28 ft. wide, and contains accommodations for fifty-four oil switches of the motor-operated type. The cells also contain disconnecting switches designed for locking the blades in position, to avoid disruption in case of heavy loads or short-circuits. In the fronts of the oil switch cells are wire-glass windows, 6 in. x 13 in., and 23 in. x 14 in. in size. The buses are horizontally mounted and are of 4-in. x 0.25-in. copper strips. The bus room is illuminated by 60-watt tungsten lamps mounted in deep Holophane reflectors.

THE BENCHBOARD

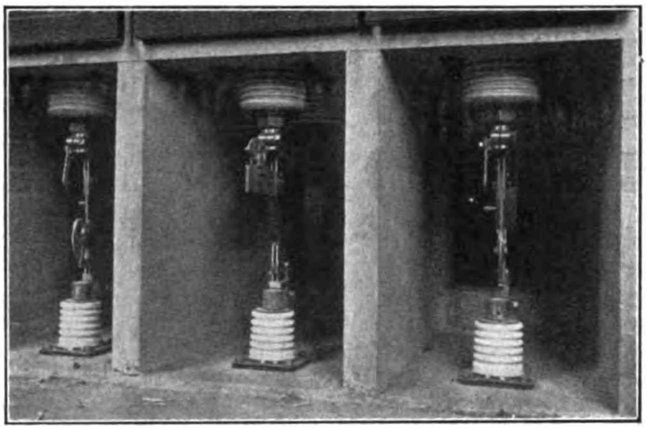
The benchboard control is operated by 125-volt direct-current derived from the exciter system. The board contains fourteen sections, accommodating eighteen 11,000-volt feeders. There are two dummy buses and seven generator panels, six feeder panels and one station panel. Each generator is provided with a reverse-energy relay in two phases, controlling the oil switch in the generator lead, and a recording wattmeter is mounted behind each generator panel. The local rotary converters are supplied through transformer banks fed through the regular 11,000-volt feeder panels. Other features of the benchboard are field switch, rheostat and governor control, signal control and synchronizing equipment, potential and current transformer terminal taps for testing and calibration, a wattless component indicator reading in kilovolt-amperes, and the usual indicating instruments. Each transformer bank is provided with an indicating wattmeter, and the benchboard is equipped with a temperature indicating set with connections to each generator armature. The main and auxiliary buses are solid throughout, no bus junction switches being provided. A General Electric engine telegraph system with 8-cp., 125-volt carbon incandescent lamps is in service.

OTHER MATTERS

Auxiliary electrical service of various kinds in the station is controlled at a nineteen-panel vertical switchboard on the gallery floor. From this are governed the operation of all motor-driven exciter sets, these being mounted on the floor in an adjacent room, steam-driven exciters, auxiliary power and lighting transformers, and local service circuits. Two sets of station auxiliary three-phase buses are installed, one at 220 volts for motor starting, and the other at 440 volts for normal operation. These buses are run at the rear of the auxiliary board with a horizontal sectionalizing switch for breaking up the service in emergencies. Three sets of station power transformers are mounted in basement compartments, with adjacent remote-controlled, solenoid-type oil switches in the taps from the transformer secondaries to the 440-volt and 220-volt auxiliary buses.



RHODE ISLAND POWER HOUSE—PUMP FLOOR AND BASE OF MAIN STEAM TURBINE



RHODE ISLAND POWER HOUSE—LOCKING DISCONNECTS IN SUB-CELLS OF BUS ROOM

Feeders are run in duct carried in the wall between pilasters from the bus and switch room to the outgoing line connections. Electrolytic lightning arresters are provided for the various feeder circuits in a separate section of the basement, with choke coils and disconnecting knife switches mounted on pipe framing. Station lighting is at 125 volts, the circuits including provision for both d.c. and a.c. supply. The main operating room is illuminated by forty-six 250-watt wall lamps and ten 500-watt gas-filled lamps mounted below the roof trusses. Two Shaw electric cranes, one of 40-ton and the other of 50-ton capacity, are installed in the operating room, the motors being wound for 600 volts, direct current, which is always available on the d.c. sides of the railway rotaries. A d.c. railway switchboard of the usual type is also a feature of the station. The outgoing 11,000-volt feeders are not equipped with integrating meters, but are provided with inverse time-limit relays.

D. F. Miner is chief engineer of the Manchester Street station with F. L. Barnard as chief electrician, W. C. Slade being superintendent of power and lines for the Rhode Island Company.

Foreign Coins in Fare Boxes

An interesting story on the foreign coins which look enough like a nickel to pass casual inspection and find their way into the pay-as-you-enter boxes of the Louisville (Ky.) Railway appeared recently in one of the local papers. According to Homer E. Bunnell, cashier of the company, hardly a day passes that some of these coins are not deposited by accident or design in the boxes. Ordinarily as soon as the coins accumulate the company ships them to Chicago, where they are exchanged. At present, with much of the foreign money depreciated, redemption is being postponed until the coins return to their normal value. A 20 franc gold piece, sold for $3.80, was the most valuable coin ever deposited and not called for. Coins from nearly all countries have figured in this collection.

Paving Street Railway Tracks*

Adequate Draining of Subgrade, Reasonable Resilience of Track and the Use of Longitudinal Expansion Joints and Permanent Rail Joints Conduce to Long Life of Paving as Illustrated by Experience in Peoria

By **R. F. PALMBLADE**
Chief Engineer Peoria (Ill.) Railway

ANY of the salient points pertaining to a discussion of street railway track construction and the paving of the right-of-way, such as drainage, foundations, concrete, treated ties, rail sections, rail fastenings and electrical connections, are each of sufficient importance to warrant most careful attention. The details of track construction which directly affect the life of the pavement in the right-of-way, however, is a subject of live interest, and the practice and experience of the Peoria Railway may be of some value to others.

The average double-track permanent way in Peoria is 17 ft. 8½ in. wide, including 1 ft. outside of the rails. For this pavement area the street railway paid the entire cost of both construction and maintenance. This amounts to paying, on the average street with double tracks, 40 per cent of the entire pavement construction cost. In fact, the investment of a transportation utility in paving alone in the average city the size of Peoria runs into hundreds of thousands of dollars, and yet it uses this pavement scarcely at all. Hence, any improvement in track construction which has a corresponding effect on the permanency of the pavement is of tremendous interest financially and otherwise to both the public utility and the municipality. The pavement in street railway tracks, as a rule, must conform to city grades as nearly as possible, and in our particular case, the paving specifications and rail sections used must be approved by the city authorities.

SOLID CONCRETE FOUNDATION UNSATISFACTORY

Generally track pavements first break down near the rail fastenings, which ordinarily is not the fault of the pavement itself but is due to the vertical vibration or play of the joint. This fact was early recognized, and the first radical move seeking to minimize this undesirable condition was the substitution of 60-ft. rails for the usual 30-ft. rails. This bettered the situation materially but since the practical rail length limit has been reached, further improvements had to be worked out along other lines. Several different types of modern pavement are in use in Peoria at the present time on the streets occupied by car lines. During the season of 1910 we constructed a stretch of double track, using concrete ballast 12 in. deep with 6-in. x 8-in. x 8-ft. untreated oak ties, spaced on 2-ft. centers, 114-lb. 7-in. girder rails, standard six-hole joints, a concrete paving foundation, a 1-in. sand cushion and a creosoted wood-block pavement with a pitch filler. The concrete was mixed in the proportions of 1:3:6. It was hoped that with the concrete almost monolithic in form and the ties completely embedded in it there would be no trouble caused by vertical vibration of the rails at the joints nor along the body of the track. This construction would, it was thought, also insure the normal life of the block pavement. Longitudinal expansion joints were not provided along the rails, the idea being to adhere to a rigid construction.

In the course of two years this track began to vibrate at the joints and even along the rail. This, in turn, caused the block pavement to rupture and heave adjacent to the rail. The blocks, in this particular case, had been rammed tight when laid, a condition which made the problem more complicated. Upon thorough examination it was found that the thousands of wheel impacts of the city cars, in addition to the heavy wheel loads of the interurban cars which operated over this piece of track, had caused the concrete directly under the rail base to pulverize—minutely, it is true, yet sufficiently to cause vertical vibration of 1/16 in. or more, which, in the course of time, became of grave importance. It was found that on account of the monolithic nature of the track construction, there being no apparent resilience whatever, the wheel impacts of the heavy interurban cars operating at 10 m.p.h. or 15 m.p.h., caused the track to fail at the point of least resistance which, in this case, was where the rail base rested on the concrete and ties.

It was also found that the rails had cut into the ties, the speed of the cutting being mainly dependent on the rate of pulverizing of the concrete. We have been repairing this track ever since. We tried to overcome the paving difficulty by placing extra long, specially made tie-plates under the rail and by relaying the blocks with longitudinal expansion joints of pitch on each side of the four-track rails. This method of repair solved the difficulty to a certain extent.

1912 CONSTRUCTION IN AND NEAR PEORIA

In 1912 we constructed through the village of Averyville, a suburb of Peoria, a double track in which we provided a 4-in. drain tile 1 ft. below the subgrade at the center of each track, rock ballast thoroughly rolled, treated ties and a concrete paving foundation. T-rails allowing sufficient space along the web and under the head to take a standard paving brick and continuous rail joints were also adopted for this track. The right-of-way was about 18 ft. wide, and it was paved with brick laid on a 1-in. sand cushion, the bricks being brought up to within ¼ in. of the top of the rail head on the street side and in the "devil strip." The outside of the rail web was plastered with a sand and cement mixture, while on the gage side the ends of the bricks were thrust under the head of the rail at an angle to conform to the crown of the pavement in each track. A pitch filler of high melting point was then hand-poured into the interstices, and care was exercised to see that the voids around the bricks under the rail head on the gage side were completely filled. This, to date, has proved one of the most efficient pieces of track and pavement we have on the system.

During this same year we also built about 2 miles of double track in Peoria, using our standard method of construction, which included 7-in. 97-lb. girder rails. The pavement consisted of standard paving brick, grout filler and cross-expansion joints of pitch spaced every 10 ft. This paving has been quite satisfactory, though we have noted that because the grout filler and brick formed practically a monolithic mass, a sounding-board effect was produced. In this connection, it is our opinion that a grout-filler brick pavement in a street railway track intensifies the traffic noises about 20 per cent more than the same pavement with a pitch filler.

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*Abstract of paper read at joint convention of Illinois Society of Engineers and Surveyors and the Illinois section of the American Waterworks Association held at the University of Illinois on Jan. 25-27, 1916.

CONSTRUCTION OF 1913

In our later track rehabilitation work we have endeavored to adhere to the following principles: First, that the subgrade must be adequately drained; second, that the track itself must be resilient to a certain degree; third, that on both sides of each rail a longitudinal expansion joint must be provided and, finally, that the rail joint itself must be of a permanent and lasting character. All these are factors directly affecting the life of the pavement.

In conformity with these principles we constructed in 1913 a double track in which we used the following: A drainage system, rolled crushed-stone ballast, creosoted ties, a concrete paving foundation, special reinforced rail joints with heat-treated bolts of a high elastic limit, a 1-in. sand cushion, and a creosoted wood-block pavement with longitudinal expansion joints every 10 ft. This particular track, though subjected to heavy traffic, has as yet given no evidence whatsoever of failure at the joints or along the rail. The block pavement has not been disturbed in the least which, from our experience, is the first evidence in track failure and is indicated by a slight rupture of the pavement.

It is needless to say that we have abandoned entirely the use of concrete under the ties in our track construction, though we do use concrete for a paving foundation, beginning at the bottom of the tie and extending 8 in. toward the surface of the street. It will thus be noted that the paving foundation is deep enough to imbed the ties and a portion of the rails, thus forming a comparatively solid mass resting on a rock or gravel ballast cushion of some elasticity. This type of construction has eliminated most of our pavement troubles.

Although, as stated, track pavements usually begin to fail in close proximity to the rail joint, joint troubles rather than pavement troubles have served to spur on the development of various types of improved rail fastenings. In our rehabilitation work we have recently been using an electrically welded joint. In connection with this an electrically-driven track grinder is employed to obtain a perfectly smooth running surface where the rail ends meet. We have recently completed about 1½ miles of double track which included three different types of pavement, using our method of standard construction with the welded joint. A fourth of a mile of this track was paved with brick with an asphalt filler; another section was laid with brick using a sand filler, and approximately 1 mile was laid using a grout filler. In the last instance a patent expansion joint, ¼ in. thick by 4 in. deep, was laid along both sides of each rail and transverse joints were placed every 10 ft. We understand that the paving commission of Baltimore, Md., has specified a bituminous filler similar to the one just mentioned along the outer rails of railway tracks. In our case the patent joint is easy to install, eliminates the difficulties caused by movement of the pavement against the rails, and serves as an expansion joint.

PAVEMENT IN CITIES OF MODERATE SIZE

An ideal pavement for street railway tracks in cities of moderate size, in general, should have a roadway built according to the following specifications, which essentially conform to our standard track construction: All double track is laid with 10-ft. 6-in. track centers. After the grade has been established the roadway is excavated to a depth of 21 in. and a 4-in. vitrified sewer tile is laid with open joints along the center of each track and 12 in. below the bottom of the subgrade. If the track is level for a distance, a suitable fall is provided for the tile to the city sewer system. The tile is then covered to the level of the subgrade with gravel or fine broken stone, after which the subgrade is thoroughly rolled with a 5-ton or 6-ton roller. Risers or cast-iron hand holes are provided at each street intersection. Five inches of 1-in. to 1½-in. crushed stone or gravel is then spread level over the subgrade and also well rolled. Oak creosoted ties 6 in. x 8 in. x 8 ft. in size are then laid at 2-ft. centers on the rolled ballast and then the tie plates and rails are laid and spiked, after which a sufficient quantity of fine broken stone is scattered between the ties to raise and tamp the track to grade.

PRESENT STANDARD CONSTRUCTION

A standard 60-ft., 7-in., 97-lb. grooved girder rail has been adopted with special reinforced channel bars at the joints. The rails are laid with staggered joints and 1-in. tie rods spaced at 7½-ft. intervals. The joints are of the six-hole standard and all plate and web holes are drilled slightly smaller than 1 in. These holes are then reamed to 1 in. in diameter and a 1-in. turned, heat-treated, high-tensile strength machine bolt is inserted. It is obvious that a driving fit is necessary. After this each bolt is pulled up snug and marked to prevent loosening.

A 10-in. No. 0000 capacity concealed compressed-terminal bond is placed under the joint plates, and when double track is being built the joints on the two inside rails are bonded with an outside 36-in. No. 0000 compressed terminal bond in addition to the concealed bond. Cross bonds of No. 0000 or more in capacity are installed every 400 ft.

Concrete in the proportions of one part of cement, three parts of sand and six parts of broken stone is then poured over the ties and between them to a depth even with the bottom of the rails, or about 8 in. The concrete is thoroughly shovel-tamped under the edges of each tie so that the set concrete will grip the tie firmly. A rail plaster composed of one part of cement and four parts of sand is then placed under the groove and head of the rail and smoothed down perpendicular to the projecting edges. A 1-in. sand cushion is then spread over the solid concrete and either a brick or a wood-block pavement is laid on it, the type of paving being designated by the city. The paving, if left to our choice, is of standard vitrified brick with an asphalt filler and the patent expansion joint previously mentioned. All bricks in the right-of-way are laid at right angles to the track. We do not use a stretcher brick nor a nose brick to form the wheel flangeways.

A smooth running surface at each rail joint is finally provided by grinding it to a perfect surface. It has been found that slight differences in the heights of the rail ends occur as they come from the mills. This in time allows the car wheels to batter down the receiving rail, causing defective joints and failure of the adjacent pavement. This condition was further relieved in 1915 by using the electrically welded joint in our construction work to the exclusion of all others.

The Sault Ste. Marie Bridge Company has placed around its drawbridges and shops a number of effective safety signs. The signs are painted in blue on a white background and they contain the words "Look, Listen, Safety First." At the left center is a red disk, and at the right center a green disk, while the center itself is occupied by a large blue cross, on which is superimposed a hand pointing to the green disk. This company is endeavoring to educate its men to "get the safety habit."

Watch Inspection Systems*

Safety of Operation and Maintenance of Schedules Are Two of the Results Obtained by Systematic Inspection of Trainmen's Watches—Rules Governing Inspections and the Systems of Keeping Records on Different Lines Are Analyzed

ON account of the increasing interest in the systems for maintaining trainmen's watches in first-class condition the editors of the ELECTRIC RAILWAY JOURNAL have secured from a number of roads which maintain such systems data as to their practice and samples of the printed matter which they use. The results are given herewith.

WHAT WATCH INSPECTION DOES

The purposes of watch inspection systems are to enable schedules to be kept up and to increase the safety of operation of the roads. That they accomplish these purposes is attested by the experience of a number of roads. In the matter of the effect on the schedule, in Lancaster, Pa., for example, after the watch inspection system went into operation the public soon discovered that cars were making time points more accurately. The result was an increase in traffic. To encourage this the company is now getting out card time-tables of individual lines, giving times at terminals and at intermediate points. The experience of the Twin City Rapid Transit Company indicates that another advantage of accurate watches is in the reduction of complaints that trains have left ahead of time.

ESSENTIALS OF A GOOD SYSTEM

There are certain elements in the successful accomplishment of the purposes mentioned above, as follows:

1. Provision must be made for the possession of a good watch by each trainman and other employee concerned with car movement, the company arranging to buy the watches and deduct instalments from wages if necessary. The company must be reasonable in enforcing this requirement.

2. Suitable clear and simple rules must be formulated and promulgated in order that the men may know what they are expected to do. With these may be given such information regarding the construction and care of watches and of the local inspection system as will conduce to intelligent co-operation.

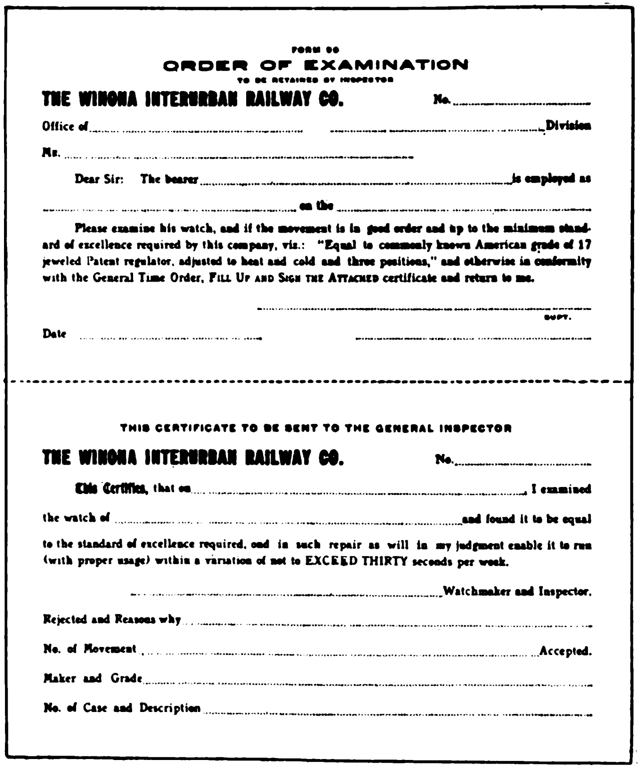
3. There must be an inspection system with suitable certificates and record forms for the inspectors' entries, and the inspectors must be conveniently located.

4. Finally, in order that discipline may be maintained, there is required a follow-up system of records for scrutiny by administrative officers, with a plan for notifying individuals of infractions of the rules.

The requirements of individual roads differ materially, and it is unlikely that a single system of inspection could be devised to suit all, but the general principles apply in all cases and can be adapted to local needs.

GETTING GOOD WATCHES

It is becoming customary to specify the quality of watch which will be passed by inspectors. The Memphis (Tenn.) Street Railway requires a watch of not less than fifteen jewels after a man has been in service three months. The Washington, Baltimore & Annapolis Electric Railway has compiled a watch list comprising nearly forty, of eight standard makes, the watches having from seventeen to twenty-three jewels. The



FORM 60

ORDER OF EXAMINATION

TO BE RETAINED BY INSPECTOR

THE WINONA INTERURBAN RAILWAY CO. No. ....

Office of ....Division

Mr. ....

Dear Sir: The bearer ....is employed as

.... on the ....

Please examine his watch, and if the movement is in good order and up to the minimum standard of excellence required by this company, viz.: "Equal to commonly known American grade of 17 jeweled Patent regulator, adjusted to heat and cold and three positions," and otherwise in conformity with the General Time Order, FILL UP AND SIGN THE ATTACHED certificate and return to me.

....
SUPT.

Date ....

THIS CERTIFICATE TO BE SENT TO THE GENERAL INSPECTOR

THE WINONA INTERURBAN RAILWAY CO. No. ....

This Certifies, that on ...., I examined the watch of ....and found it to be equal to the standard of excellence required, and in such repair as will in my judgment enable it to run (with proper usage) within a variation of not to EXCEED THIRTY seconds per week.

..................................Watchmaker and Inspector.

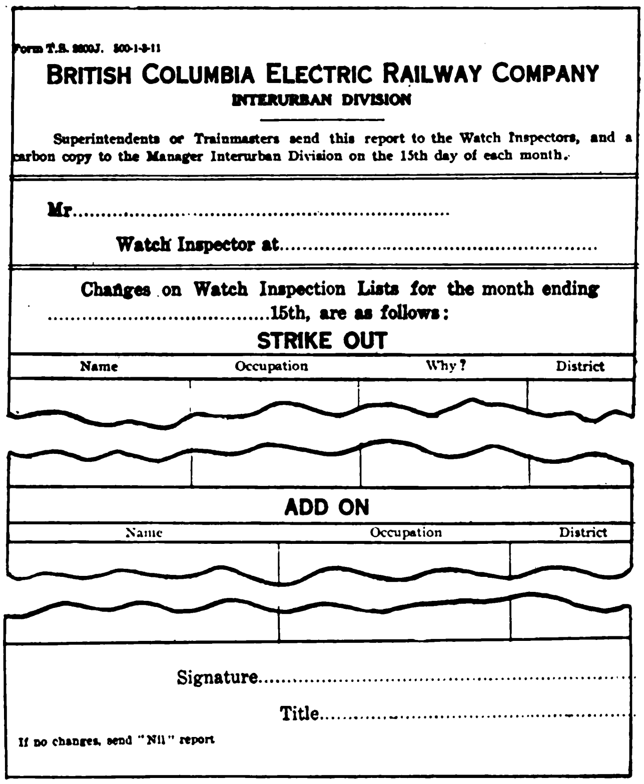
Rejected and Reasons why ....

No. of Movement ....Accepted.

Maker and Grade ....

No. of Case and Description ....

TIME INSPECTION—SAMPLE EXAMINATION ORDER AND CERTIFICATE FORM



Form T.S. 2800J. 500-1-3-11

BRITISH COLUMBIA ELECTRIC RAILWAY COMPANY

INTERURBAN DIVISION

Superintendents or Trainmasters send this report to the Watch Inspectors, and a carbon copy to the Manager Interurban Division on the 15th day of each month.

Mr..................................

Watch Inspector at..................................

Changes on Watch Inspection Lists for the month ending ....15th, are as follows:

STRIKE OUT

Name	Occupation	Why?	District

ADD ON

Name	Occupation	District

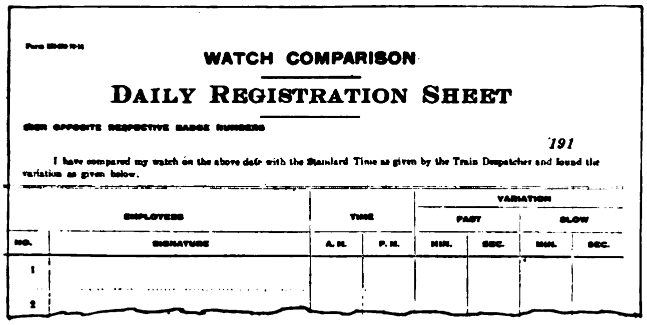
Signature..................................

Title..................................

If no changes, send "Nil" report

TIME INSPECTION—FORM FOR USE IN CHANGING INSPECTION LISTS

For previous articles describing the practice of particular electric railways see ELECTRIC RAILWAY JOURNAL, Vol. XLII, Sept. 27, 1913, page 501; Vol. XLVI, Oct. 23, 1915, page 874, and Vol. XLVI, Nov. 20, 1915, page 1034.



WATCH COMPARISON

DAILY REGISTRATION SHEET

SIGN OPPOSITE RESPECTIVE BADGE NUMBERS

191

I have compared my watch on the above date with the Standard Time as given by the Train Despatcher and found the variation as given below.

EMPLOYEES		TIME		VARIATION			
				FAST		SLOW	
NO.	SIGNATURE	A. M.	P. M.	MIN.	SEC.	MIN.	SEC.
1							
2							

TIME INSPECTION—FORM FOR DAILY TIME REGISTRATION, DOMINION POWER & TRANSMISSION COMPANY

People's Railway, Dayton, Ohio, has a minimum standard seventeen-jewel watch adjusted to heat and cold and to three positions. The general custom appears to require a watch capable of adjustment to within thirty seconds per week. The Pacific Electric Railway, Los Angeles, Cal., specifies for old watches movements with seventeen jewels, Breguet hair springs and patent regulator, lever set and adjustable to temperature. New watches must also be adjusted to three positions and have steel escape wheel and double rollers. This and other companies have lists of makes which will not be accepted, one company barring watches of makers no longer in business, as such watches cannot be maintained at a high standard.

WATCH INSPECTION RULES

In the matter of rules there is wide divergence of practice. Some companies, The British Columbia Electric Railway, for example, have booklets of regulations, containing rules for employees and instructions for watch inspectors. This company ends its instructions with the following comment to inspectors: "Make a friend of the employee; be courteous; win his confidence by square and fair dealing—it will pay you financially. Bear with him, though sometimes he may appear to be unreasonable. Generally speaking, if he complains he has a cause—try and remedy it. Mutual forebearance all around will give what we aim at, viz., the most successful system in existence." With this spirit any system of rules will be effective. This company's booklet is substantially bound and will wear for a long time. The Winona Interurban Railway, Warsaw, Ind., has a similar booklet put up in cheaper fashion, suitable for carrying in a pocket book. The Pacific Electric Railway issues official circular letters to heads of departments, watch inspectors and others, giving rules, special instructions, etc.

ORGANIZATION

Obviously the success of any system depends upon the machinery used in carrying it out and in this case everything depends upon the chief watch inspector. The Pacific Electric Railway has a general time inspector reporting to the general manager, with an assistant and local inspectors for the several divisions. On the Oakland, Antioch & Eastern Railway there is one regular watch inspector to whom the men report for comparison twice each month. The men are also required to compare their watches with the standard clock in the dispatcher's office once each day, those making more than one trip comparing before starting on each trip. This practice of requiring the men to check up their watches frequently in the train dispatcher's office is followed on a number of roads.

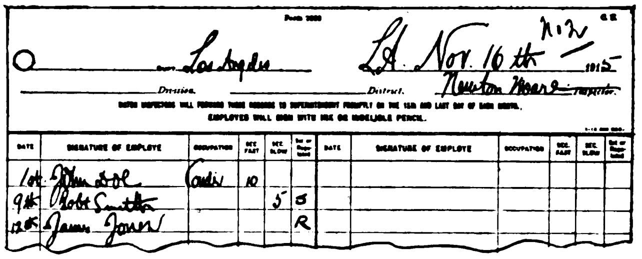
The duties of the inspector are to insure the possession by the men of watches of the proper quality, to see that these are cleaned and oiled at suitable intervals, about once a year, and to keep the watches within the prescribed limits of accuracy.

FORMS AND RECORDS

The Dominion Power & Transmission Company, Hamilton, Ont., requires motormen and conductors to call for standard time from the dispatcher before taking their runs. A daily registration sheet, with spaces for 224 entries, is used for the record of this procedure.

An inspector's certificate of some form is a necessity in any system. In the case of a first examination the certificate form may be a part of a superintendent's order authorizing the inspection. The periodical inspection records are usually kept on small time comparison cards, vest pocket size, on which the inspectors make their entries. Special loaner watch cards are usually provided also. In some cases the standard clocks are checked up also on a somewhat similar form. Instead of cards the inspection records may be entered on printed forms with the employees' signatures, this plan having the merit of reducing clerical work, but leaving the employee to depend upon his memory for his watch rating.

In any case the results of the inspections must be



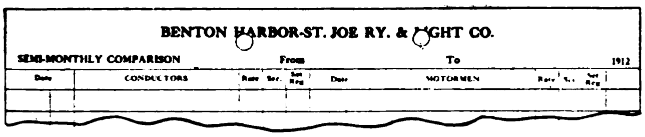
Los Angeles LA Nov. 16th 1915 No 12

Division. District. Newton Moore Inspector.

WATCH INSPECTORS WILL FORWARD THESE RECORDS TO SUPERINTENDENT PROMPTLY ON THE 15th AND LAST DAY OF EACH MONTH.
EMPLOYES WILL SIGN WITH INK OR INDELIBLE PENCIL.

DATE	SIGNATURE OF EMPLOYE	OCCUPATION	SEC. FAST	SEC. SLOW	Set or Regulated	DATE	SIGNATURE OF EMPLOYE	OCCUPATION	SEC. FAST	SEC. SLOW	Set or Regulated
1st	John Doe	Condr	10								
9th	Robt Smith			5	S						
12th	James Jones				R						

TIME INSPECTION—FORM FOR COLLECTING ORIGINAL DATA, PACIFIC ELECTRIC RAILWAY

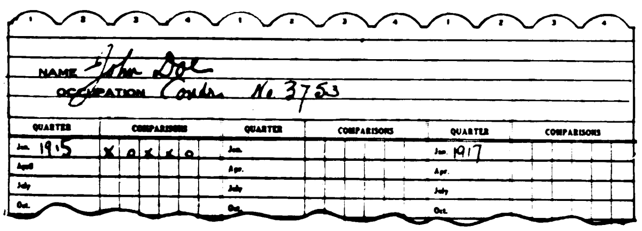


BENTON HARBOR-ST. JOE RY. & LIGHT CO.

SEMI-MONTHLY COMPARISON From To 1912

Date	CONDUCTORS	Rate	Sec.	Set Reg	Date	MOTORMEN	Rate	Sec.	Set Reg

TIME INSPECTION—FORM FOR TABULATING INSPECTION DATA



1 2 3 4 1 2 3 4 1 2 3 4

NAME John Doe

OCCUPATION Condr No 3753

QUARTER	COMPARISONS	QUARTER	COMPARISONS	QUARTER	COMPARISONS
Jan. 1915	x o x x o	Jan.		Jan. 1917	
April		Apr.		Apr.	
July		July		July	
Oct.		Oct.		Oct.	

TIME INSPECTION—PERMANENT RECORD CARD USED BY PACIFIC ELECTRIC RAILWAY

Form T.S. 2600I. 500-1-3-11

To The British Columbia Electric Railway Company
Interurban Division

Please pay..........................Watch Inspector of..........................the sum of................dollars, on account of Watch Movement No............Case No....... purchased from him, and deduct this amount from my wages due me for the month of............................, 191 ; but in case my wages are garnisheed or attached under legal process, or I am discharged or die in said Company's service, then the amount unpaid upon the said watch shall immediately become due and be paid to the said Watch Inspector out of any wages then earned by me, said watch to remain the property of the said Watch Inspector until entirely paid for.

Witness.................... Signature......................

Dated...................... Occupation.....................

................................, 191

TIME INSPECTION—FORM FOR USE IN AUTHORIZING PAYMENT BY COMPANY tabulated for transmittal to the administrative officers, and considerable ingenuity is displayed in the designing of forms for this purpose. For permanent record one road uses a card record, one card for each employee, upon which the results of inspection for several years can be recorded.

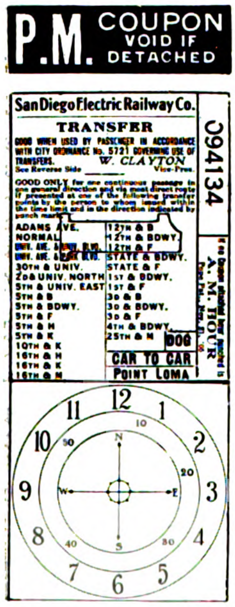
CONCLUSIONS

The use of systematic time inspection, while comparatively new on electric railways, is on the increase. The steam railroads have of necessity had such systems for many years and their experience is available for electric railways. There is a distinct disciplinary value in having accurate operation of watches and clocks on an electric railway, as this not only makes it possible to keep up schedules but fosters a pride in doing so. Snappy, enthusiastic co-operation in this matter can be secured and is worth all that it costs. There is an innate human desire to have first-hand knowledge of the correct time and the modern electric railway manager is not slow to utilize this.

New San Diego Transfers

Time-Limit, One-Direction Transfers, Which Eliminate Many of the Abuses Formerly Prevalent, in Use Since Jan. 1

AT the beginning of this year the San Diego (Cal.) Electric Railway adopted a new form of transfer, shown in the accompanying illustration, which has eliminated in a large measure the abuses of stopping over and round-trip and indirect-route riding formerly prevalent on this system. The transfer entitles the passenger to a journey in one continuous direction within the time limit shown, but it is not transferable and does not permit a stop-over. When a second transfer is necessary, a red one is issued. No passengers are allowed a red transfer except for one or two routes to remote parts of the city.



P.M. COUPON VOID IF DETACHED

San Diego Electric Railway Co.

TRANSFER

GOOD WHEN USED BY PASSENGER IN ACCORDANCE WITH CITY ORDINANCE No. 5721 GOVERNING USE OF TRANSFERS.

See Reverse Side

W. CLAYTON
Vice-Pres.

094134

GOOD ONLY for one continuous passage in one general direction and via most direct route if presented at one of the following transfer points by the person to whom issued within the time limit and in the direction indicated by punch mark.

ADAMS AVE.
NORMAL
30TH & UNIV.
2D & UNIV. NORTH
5TH & UNIV. EAST
5TH & B
5TH & BDWY.
5TH & F
5TH & H
5TH & K
10TH & K
16TH & H
16TH & K
16TH & M

12TH & B
12TH & BDWY.
12TH & F
STATE & BDWY.
STATE & F
1ST & BDWY.
1ST & F
3D & B
3D & BDWY.
3D & F
4TH & BDWY.
25TH & M
DOG
CAR TO CAR
POINT LOMA

A. M. HOUR

NEW SAN DIEGO TRANSFERS

Prior to Jan. 1 Superintendent M. J. Perrin called in at various times all of the conductors in groups of five and thoroughly discussed every possible phase connected with the issuance of the new transfers. Lectures on the subject were given, and details of the system pertaining to individual routes were considered with the men with a view to fully familiarizing each conductor with matters likely to come up pertaining to the issuance and acceptance of transfers on his route. Later a pocket-sized book of instructions was issued to conductors fully covering the whole plan. The result of this preliminary work among the men was that on the day the new transfers went into effect every one of the conductors was thoroughly instructed and information was given promptly to patrons when any question arose.

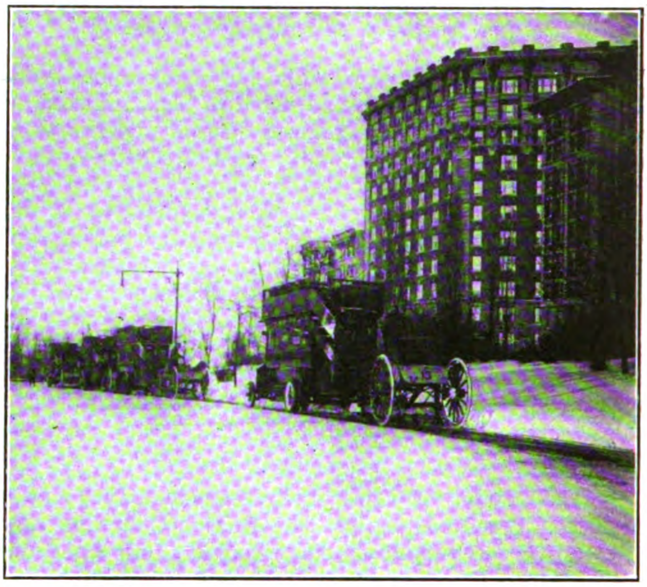
The transfers have been in effect for a month and are considered a decided success both from the viewpoint of the company's officials and the public.

Progress is being made with the construction of the electric railway connecting Turin, Italy, with Lanzo. Extensive construction has been required, including five tunnels, of which four are already finished, also six bridges and two large viaducts.

Efficient Snow-Fighting System

New York Streets Are Quickly Cleared of Snow by Special Squads of Motor-Bus Company Employees

AT the beginning of the snow storm that struck New York City on Feb. 2 a novel and effective snow-fighting system was put into operation just off upper Fifth Avenue, as shown in the illustration. When less than 1 in. of snow had fallen, twenty-five snowplows manned by more than 100 motor-bus employees were starting out from the garage of the Fifth Avenue Coach Company in East 102d Street to fight the storm. The company has voluntarily offered to the city to keep clear in times of storm those thoroughfares on which its motor buses operate. This service, including about 20 miles of city streets, was performed during the recent storm in an unusually short time.



NEW YORK MOTOR BUSES HAULING SNOW PLOWS IN DIAGONAL FORMATION

In order to render this service the motor-bus employees have been so organized that each one has a definite post and job, and is subject to call at any hour of the day or night. The recent storm was an illustration of this, for at 3.30 o'clock on the second morning, when the snow had begun to fall again, messengers were dispatched from the garages to assemble the snow-fighting corps. A record is kept of the exact floor on which each man lives and the messengers have a stated route which will collect the greatest number of men in the shortest time. The first plow usually leaves the garage within ten minutes of the alarm time.

The snow plows are of the road-scraper kind and are pulled along by the big motor buses. A man on the plow and the driver and conductor of the bus constitute the crew. These teams travel in pairs or in threes or fours, according to the width of the street, so that the plows follow along diagonally behind one another. In this way the snow is pushed to one side and banked. After the storm when ice forms on the cleared roadway the coach company sends out motor sand cars which automatically sift sand over the glassy thoroughfare. In addition each plow is equipped with bags of sand and ashes.

The Ealing chamber of commerce, Ealing, England, has decided to ask the London United Tramway Company to permanently reduce the speed of its cars, owing to the noise and risk of accidents on the down grades.

Electric Railway Earnings in New York

Up-State Commission Issues Comparative Earning Figures for Last Nine Years—Mr. Hasbrouck, Statistician of Commission, Says Loss in Net Income Is Not Due to Decreased Business or Increased Operating Expenses, But to Higher Taxes and New Capital Costs

The division of statistics and accounts of the Public Service Commission for the Second District of New York has compiled some figures, shown in the accompanying table, which cast an illuminating light upon the progress made during the last nine years by electric railways under its jurisdiction. It will be recalled that this commission regulates all the railways in the State outside of New York City. The figures now published were contained in the annual report of the commission for the year ended Dec. 31, 1915, recently submitted to the Governor. The table is self-explanatory, but it may be well to point out some of the most striking features.

For the first time since 1907, the electric railway operating revenues for the fiscal year ended June 30, 1915, showed a decrease as compared with those for the preceding year. The decrease amounted to 2.9 per cent of the returns for the preceding fiscal year, although the total was still 57.4 per cent greater than the railway operating revenues for 1907. Railway operating expenses also decreased 2.5 per cent from the 1914 figure, but this was not enough to prevent a decrease in net revenue from railway operations, which in 1915 showed a loss of 3.7 per cent. This falling off was intensified by the tax charges, which increased to a smaller degree than usual but still gained 1.5 per cent as compared to 1914. It may be noted, incidentally, that the tax charges for 1915 increased 124.5 per cent above the figure for 1907. The railway operating income showed a falling off in 1915 of 4.8 per cent as compared to 1914, although this item was still 44.8 per cent greater than the returns for 1907. The net revenue from other operations decreased 3.5 per cent and non-operating income increased 2 per cent as compared to 1914, so that the net effect upon gross income for 1915 was a decrease of 4.3 per cent as compared to the preceding year.

Interest charges, which have shown a steady increase over 1907 from 19.2 per cent in 1908 to 111.3 per cent in 1915, also increased 5 per cent in 1915 as compared to 1914. Other deductions from gross income, which have displayed a much more rapid increase over 1907 from 14 per cent in 1908 to 450.6 per cent in 1914, showed in 1915 a slight decrease of 3.1 per cent from the 1914 result, so that the net increase over 1907 for the last year was reduced to 433.3 per cent. The net income available for dividend and other appropriations, which has been falling off since 1911, suffered in 1915 a decrease of 67.5 per cent as compared to 1907. The decrease in 1915 as compared to 1914 amounted to 46.3 per cent, this figure being exceeded only by the return for 1913, when the decrease from the net income for the preceding year totaled 50.8 per cent.

The dividend payments have been declining since 1913, when they amounted to 161.4 per cent of the total paid in 1907. In 1914 the disbursement was cut to 135.4 per cent of the 1907 payment, while in the last fiscal year the disbursement amounted to only 74.1 per

STATISTICS OF ELECTRIC RAILWAYS IN NEW YORK STATE, OUTSIDE OF NEW YORK CITY, FROM 1907 TO 1915

Year Ended June 30	Amount	Per Cent of Increase or Decrease		Amount	Per Cent of Increase or Decrease		Amount	Per Cent of Increase or Decrease		Amount	Per Cent of Increase or Decrease	
		Compared with Preceding Year	Compared with First Year of Series		Compared with Preceding Year	Compared with First Year of Series		Compared with Preceding Year	Compared with First Year of Series		Compared with Preceding Year	Compared with First Year of Series
	Railway operating revenues			Railway operating income			Interest charges			Passengers carried		
1907	$19,774	....	....	$6,152	....	....	3,804	....	....	418,622	....	....
1908	21,617	9.3	9.3	6,219	1.1	1.1	4,536	19.2	19.2	448,846	7.2	7.2
1909	22,354	3.4	13.0	6,349	2.1	3.2	4,960	9.3	30.4	462,456	3.0	10.5
1910	24,917	11.5	26.0	7,628	20.1	24.0	5,141	3.6	35.1	499,357	8.0	19.3
1911	27,041	8.5	36.8	8,804	15.4	43.1	5,293	3.0	39.1	542,695	8.7	29.6
1912	28,010	3.6	41.7	8,648	D 1.8	40.6	5,441	2.8	43.0	575,431	6.0	37.5
1913	30,234	7.9	52.9	8,993	4.0	46.2	7,009	28.8	84.3	600,956	4.4	43.6
1914	32,062	6.0	62.1	9,360	4.1	52.1	7,656	9.2	101.3	632,902	5.3	51.2
1915	31,127	D 2.9	57.4	8,909	D 4.8	44.8	8,037	5.0	111.3	608,471	D 3.9	45.4
	Railway operating expenses			Other operations, net revenue			Other deductions from gross income			Revenue car-miles		
1907	$12,736	....	....	$333	....	....	243	....	....	80,000	....	....
1908	14,333	12.5	12.5	502	50.8	50.8	277	14.0	14.0	85,446	6.8	6.8
1909	14,844	3.6	16.6	548	9.2	64.6	340	22.7	39.9	86,144	0.8	7.7
1910	15,977	7.6	25.4	624	13.9	87.4	635	86.8	161.3	93,557	8.6	16.9
1911	16,796	5.1	31.9	642	2.9	92.8	840	32.3	245.7	96,474	3.1	20.6
1912	17,827	6.1	40.0	660	2.8	98.2	981	16.8	303.7	97,894	1.5	22.4
1913	19,456	9.1	52.8	683	3.5	105.1	1,220	24.4	402.1	102,197	4.4	27.7
1914	20,741	6.6	62.9	735	7.6	120.7	1,338	9.7	450.6	106,177	3.9	32.7
1915	20,228	D 2.5	58.8	709	D 3.5	112.9	1,296	D 3.1	433.3	102,517	D 3.4	28.1
	Net revenue, railway operations			Non-operating income			Net income			Per cent	Operating ratio	
1907	$7,038	....	....	$433	....	....	$2,870	....	....	64.41	....	....
1908	7,284	3.5	3.5	320	D 26.1	D 26.1	2,229	D 22.3	D 22.3	66.30	2.9	2.9
1909	7,510	3.1	6.7	935	192.2	115.9	2,532	13.6	D 11.8	66.40	0.2	3.1
1910	8,940	19.0	27.0	755	D 19.3	74.4	3,232	27.6	12.6	64.12	D 3.4	D 0.5
1911	10,245	14.6	45.6	981	29.9	126.6	4,294	32.9	49.6	62.11	D 3.1	D 3.6
1912	10,183	D 0.6	44.7	1,288	31.3	197.5	4,174	D 2.8	45.4	63.65	2.5	D 1.2
1913	10,778	5.8	53.1	608	D 52.8	40.4	2,055	D 50.8	D 28.4	64.35	1.1	D 0.1
1914	11,321	5.0	60.9	636	4.6	46.9	1,737	D 15.5	D 39.5	64.69	0.5	0.4
1915	10,899	D 3.7	54.9	649	2.0	49.9	933	D 46.3	D 67.5	64.99	0.5	0.9
	Railway tax accruals			Gross income			Dividends during year					
1907	$887	....	....	$6,917	....	....	$1,600	....	....			
1908	1,065	20.1	20.1	7,042	1.8	1.8	2,065	29.1	29.1			
1909	1,161	9.0	30.9	7,832	11.2	13.2	2,191	6.1	36.9			
1910	1,312	13.0	47.9	9,007	15.0	30.2	2,153	D 1.7	34.6			
1911	1,442	9.9	62.6	10,427	15.8	50.7	2,776	28.9	73.5			
1912	1,535	6.4	73.1	10,597	1.6	53.2	3,546	27.7	121.6			
1913	1,784	16.2	101.1	10,284	D 3.0	48.7	4,183	18.0	161.4			
1914	1,961	9.9	121.1	10,731	4.3	55.1	3,767	D 9.9	135.4			
1915	1,991	1.5	124.5	10,267	D 4.3	48.4	2,785	D 26.1	74.1			

In all the monetary columns in the accompanying table the last three figures are omitted.

The letter D prefixed to a figure indicates a decrease.

cent of the 1907 amount. From the point of view of successive years, the increase of 18 per cent in 1913 over 1912 was cut in 1914 to a decrease of 9.9 per cent from 1913 and in 1915 to a decrease of 26.1 per cent from 1914. As compared to 1914, the year 1915 showed a falling off in traffic of 3.9 per cent as measured by passengers carried and of 3.4 per cent as measured by revenue car-miles, although the total traffic in each instance was greater than in any year preceding 1914. The operating ratio for 1915 continued the steady increase of the last four years, although the percentage of increase over 1907 is still only 0.9 per cent.

RESTRICTIONS ON THE USE OF THESE FIGURES

In an interview with a representative of the ELECTRIC RAILWAY JOURNAL, Henry C. Hasbrouck, head of the division of statistics and accounts, stated that totals as given in the commission reports should be used with caution. They are compiled by simply adding the revenues, expenses, etc., stated in the annual reports of the seventy-four operating electric railways, practically as these are contained in the published "Abstracts of Annual Reports" of the commission. Any differences between present figures and those previously published are caused almost entirely by corrections necessitated by late returns from some of the companies amending the reports originally filed.

According to Mr. Hasbrouck, this method of compilation obviously contains several sources of errors. Perhaps the most important is the impossibility of segregating urban from interurban business, for it is clear that figures which contain revenues and expenses for both these classes of operations lose something of their significance for either. Moreover, the comparison from year to year of totals for electric railways reporting to the commission is not a comparison of exactly the same properties. For example, new lines which have been under construction may be opened for operation; railroads which have been operated by steam power may be electrified, and an interstate corporation may transfer its operations outside of New York to a foreign subsidiary, thus reducing the totals although traffic may have actually increased. It is also true that in spite of all insistance on uniformity of accounting there are sometimes important items concerning the accounting treatment of which a difference of opinion may exist that causes two or more companies to report the same kind of transaction in different ways.

Mr. Hasbrouck said, however, that an analysis of the sources from which these particular figures are derived does not indicate that any of the possible errors due to comparing unlike quantities are such as should materially affect the totals. The mileage operated by electric railways has increased somewhat from year to year, approximately 280 miles from June 30, 1907, to June 30, 1915, but it is quite evident that the steady decrease in net income since 1911 is not caused by high fixed charges and low earnings on a few large new properties. Neither can the decrease be accounted for by any difference in the number of reporting corporations due solely to the transfer of properties outside the State by or to corporations whose operations extend beyond New York State boundaries. Two lines, the Jamestown, Westfield & Northwestern and the Niagara Junction, which are included in the electric railway totals for the last fiscal year, were formerly classed among the steam railroads, but this inclusion would not seriously alter the tendency of the figures as compiled.

HIGHER CAPITAL COSTS AND TAXES THE REAL DRAIN

With all due allowances for the various sources of errors, as previously outlined, however, Mr. Hasbrouck felt that there was no escape from the conclusion that during the last four years, while net revenue from operations had remained fairly constant, taxes, interest, rentals and other charges against gross income had increased so rapidly that the amount available for dividend appropriations had very materially diminished. It did not appear to what extent these factors had affected city lines as compared to interurban lines, but Mr. Hasbrouck was inclined to think that both classes of traffic were equally concerned. Moreover, there was no indication of any extraordinary loss in operating revenues, although as before noted there was some falling off in the year ended June 30, 1915, as compared to the preceding year. Apparently this in a large part was due to the general business conditions during these periods. In Mr. Hasbrouck's opinion it was not a decrease in the amount of business done by electric railways or an increase in the expenses of operation, properly so-called, which reduced the sum available for dividends. It was rather increases in the amount required to pay for the capital necessary for improvements and extensions and in the amount of taxes.

INCREASE IN "OTHER DEDUCTIONS"

Referring particularly to the item of "other deductions from gross income," which showed a higher percentage of increase than any other during the nine years covered by the tabulation, Mr. Hasbrouck stated that this appeared to be in part caused by differences of accounting classification resulting in the inclusion of certain charges under this head during the later years that were formerly carried in the operating expense group. Rentals for leased railroad property and for the joint use of tracks, terminals and equipment owned by another railroad, are items which might be affected by such differences in accounting practice so as to indicate an increase in fixed charges that would be more apparent than actual. This group also includes sinking fund payments and gradual amortization of accounts which have been carried among the company's assets, but which represent either previously unrecognized losses (such as property retired but not written off the books) or large charges for intangible items of various sorts which it is not conservative policy to carry in the investment account indefinitely. Such sinking fund payments and amortization charges do not, of course, represent for the most part actually increased cost of procuring capital, but rather a more conservative accounting policy. At any rate their effect in reducing net income is inconsiderable by comparison with the increase in taxes, interest and rentals.

Standards for Southern Pines

The Southern Pine Association, New Orleans, La., has issued a reprint from the copyrighted standards of the American Society for Testing Materials which includes a definition of the "density rule" which was approved and adopted by the association. This new classification eliminates the names "long-leaf," "short-leaf" and "loblolly" pines and provides two classes: Dense Southern yellow pine and sound Southern yellow pine. Dense Southern yellow pine includes the best pieces of what has hitherto been known as long-leaf pine, and excludes the occasional pieces of inferior quality, for structural purposes. It also includes those pieces of short-leaf pine, Cuban pine, and loblolly pine which, because of their density and strength, are in every way equal to high-grade long-leaf pine, as shown from numerous tests by the United States Forest Service and many other well-known authorities.

Heavy Electric Traction at A. I. E. E. Mid-Winter Convention

On Feb. 9 in New York F. E. Wynne, G. M. Eaton and A. J. Hall Presented Papers Based on Their Experience with the Electrification of the Norfolk & Western Railway, on Which Single-Phase, Three-Phase Locomotives Are Used

AT the mid-winter convention of the American Institute of Electrical Engineers, held in New York this week, a morning session was devoted to the problems of heavy electric traction and three brief papers were presented on this subject based, in particular, on experience which the authors had had with the equipment for the Norfolk & Western Railway electrification.

As these papers presented data not otherwise available, they are abstracted below. The abstracts have been designed to supplement the articles previously published in this paper, particularly those printed in the following issues: March 20, 1915, page 581, and June 5, 1915, page 1058.

Operation on the Norfolk & Western Railway

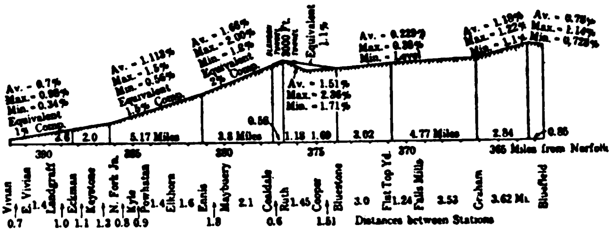
In opening the symposium on heavy electric traction F. E. Wynne, engineer Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., first explained briefly the general character of traffic on the section of the Norfolk & Western Railway lying between Bluefield and Vivian, W. Va., and outlined some of the difficulties of steam operation. He made the following statements, among others, regarding electric operation.

"One electric locomotive at the head and one electric pusher take trains of 3250 tons each to Ruth, where the pusher cuts off, and returns west light or assists in delivering empties. From Ruth to Flat Top the head engine alone suffices. At Flat Top the train is filled out to 4700 tons and an electric pusher is attached to assist it to Bluefield. A regular day's work for a head crew is to take a train of empties from Bluefield to the west slope, return with load to Flat Top, then run west light with empties or with west load to the coal fields, or return with load to Bluefield. An Elkhorn pusher crew frequently handles five or six east-bound trains as a day's work, while a Flat Top pusher at times exceeds this on account of the shorter distance. With the electric locomotive, gathering loads and delivering empties may be accomplished equally well by either the head or the rear locomotive.

"On account of the length of train and the curvature of the track, it is at times impossible to hear whistle signals. In starting a train with two engines other means of signaling are used. The head locomotive releases brakes and lets the slack run back. As soon as the engineman on the pusher feels the blow resulting from this, he applies power and holds the train until the head engineman has applied power and the front portion of the train is sufficiently under way to permit motion of the rear locomotive. The period of standstill with power on for the pusher engine with this method of operation rarely exceeds thirty seconds, and generally a satisfactory start is secured on the first attempt.

"By means of pole changing, the electric locomotives are arranged for two speeds. The 14-m.p.h. speed is used regularly for heavy freight work, while the 28-m.p.h. speed is used for passenger trains, light engine movements, and a certain amount of time freight operation. The speed of the coal trains has been more than doubled on the heavy grades, and the average running speed for east-bound loads over the entire trip from the coal fields to Bluefield has been increased more than 50 per cent. In passenger service, it is a common occurrence to pick up a train twenty minutes late at North Fork and put it into Bluestone Junction on time.

"Considerable assistance in effecting a smooth stop is secured with trains having two locomotives approximately a half mile apart, by passing the load from locomotive to locomotive while backing off the control. When the head engineman desires to make a stop, he introduces a portion of the rheostat into the circuit of his motors. This slightly reduces the speed of the head engine and throws additional load on the rear locomotive. The engineman of the latter, noticing the increase of load, realizes that a stop is about to be made, and he too starts to insert resistance into his motor circuits, always, however, keeping his tractive effort up near the maximum. The front engineman, on the other hand, inserts his resistance more rapidly, reducing the speed of his engine at a slightly greater rate than the rear engineman, and allowing the latter to 'bunch' all the slack in the train. As soon as the slack has all been 'bunched,' the head engineman shuts off, and if necessary, makes a slight reduction with his automatic brake to bring the train to a stop. The rear engineman, in his turn, introduces more and more resistance into his motor circuits to keep from overloading his motors, until 'flush level' has been reached. When he gets to this point, he holds his resistance constant until the train has been brought to a dead stop. He then makes a 30-lb. or a 40-lb. application with the independent brake, and having done this, throws his master controller to the off position.



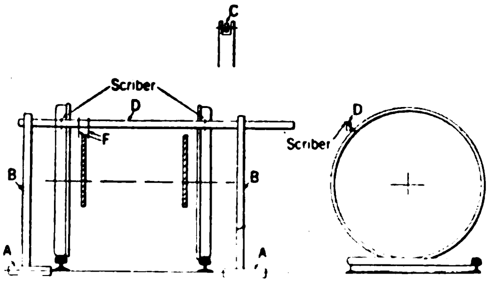
PROFILE OF THE ELECTRIFIED DIVISION OF THE NORFOLK & WESTERN RAILWAY

"Compared with the Mallet locomotive performance in 1911, the dispatcher's reports show that the electric locomotives are making eight times as many miles per train-minute delay due to locomotive failures in service. They further show that the electric locomotives have handled up Elkhorn Hill in a single day 50 per cent more slow freight tonnage than was handled by steam locomotives in the maximum day reported prior to the summer of 1911. This was done with only nine of the twelve electric engines in service. From Nov. 1 to Dec. 17, inclusive, there was no delay due to failure of electric locomotives in service. During this period the electric locomotives made nearly 45,000 miles with approximately 700 freight trains and 25,000 freight cars, each of from 60,000 lb. to 180,000 lb. capacity, east-bound up Elkhorn Hill. In addition they pushed an average of two passenger trains per day up the hill and cared for an unknown quantity of switching service and west-bound freight traffic."

Chattering Wheel Slip in Electric Motive Power

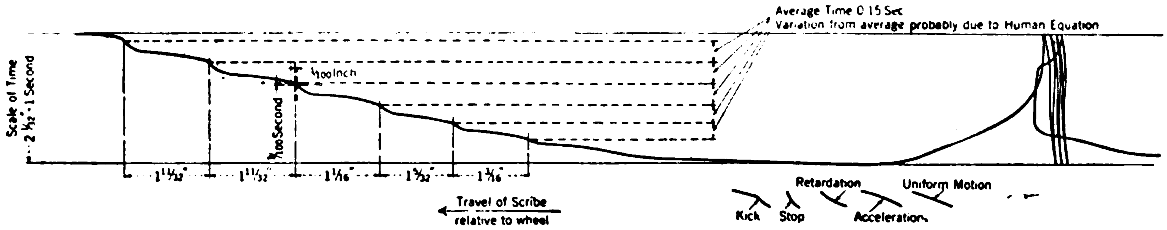
In his paper on the above subject, G. M. Eaton, engineer Westinghouse Electric & Manufacturing Company, showed that chattering wheel slip is characteristic of all types of electric motive power. Comparing electric motive power with steam, he explained that the chattering which occurs with the former is due to the considerable mass of those moving parts which have high moments of inertia. He proceeded substantially as follows:

"In an electric locomotive the moment of inertia of the rotors, especially when operating through a gear reduction, may be as great as, or greater than, that of the driving wheels. The combined inertia of connecting rods, crossheads, piston rods and pistons in the steam locomotive is practically negligible as far as it affects acceleration of driving wheels, after slipping starts.



HAND-OPERATED DEVICE FOR RECORDING CHATTERING SLIP

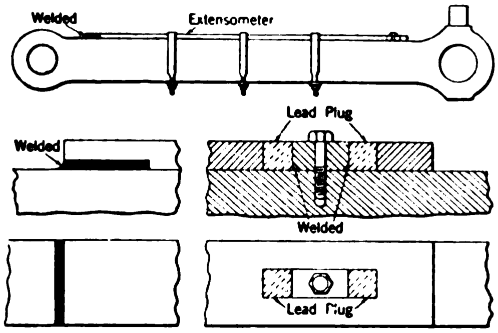
"When slipping occurs in an electric locomotive, the sequence of events is as follows, regardless of the type of drive: Current is applied to the motor, and the rotor starts to turn. Clearances in the entire transmission mechanism are first eliminated. Then, as the torque is increased, the metal of the transmission, framing, etc., is bent and twisted, or otherwise deflected. This stressed metal becomes a storage battery of energy. Finally the tractive effort reaches a value sufficient to overcome the existing adhesion of the rail, and the wheel starts to slip. The instant that relative movement occurs between wheel and rail, the coefficient of friction drops from that of repose to that of relative motion. There is, therefore, an opportunity for the stressed metal to start discharging its stored energy, since part of the resisting force has disappeared. This energy is expended in accelerating the wheels ahead of the angular positions they occupied relative to the rotors at the instant slipping started.



OSCILLOGRAPH RECORD SHOWING MOTION OF WHEEL DURING CHATTERING SLIP

"It is necessary next to analyze independently the two divisions of the rotating system, namely, rotors and wheels. Since the wheels are being accelerated ahead of the rotors, the rotors are losing their load and will tend to speed up. This is true not only of motors of series characteristics, but also of induction motors when running below synchronism, as they will be ordinarily doing in traction work when the wheel slips. In fact, the induction motors, because their generated counter e.m.f. with increased speed is less than with series motors, will hold up their torque better and, therefore, accelerate faster. The induction motor, in this particular, more nearly approaches the steam locomotive, in which at starting steam is cut off as late as possible in the stroke so as to get the maximum starting tractive effort.

"Analyzing next the other division of the system, the adhesion at the rail will decrease, as the velocity of the wheel tread relative to the rail increases. The effort being transmitted through the transmission system, however, will decrease very rapidly due to expenditure of stored energy, and as soon as this effort which is tending to accelerate the wheel is less than the adhesion at the rail, which is tending to retard the wheels, the wheels will start to slow down.



EXTENSOMETER TO INDICATE CONNECTING-ROD STRAINS

"There are, then, two sets of rotating masses mechanically coupled, the masses at one end of the system accelerating and those at the other end retarding. As soon as the clearances in the transmission are taken up, there is liable to be a jolt on the mechanical system accompanied by a recoil. This sets up the chattering action which has been experienced in practically every type of electrically-driven rolling stock, where the motors are sufficiently powerful to slip the wheels at high adhesion.

"The same characteristic occasionally occurs in city and interurban cars, although this is much less frequent than in heavy-hauling electric locomotives. This is due to the greater tractive power which is employed in the latter type of motive power. In the case of freight locomotives where the motors are geared directly to the axles, the same phenomenon has been observed.

"On the Norfolk & Western locomotives, chattering slip occurred in the running gear, and, after the locomotives had been in service for some months, evidences of failure were detected in the crank pins. The cause was traced to chattering slip by means of a rough oscillograph, illustrated herewith.

"The brakes were set on three trucks, and the oscillograph frame was set up on the fourth truck, the wheel tread was chalked, and the oscillograph frame was oscillated about the supporting point *A*, the amplitude of oscillation being 2 in. The time of a complete oscillation was two seconds. The scribers were pressed against the wheel treads. The wheel treads were then slipped and the characteristic diagram of the chattering slip was obtained, as shown in another figure. From this diagram it is possible to calculate the forces necessary to produce the acceleration and retardation which occurs, and the resulting stresses in the rods, pins, etc.

"To check the oscillograph figures, extensometers were arranged, as shown herewith, by means of which the connecting rods indicated their own stresses. The extension and compression of the rods were recorded by means of blocks of lead arranged as shown. The results obtained by the two methods checked very closely. On the basis of the results, new pins, rods, etc., were applied on the locomotives, and have proved adequate. This chattering slip was more evident on the Norfolk & Western locomotives than could have been anticipated, since this is the first time electric haulage has been applied in service where such extremely high tractive efforts were required.

"In all heavy-hauling electric motive power the problem of chattering wheel slip must be considered with every type of drive. The great number of variables entering, and the wide fluctuation of certain of these variables, renders broad experience necessary in securing a successful solution of the problem."

The Liquid Rheostat in Locomotive Service

In discussing the subject of liquid rheostats, A. J. Hall, engineer Westinghouse Electric & Manufacturing Company, stated that liquid rheostats were first successfully used in locomotive service in this country to control three-phase induction motors on the Norfolk & Western locomotives, the principal functions of such rheostats being to cut out the resistance in the secondary circuits of the main motors while accelerating or regenerating, to compensate for the slip between the different pairs of motors due to variation in the size of drivers, and to make and break the main circuit to reduce wear on the primary switches. He gave the accompanying circuit diagram of the locomotive connecttions, showing the liquid rheostats connected in the three-phase motor secondary circuits. He then described the construction of the rheostats in substance as follows:

"The rheostats are operated in pairs, each pair having one operating mechanism, storage reservoir, cooling tower, and circulating pump. The accompanying illustrations show the mechanical structure of the rheostat, which consists of one main casting, divided into four compartments, a central one and three arranged in triangular form around it. A set of electrodes is mounted in each of the three outer compartments. In each compartment, one electrode is grounded to the side of the main casting, and the other is suspended from the top cover and insulated from ground by three porcelain insulators. The rods which support the latter electrode are connected by copper straps on the outside of the cover.

"Each set of electrodes is connected through a pole change-over switch to the secondary of a three-phase motor. The electrolytes furnish resistance between the insulated electrodes suspended from the cover and those grounded on the side of the main casting, thus making the main casting the common point of the star connection. The center compartment provides space in which a steel tube, which can be raised or lowered, acts as an overflow pipe for the liquid. The height of the liquid in the rheostat is thus varied by the condition of the overflow tube. The electrodes are made up of iron plates, of which the effective area gradually increases and the resistance of the circuit decreases as the surface of the liquid rises.

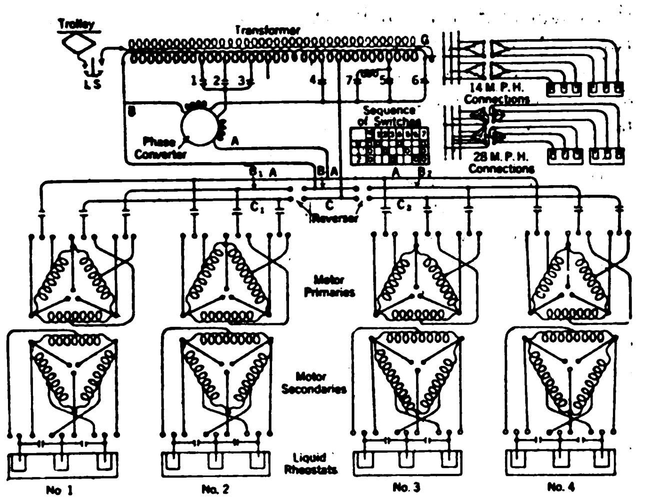
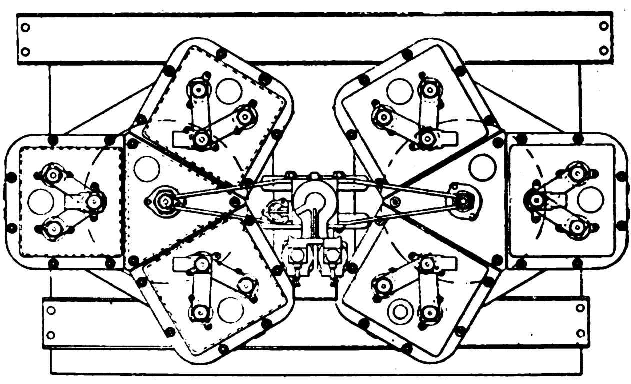


DIAGRAM OF MAIN CIRCUITS OF NORFOLK & WESTERN SINGLE-PHASE LOCOMOTIVE

"Two of these rheostats are mounted on the top of the main supply tank containing the electrolytes, which consist of a 0.5-per cent to 1-per cent solution of anhydrous sodium carbonate. The intake to a pump which will circulate about 300 gal. per minute is connected to the supply tank, and the outlet is divided into two paths which lead into the bottom of the rheostat casting mounted on top of the supply tank. The upper portion of the regulating or overflow tube is about 3 in. smaller in diameter than the lower portion, so that when this tube is at its lowest position, there is a space around the valve for the liquid to flow through from the rheostat to the supply tank without coming into contact with the electrodes. When the overflow tube is raised, the upper portion of the larger part of the tube comes in contact with the valve seat, preventing the liquid from flowing through. It then flows over the top of the tube, raising the level of the electrolyte in the rheostat and submerging a portion of the electrodes. This position is called the 'flush-level' of the rheostat.

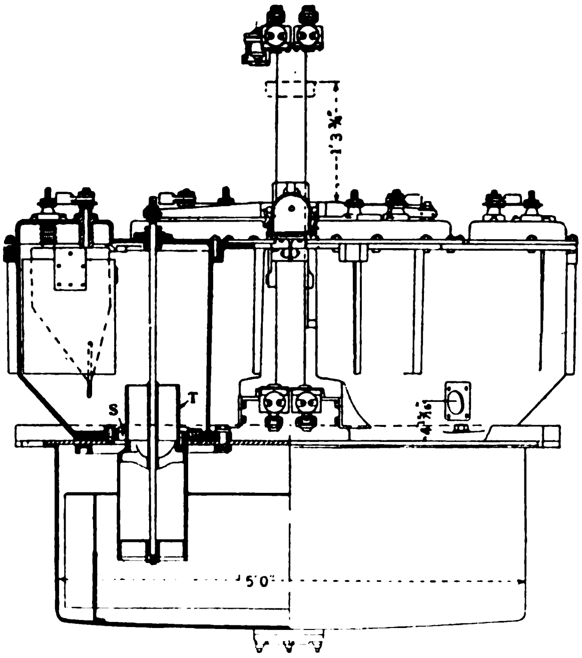
"The operating mechanism in the center of the rheostat is controlled by a balanced pressure operating mechanism, which is mounted above and between the two rheostats. The cross-arm extending from this mechanism is connected to each of the overflow tubes by a rod. Thus the raising or lowering of this cross-arm raises or lowers the level of the liquid.

"The master controller consists of two separate and independently operated drums, not mechanically interlocked, but both interlocked with the reverse drum, so that both handles must be in the 'off' position before



PLAN VIEW OF RHEOSTAT TANKS AND OPERATING MECHANISM the reverse drum can be thrown. The speed drum has four 'on' positions to set up the required combination of pole change-over drums, reverses and primary switches. Between the 14 m.p.h. and 'off' positions there is a notch which will give a 14 m.p.h. combination on one truck only in each unit. This is useful for handling a light engine, switching, or starting long trains of empties. The other division is between the 14-m.p.h. and 28-m.p.h. combinations. This is for changing over from 14 m.p.h. to 28 m.p.h. without losing tractive effort or causing sudden jolts in the train. The transition is made by first changing over one pair of motors in each unit to 28 m.p.h. and as soon as the rheostat for these motors has reached the 'flush-level' condition on the 28-m.p.h. combination, the speed handle is moved to the full 28-m.p.h. position, thus changing over the remaining pair of motors.

"The accelerating drum has three operating conditions, marked 'lower,' 'hold' and 'raise.' These terms refer to the level of the liquid in the rheostat.



PARTIAL SECTION AND PARTIAL ELEVATION OF LIQUID RHEOSTAT

"When the rheostats are full of liquid the proper short-circuiting switch is closed, short-circuiting the motor secondaries. These switches do not come into action until the operating mechanism is in the full 'on' position.

"Two limit switches are used, one for each speed combination, their function being similar to an overload trip, except that they do not open the main circuit. Should the torque exceed a predetermined amount, the limit switch will open the control circuit of the liquid-rheostat operating mechanism, and thus lower the lever of the electrolyte, inserting more resistance in the secondary of the motor.

"The cooling tower for the electrolyte consists of a series of inclined trays, the liquid flowing over them while air is blown over the surface of the liquid to dissipate heat by vaporization. A supply pipe for the cooling tower is connected to the main circulating system near the outlet of the pump. This pipe will by-pass a certain amount of liquid, which, after flowing over the surface of the trays, flows back into the supply tank. The cooling tower operates whenever the locomotive is in service, the rate of cooling varying according to the temperature of the liquid."

Notes on the Discussion on the Norfolk & Western Electrification

After the presentation of Mr. Wynne's paper, A. H. Armstrong, General Electric Company, asked a number of questions as to the operating features of the locomotives equipped with constant-speed motors, particularly in regard to making up time, etc. R. E. Hellmund, Westinghouse Electric & Manufacturing Company, stated that from observation of the locomotives on the Italian State Railways and of the Norfolk & Western locomotives he was convinced that the supposed disadvantages of the constant-speed characteristics were not really serious.

F. H. Shepherd, Westinghouse Electric & Manufacturing Company, said that the great thing about the Norfolk & Western locomotives was the perfection of control. When the possible damage to tonnage trains through irregularity in control was considered the perfection in this line due to the use of the liquid rheostats was appreciated.

B. A. Behrend, consulting engineer, Boston, Mass., regretted that the steam railroad men forced upon the manufacturers of electric railway apparatus the use of a system as complicated as that which had to be used in this case. If it had been possible to employ the straight three-phase system the capacity of the power plant would have been greater and the apparatus on the locomotive simpler.

Prof. W. I. Slichter, Columbia University, emphasized the fact that much progress has been made in ten years in that the superiority of the electric locomotive has been demonstrated, and Prof. C. F. Scott, Yale University, thought that the result achieved by such installations as that on the Norfolk & Western should be appreciated. When one considers that the electric locomotives are actually hoisting the coal much better than it had been hoisted by steam locomotives the minor defects should be overlooked. This is really a hoisting proposition and not one of main-line electrification.

William Arthur, engineer with McHenry & Murray, called attention to the unimportance of the weight item in heavy traction. Weight is needed to give required tractive effort. Recent studies had shown him that in the three systems in use in heavy traction the locomotive weights were about the same.

H. M. Hobart, General Electric Company, put in a plea for economic considerations in heavy traction and elsewhere. He disagreed with previous speakers who, he thought, overlooked this phase of the question. After all it is the "dollars and cents" consideration which must determine the superiority of one system over another and not merely its technical qualities. He also thought that it is not enough that a locomotive will handle the freight even if some of the details are not perfect. The whole installation is composed of details which must each be excellent for the best results.

In response to a question Mr. Hellmund stated that the rheostats on the Norfolk & Western locomotives easily handled 800 amp. at 750 volts for ten minutes or more and that the evaporation of water in the cooling tower was so slow that the addition of make-up water once a day was sufficient. He also said that there is an interlock on the rheostat to prevent the short-circuit switches from being closed before the resistance is minimum. Another question answered by Mr. Hellmund referred to the effect of voltage variation on the performance of the locomotives. He said that while the torque varies as the square of the voltage, there is ample margin in the design to take care of this. Mr. Wynne said that the maximum voltage drop in this case is about 25 per cent.

Reducing Accidents on the Union Traction System

The Union Traction Company of Indiana Last Week Received the Brady Medal on the Basis of Its Accident Record for the Year Ended June 30, 1915—This Article Gives in Detail Some of the Reasons Why the Record Was So Good

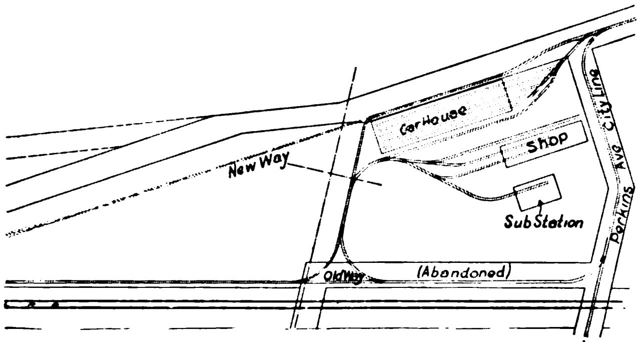
IN view of the fact that the Union Traction Company of Indiana was awarded the Anthony N. Brady medal for its 1915 safety record, as announced in the issues of this paper for Jan. 22 and Feb. 5, the editors have secured from President Arthur W. Brady of that company some details of this record.

STATISTICS RELATING TO SAFETY

The company last year operated more than 400 miles of single track, of which 47 miles were in cities and 330 on private right-of-way. Practically 17,000,000 passengers were carried and more than 8,000,000 car-miles were run.

Out of about $6,135 earned per mile of track $243 was set aside for accident claims, although but $53½ was required. The ratio of accident costs to gross income was 0.881 per cent.

The company employed on an average 1394 persons and operated 232 passenger cars and forty-eight freight cars, 221 of the cars being motor cars. On the system are 1361 highway grade crossings in a highly prosperous country, and the cars operate through active and wide-awake cities, in a section where one out of every thirty-five inhabitants is the owner of an automobile. The tracks are built for and used by high-speed limited cars, some of which are scheduled at 45 m.p.h. with no passenger stops for 38 miles. There are 194 grade railroad crossings, some of the most important of which are guarded by a total of thirteen flagmen, but all cars are required to make a full stop before crossing.

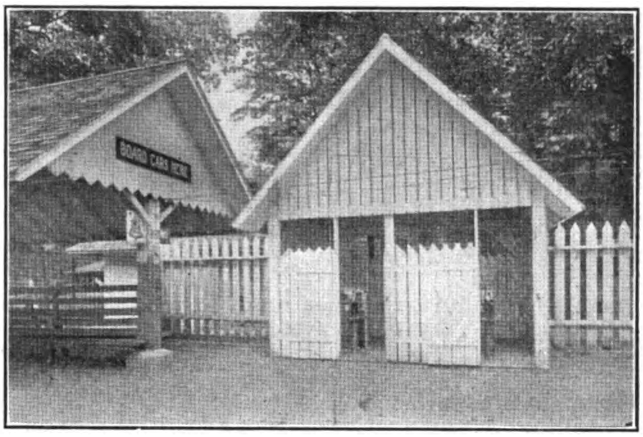


TRACK REARRANGEMENT AT MUNCIE CARHOUSE

For education of employees and the public the company has a modern safety organization with which the readers of this paper are familiar from the many references which have been made to it in these columns. The equipment is also designed to minimize the number and severity of accidents. This applies to track and structures, line and power plant, rolling stock and shops. Several illustrations have been chosen to show typical safety efforts.

Fifty-one miles of track are protected by the General Railway Signal Company's continuous track circuit automatic block signals of the absolute permissive block signal type with light signals. Equipment for 25 miles more is on hand.

The company has three dispatch offices located at important division terminals, which take care of the dispatching of interurban trains. In each of these dispatch offices there are four dispatchers, a chief and three assistants. The dispatching is done in three tricks; one six-hour trick, and two nine-hour tricks. The chief dispatcher takes care of the light, six-hour trick; two dispatchers are used for the afternoon nine-hour trick, and one for the night nine-hour trick. In addition to working the six-hour trick, the chief dispatcher rides certain trains each day on his division, so as to get closely in touch with the train crews and to instruct them in train operation. The dispatch circuits are connected to all sidings, stations and substations, making it possible for the dispatcher readily to communicate with a train crew at any point desired. The dispatching is done by what is known as the "double order system," that is, the same order, in the identical wording, is given to all trains interested.



SAFETY GATES AT MOUNDS PARK LOADING STATION

All trainmen are required to have watches with at least seventeen jewels, and which will not exceed a variation of thirty seconds in one week. All watches are required to be thoroughly inspected semi-annually, and each trainman must report to the watch inspector semi-monthly for the purpose of having his watch set, regulated or adjusted, as the case requires.

During the year ended June 30, 1915, the company had no casualties in train accidents, but two industrial accidents occurred and in transportation casualties other than train accidents thirteen persons were killed and nine were injured. Most of the fatal accidents were due to intoxication, to trespassing or to carelessness, and the liability of the company was not great.

SUGGESTIONS FROM EMPLOYEES

The company has been quick to adopt suggestions received from employees. Among those adopted last year the most important are tabulated on the next page. The list is printed here as suggestive to employees on other properties.

Suggestions Acted Upon by Local Committee

That air pressure in auxiliary reservoir be tested each day in cold weather on all cars equipped with HL control.

That the foot gong in Car No. 251 be placed near the brake staff, so that it can be more easily used.

That two barrels of salt water be put at the Anderson freight house for use in case of fire.

That there be four windows cut in the oil-house basement for ventilation.

That grab handles and stirrups be placed on all corners of freight trailers for the safety of trainmen in placing flags, and also to make it more convenient to get on after leaving the train to flag crossings and throw switches, etc.

That a trespass sign be placed at the north end of White River bridge, and the one at south end be restenciled.

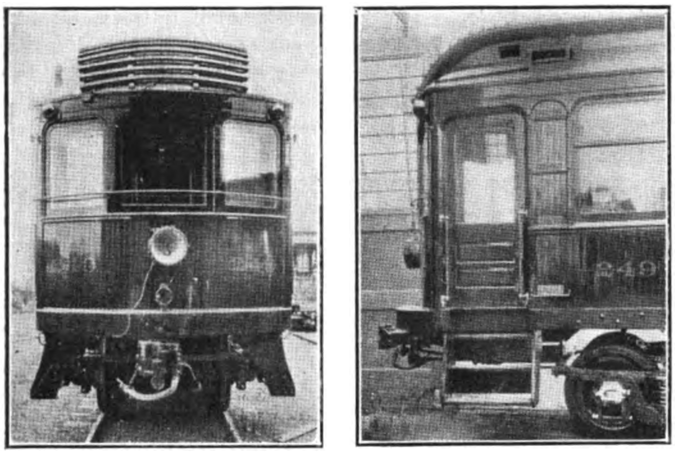
That a better system of car inspection be had before accepting cars from foreign lines at places where cars are accepted from other companies.

That shrubbery which obstructs the view on the south side of the track east of Brightwood Avenue be cut. It is understood that permission was secured at one time to keep this cut.

That a bulletin calling attention to fire hazard be reissued and read at meetings of all local safety committees.

That all trainmen bleed air tanks when leaving cars at the end of a run on account of air lines freezing and causing delay, and that the transportation department place bulletins at all division points, calling trainmen's attention to this help for better service.

That all grab handles be made tight in sockets, so that they cannot turn.



REAR END OF CAR WITH GRAB RAIL; SCALING LADDER AND HANDLES IN SIDE OF CAR

That as the gong on Car No. 26 does not ring loud enough for safety a louder gong should be installed.

That the company provide posts or a fence between Cowan Station and the bridge just south of the station, in order to prevent rigs backing into the ditch and upsetting.

That the line car carry poles on the side opposite traffic, when on double track.

That when a chemical fire extinguisher has been used, it should be turned in at the first shop reached; also that crews be instructed by bulletin on bulletin boards that a charge is useless after a part of it has been used.

That crews keep fuse boxes cleaned of papers and lamps, as there should be nothing in boxes but what is marked on them.

That "high tension" at Lafontaine substation be fenced off.

That the dirt piled by the "Big Four Railroad on the Cemetery Line near the railroad crossing at Marion be removed.

That ties along the right-of-way between Highland Avenue bridge and Matter Park, Marion, be removed.

That limbs be trimmed from the tree at Fairmount between the hand block and water fountain.

That all cars using the cemetery tracks round the curve at "Creamery" be under perfect control, so as to stop within 5 ft.

That all the roadway telephone booths be kept locked at all times.

That all cross-cut saws be shielded before being placed on any city car.

That there be installed at the Gas City Junction a small hand-throw arm for the use of the Gas City cars when they are in Jonesboro.

Suggestions Acted Upon by the General Board

That Polk milk station at Fortville be asked to take care of exhaust steam from the station, as it completely obstructs the view of the track.

That a stairway be built at the south end of the Anderson power house for the convenience of coal men.

That loose rails be not carried on work cars, as in case of collisions or serious accident the results might be disastrous. This applies to loose rails being carried on the cars to weight them down.

That folding fenders be placed on a city car in Elwood to prevent boys from riding on the fenders as they do on the present fenders.

That the company have new posters printed with several suggestions pertaining to safety of shop men or other employees working in or about cars and engine rooms, the general safety board to decide what suggestions would be best for such posters.

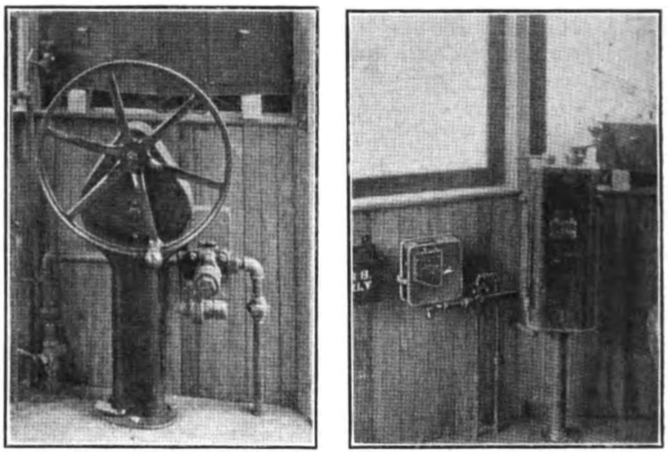
That oil boxes, bull-rope boxes and trolley pickups be sealed, and that one man be appointed at the shops to replace material when the seals are broken.

That double whistle signals be sounded at all obscure country crossings.

That, as passengers open the rear outside doors of pay-as-you-enter cars while conductors are flagging railroads or throwing block lights, signs be placed on the doors, reading "Passengers must not open these doors."

That something be done to keep children from playing on bridge abutments.

That compulsory stops be established at certain designated points, to be made by all cars before crossing streets.



NEW STAFF BRAKES ON INTERURBAN CARS; NEW EMERGENCY REVERSE

That there be some small boxes made and hooked in front of water cans in which to put used cups; hooked up almost as high as the average person's eyes, so they cannot help seeing where to put these cups.

That electric light companies interchange notices of wire troubles, so that the company owning the wires can at once look after the trouble.

That the trolley wire in the train shed at Muncie be supported at sufficient distances, so that in case of a break it will not drop low enough to injure anything.

That a few shovels of coarse gravel or rock that are thrown off the grade be placed around the poles after cutting the grass to prevent the poles from taking fire from the grass.

That the out-bound track at Anderson Junction be not used by freight cars at the Anderson freight house without the sending of a flagman around the curve.

That siding signboards could be seen much more readily if they were lowered on the poles 10 ft.; they are now up near the mast arms and out of the line of vision on the Honey Bee division.

At the north end of Burr Cut siding on the east bank at a point where the steam shovel quit work there is a knoll of dirt which projects and obscures the view of the curve at this point. The dirt could be moved at little expense and it could be used to good advantage on the Blue River fill where the grade is narrow. This would give the motormen at least 1000 ft. more of view.

That the company have an emergency call on the telephone in order that all stations may be called at one time.

That the automatic air valve on the steel cars be changed to a different position, as it can now be easily closed accidentally.

Open Letter from President Henry

Reasons for the Amendments to the Constitution Adopted in Chicago—Associations with Which Representatives of Manufacturing Companies May Affiliate—Help Which the Manufacturers Have Given in the Past and Can Give in the Future—Work to be Done

THE passage at the Chicago convention last week of the amendments to the constitution of the American Electric Railway Association permitting manufacturing companies to become members of the association on the same basis as railway companies makes the following letter from President Henry to the members of the two associations of especial interest.

INDIANAPOLIS, IND., Feb. 7, 1916.

To Members of the
American Electric Railway Association
and of the
American Electric Railway Manufacturers' Association:

It is proper and, I think, desirable that I should say a word on the amendments made to the constitution and by-laws of the American Electric Railway Association at the recent mid-year meeting of the association at Chicago.

Although the consideration of these amendments had been pending since the San Francisco convention, in October last, it was evident at the mid-year meeting that much misunderstanding existed in regard to them.

Briefly stated, the amendments cover only one thing and that is, provision for companies engaged in the manufacture or sale of electric railway material to become members of the American Electric Railway Association upon exactly the same basis and with exactly the same rights and privileges and charged with the same duties and obligations as electric railway company members. The fees for such membership are based upon the gross receipts of such companies growing out of the manufacture or sale of electric railway material, covering the same range as the dues paid by railway company members, but classified in fewer and larger groups so that the statement of such a company regarding the dues which it should pay will only show the large group in which it stands, and thus not disclose the amount of its annual business. The amendments are so worded as to permit publishers of the technical press and engineering companies also to become members.

THE REASONS FOR THE AMENDMENTS

These amendments were felt to be desirable and necessary in order that the industry in which we are all alike interested should have the united support of one compact organization, composed not only of railway companies but also of companies making and selling electric railway material. Although the manufacturers and salesmen have, in the past, in many ways constantly shown their willingness and desire to aid in the work of the association, it has not been possible to have the full benefit of their help and co-operation because they were not members of the association, took no part in the meetings of the association, were not authorized to act on the committees of the association, and were, in fact, only outside friends of the association, willing to aid whenever they could. Under the amendments made, the manufacturing and selling company becomes a full-fledged member of the association the same as a railway company, and as such its representatives are entitled to membership in any of the affiliated associations—the Claims Association, the Engineering Association, the Accountants' Association or the Transportation & Traffic Association—and will be assigned to the same on request. The executive officials of the company will, however, be entitled to membership in all of these affiliated associations, without a special assignment. Moreover, at any time the manufacturing and selling company members deem it desirable they may, upon application to the executive committee, have organized a new affiliated association in which they may consider not only general affairs of the American Association, but also such special matters as they, as manufacturers and salesmen, may be interested in, and to such an affiliated association there would no doubt be referred, from time to time, the control, management and handling of such affairs of the American Association as could be better handled by a group of manufacturing and selling members than by a group of electric railway members. The president of such affiliated association would by virtue of such office become a member of the executive committee of the American Association.

MANUFACTURERS NEEDED AS CO-WORKERS

These amendments are in no way a reflection upon the manufacturers and salesmen, or upon their present organization under the name of the American Electric Railway Manufacturers' Association. They have, through that organization, carried forward a very useful and necessary work, providing for and managing exhibits at the conventions held by the American Association, and adding much to the interest and pleasure of the occasions by looking after the entertainment features. Moreover, they have, in addition, given all the aid they could as outsiders to the work of the parent association. The time has come, however, when the parent association must have not the outside help of the manufacturers and salesmen, but must have them as members in and co-workers of the association itself. The industry needs the active, energetic and enthusiastic support of all persons interested in it, whether they manufacture and sell the material for the railways, or whether they are engaged in the operation of the railways themselves. The work to be accomplished is a work of education, a struggle for rights and an effort to secure a stable and lasting basis upon which our business may rest to the benefit not only of the owners, but also of the communities which they serve.

We want, of course, the help that will come from the increased funds with which to carry on our work, for this the association badly needs in order properly to carry forward the various phases of the work before us, but most of all we need and want the additional help and influence in the presentation of our cause which will come from the hearty support of the solid business interests which the manufacturers and salesmen of railway material represent, and we want their advice and help in all of the councils of the association.

Duplication of effort means waste, expense and often lack of harmony. United effort in a common cause must mean success, if success is possible of accomplishment. For this reason the association has opened up its doors and invited into full membership the companies engaged in the manufacture and sale of electric railway material; they will no longer be allies but will be a part of the association in full fellowship, and co-workers in every respect with the railway members.

CHANGES ARE NO CRITICISM OF PRESENT MANUFACTURERS' ASSOCIATION

As stated, the changes made are in no way a criticism of the present American Electric Railway Manufacturers' Association, and from a legal point of view they in no way affect that association. It would, in fact, not be inconsistent, under the amendments, for that association to be continued and even to carry forward exactly the same work which it has heretofore carried forward, but it may, after due consideration, be found that this work can be as well or better performed under and by an affiliated association organized especially for manufacturers and salesmen, at the same time saving a duplication of labor and expense. The closer and more harmonious the union between all of the interested companies and persons can be made, the greater will be the benefits to the parent association and all of the affiliated associations.

THE WORK OF THE FUTURE

Already a number of manufacturers have made application for membership under the amendments enacted, and from indications this will be quite promptly and generally followed, so that it seems probable that in the very near future the American Electric Railway Association will embrace within its membership a very large proportion of the companies engaged in the manufacture and sale of electric railway material, and the ranks of the association, being thus greatly strengthened, will be strong to resist the attacks of our opponents and strong to carry forward the work which the association is organized for in the upbuilding of our industry and the securing to those who have made investments in that industry a reasonable return upon the capital invested.

APPROVAL EXPRESSED BY MANY

I cannot close this statement without expressing my thanks to the many representatives of the manufacturing and selling industry, as well as the electric railway men, for their kindly expressions of a desire to aid in bringing about the results sought in the making of the amendments to the fundamental law of our association. Almost unanimously they have said to me that this is exactly the thing that ought to be brought about and that they are ready, willing and anxious to give their assistance therein.

CHARLES L. HENRY,
President American Electric Railway Association.

Enormous Turbo Unit Ordered

The Interborough Rapid Transit Company of New York has ordered from the Westinghouse Electric & Manufacturing Company a 70,000-kw. turbo unit for its Seventy-fourth Street power station. The unit will be in three sections, one high pressure and two low pressure and on light load it will be capable of operation at high economy with the high-pressure and one low-pressure cylinder. The three electric generators of the unit will be of equal size and at about 60,000 kw. will divide the load equally. The steam pressure to be used will be about 225 lb. and the superheat approximately 150 deg. Fahr.

According to the bureau of foreign and domestic commerce, an American consular officer in Brazil writes that a man in his district is in the market for a gasoline motor car to be used on a track having a gage of 60 cm.

AMERICAN ASSOCIATION NEWS

Meeting of Joint Committee on Block Signals

The committee on block signals met in Cleveland on Feb. 1 and 2 to consider the work of the sub-committees appointed at the Newark meeting. The members present were J. M. Waldron, New York, chairman; G. N. Brown, Syracuse, N. Y., who acted as secretary; J. J. Doyle, Baltimore, Md.; John Leisenring, Springfield, Ill., and J. B. Stewart, Jr., Youngstown, Ohio. By invitation there were also present S. M. Day, Rochester, N. Y., and H. W. Griffin, New York, representing the signal manufacturers.

The revision of existing standards was first taken up and the advisability of eliminating marker lights on adopted standards for signal aspects was discussed. It was decided that a footnote on this matter should be prepared and it will be taken up again at the March meeting. The sub-committee on revision was also requested to rewrite the recommendations appearing in the Manual in regard to continuous track circuits.

On the design on block signal apparatus it was decided to consider simple parts of mechanical interlocking work, with a view to adopting them as standard and referring to the same numbers of plates and drawings as are used by the Railway Signal Association. Specifications will also be prepared on mechanical interlocking, signal numbering, switch stands and markers to be placed in advance of signals.

On the subject of clearance diagrams for semaphore signals which had been considered jointly by representatives of this committee and the power distribution committee, it was agreed that a separate diagram should be prepared to take care of lines where steam road equipment is operated and where trainmen are allowed to climb to the top of cars. A few minor changes were made in the clearance diagram shown in the 1915 report, consisting of the lowering of the bracket arm to conform with the power distribution committee's minimum of 19 ft. A minimum clearance between the edge of the illuminated roundel and the face of the pole will also be shown with a note explaining that this requires a 9-in. rake in 24 ft. in place of the standard 6-in. rake. This is to apply to all poles within 300 ft. in advance of signals and where the minimum height of signal blade and pole setting are used.

In the study of block signal operation it was recommended that a maintenance cost data sheet be sent to all member companies to secure information on both track circuit and trolley contact signals. A proposed monthly signal report form was also considered and a decision reached to send copies to all companies to secure data on operating efficiency. These two forms will go out from the secretary's office at once.

The sub-committee on highway crossing protection is about to communicate with the automobile associations of the country and with the civic authorities in the several states to obtain information as to the protection advocated by these bodies. Drawbridge protection will also be studied.

A rough draft of a form of contract for signal installations was prepared during the course of the meeting by a sub-committee after reviewing the forms of contract used by the signal companies. This will be considered further at the next meeting of the full committee.

The next meeting of the joint committee will be held in Chicago about the middle of March.

COMMUNICATIONS

Steel Wheels and Rail Corrugation

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., Jan. 31, 1916.

To the Editors:

I note upon page 216 of the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 22 under "Communications," that my very good friend T. F. Mullaney, chief engineer of the Third Avenue Railway, has made certain assertions that would tend toward the indictment of the forged or rolled steel wheel as the cause of rail corrugations. Of course, I am sure that Mr. Mullaney, like the writer and all the rest of us, would be very glad to know the facts and the real answer; but as far as the relation of the steel wheel to rail corrugations is concerned, the writer through twenty years of experience upon three street railway systems knows to a certainty that rail corrugation not only goes back that far, but has continued throughout that period. In fact, it was especially bad on certain systems wherein no thought was ever given to using other than a cast-iron wheel.

There are those to-day who assert that a cast-iron wheel causes rail corrugation, just as the statement is made that the use of steel wheels is responsible for corrugation. In my judgment neither can be directly indicted as the cause, and perhaps it is true that one is no more responsible than the other.

The steel wheel in city surface operation has become as firmly fixed as regards safety, the elimination of flat wheels and of chipped flanges, and even for its direct economy, as air brakes upon heavy cars heretofore operated with hand brakes only.

Incidentally, and speaking as one who was considerably interested in track construction from 1896 to 1899, I believe that this subject, a matter of universal discussion and wherein but few definite conclusions have been drawn, can well afford to be treated in a very broad manner and without any attempt to point out the answer in advance. As far as steel wheels versus cast-iron wheels are concerned, argument can doubtless be had in the same manner as when the country school teacher upon being asked by the local board of education as to whether he taught that the earth was round or flat, promptly replied that he could teach either way and which did they prefer.

W. G. GOVE,
Superintendent of Equipment.

Cause of Rail Corrugation Elusive

THE METROPOLITAN STREET RAILWAY COMPANY

KANSAS CITY, MO., Feb. 3, 1916.

To the Editors:

The writer has noted, with a great deal of interest, the recently published articles concerning the causes of rail corrugation. Everyone is agreed that the proper remedy is not the grinding of the rails, but that the causes of the corrugation should be determined, if possible, and eliminated.

Fortunately Kansas City has not been annoyed with a large amount of corrugated rail, there being only several isolated cases. There is no theory as to the cause of these that will fit absolutely in each case. The corrugation occurs in sections of rail rolled many years ago, and in the rails rolled in recent years. It also existed before steel wheels were in use on any of our cars, and it has occurred since practically all of these wheels have been removed. We have instances of the latter on practically new track laid on rigid foundations. Some of our worst cases of corrugation occur upon loose rail or on resilient foundations.

Various theories have been advanced in attempts to determine the causes of corrugation, but none will stand the test of absolutely all conditions. That the quality of the rail, its method of rolling, or its chemical composition has anything to do with this phenomenon has not been demonstrated. As has been stated in many articles, steel experts have tried heavier sections of rail and metal of varying quality without obtaining the desired results.

One theory that has found much favor was that a rigid foundation would tend to produce corrugation. This, also, has been demonstrated as having no bearing on the case. Corrugations have occurred alike in track laid with solid concrete and track laid upon timber, and in other cases within the knowledge of the writer there was practically nothing under the track but mud.

That steel wheels are the cause of this trouble is one of the recent theories. This, also, is probably doomed to be cast into the discard. Corrugations occurred before steel wheels were in general use, and on lines where they were never used. The advancement of the theory that corrugations are produced by the bearing of the wheel tread at a point near the edge of the rail has been ingeniously demonstrated in a theoretical way, but I fear it is not borne out by facts.

Corrugations have occurred in rails that have been worn off and the head of the rail made to conform to the contour of the wheels which were running over it. Surely in cases of this kind corrugation could not be charged to irregular bearing, or the peening of the metal on the edge of the head. While these matters may have some connection with corrugation, they are the results of it, rather than the cause. The theory as advanced will not fit every case, and the true source of corrugations will not be determined, except when the theory fits each and every case. The other causes that have been brought forward may have some bearing upon the case, but should be considered rather as contributory and not as initial sources of the trouble.

It is conceded, of course, that the corrugations are produced by some force acting upon the rail through the tread of the wheel. In the use of the wheel, the ideal theoretical condition would be that of a perfect cylinder rolling upon a perfect plane. Such conditions would not produce corrugations where the pressures are limited to what the material in the contact surfaces could reasonably be expected to bear, therefore the corrugations must be produced by some unusual movement or action of the wheels.

Our experience would indicate that corrugations generally occur at such points as the car is being accelerated or retarded. Possibly the direct cause is due to what might be described as a "chattering" of the wheel. In the acceleration of the car this might be traceable to conditions existing in the bearings, the truck, the gears, and, possibly, in the motor itself. In the retarding of the car, it would be traceable to conditions under which the brakeshoe was working. The metal of the shoe might hold constantly, or be a rapid series of alternations from a perfect grip upon the metal to a condition of slipping. This condition might be brought about either by the nature of the metals in contact or by the details of the brake rigging. Local conditions of grades, curvature, general conditions of track, etc., in combination with the conditions that exist in the car itself, would tend to localize the corrugations so that they might exist in one part of the track and not in another.

While there is no question but that rail of certain quality might lend itself more readily to the action of the wheels and tend to corrugate and while there is no question but that, to some extent, the shape of the rail head and its contact with the wheel may have some bearing on the difficulty, the use, for many years, of both rail and wheels when corrugation did not occur would tend to demonstrate that its cause lies in something that has been introduced into the operation of cars in recent years.

As has been previously suggested in your columns, rail corrugation is undoubtedly due to a combination of circumstances. As there is no theory which would place the cause for this either in the wheel or in the rail, or in any one local condition, we must look further for the initial cause. It is the opinion of the writer that the investigation as to the primary cause of corrugation should be transferred from the examination of the rail and the wheels to the operation of the brakes and the motors. A. E. HARVEY, Chief Engineer.

Causes of Rail Corrugation

SPRINGFIELD, MASS., Feb. 1, 1916.

To the Editors:

In your issue of Jan. 15, George L. Fowler referred to an article published in your columns several years ago on rail corrugation, which attributed corrugation to excessive wheel pressures. If the article which Mr. Fowler had in mind was the one written by me, to which I called attention in your issue of Jan. 8, excessive wheel pressures were given as only one of three important factors in rail corrugation. Two others mentioned in the article as having an even greater bearing on the occurrence were: Non-uniformity of pressure and point of application of pressure. As my article on rail corrugation, written in 1911, pointed out, excessive wheel pressures, if uniform, will not cause corrugation but a cold flowing of the metal, a condition which is often found on steam roads. Where these excessive pressures are non-uniform, rail corrugation will be found on steam roads as well as on electric roads. My observation has shown that wherever rail corrugations appear they are due to pressures exceeding the elastic limit of the metal, but in addition to this the pressures are non-uniform.

There are, of course, a number of conditions which may produce non-uniform pressures on rail head of sufficient intensity to exceed the elastic limit of ordinary steel rails, but, I repeat, chief among these is the variation of the area of contact between the wheel and surfaces of the rail and the shifting of the point of application of the pressure from the center of the rail to the edges. The chief advantage of the rounded head, as already stated, is that it is possible under operating conditions to obtain a uniform area of contact between the wheel and rail, but a further advantage is that it also keeps the point of application of the pressure away from the edge of the rail where the elastic limit of the metal is reduced from its cubical value to its linear value, a point which does not seem to have been clearly brought out in the recent articles published but which, undoubtedly, explains why rail corrugation is not "rampant" on steam railways. With rails with flat heads, if it were possible at all times to maintain the surface of the rail in such a position that a line contact would be obtained between the wheel tread and the rail, it is probable that little or no difficulty would be experienced with rail corrugation. But where such rails are embedded in concrete and crowded inwardly and outwardly by the expansion of pavement, it is obvious that it will be a practical impossibility to maintain the rail surface in such condition, and it is due to this very fact that rail corrugation appears more frequently on rails of this kind.

It must not be assumed that corrugation never will appear on track laid with rails having rounded heads because the normal wear of the rail will tend to flatten the head, and if the rail is anchored to these foundations so rigidly that it may not assume the position under load where the point of contact between the wheel and rail will fall at some distance from the edge of the rail and also obtain a uniform area of contact, corrugation will appear on T-rails as well as on any other type. The same condition will hold true wherever non-uniform pressures exceed the elastic limit of the steel, and I might note that these conditions would probably be found in the New York subways, particularly near stations where acceleration of trains, both positive and negative, produce non-uniform pressures on rail head. Similar conditions will be found on curves, due to the flanges relieving to a certain extent the pressure on the top of the rail head and transferring it to the side, reducing the area of contact to a point and producing corrugation on the side of the rail head. It is hardly necessary to add that similar conditions will result from a non-homogeneous structure of the metal because here, even though the area of contact, its point of application and its intensity remain constant, if the resistance to these pressures is variable the result will be the same as if the resistance were constant and the pressure variable. This point may perhaps be best illustrated by referring to the action of a billet in a rolling mill. If the pressure on the rolls were altered rhythmically, a wave would be produced in the resulting bar, and, conversely, if the bar, hot in certain portions and cold in others (giving various degrees of resistance to rolling), were run through rolls having constant pressure, the hot portions would be made thinner than the cold portions.

There are a great many conditions which arise in street operations which may bring about the conditions which are essential for the production of corrugation, namely, pressure exceeding the elastic limit of the metal and application of the pressures at or close to the edge of the rail where the elastic limit is reduced from its cubical value to its linear value, the intensity of pressure, of course, varying according to the area of contact.

I have also read with interest Mr. Mullaney's letter in your issue of Jan. 29 but do not quite understand his process of reasoning. In attributing corrugation to the use of steel wheels (I assume, of course, that when he attributes corrugation to steel wheels he is referring to the material and not to the shape of the wheel) it is not surprising that corrugation would appear on track which had been in service some years and which had never shown much evidence of corrugation. If such a change were made in the shape of the wheel tread as to shift the point of contact from the center of the wheel to the edges, it would cause at the same time a variation in the area of contact between the wheel and the rail. When a certain type of wheel is used exclusively on one section of track, the latter becomes worn in time to conform to the wheels which pass over it. If suddenly a change is made to a different type of wheel, it is obvious that unless considerable care is taken in designing the wheel tread the new wheels will not make contact where the old ones did, and I venture to say that Mr. Mullaney would have noted the same results if a corresponding change had been made from steel to iron wheels. To the writer, the importance of grinding the wheels after turning in order to remove any signs of chattering of the tool is not as great as the turning of the wheels to the proper shape so that they will make contact with the rail somewhere near its center. The effect of non-homogeneous rails due to chattering of the rolls was explained in my previous letter.

G. E. PELLISSIER, Consulting Engineer.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices
in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

A Satisfactory Equipment for Air-Brake Instruction

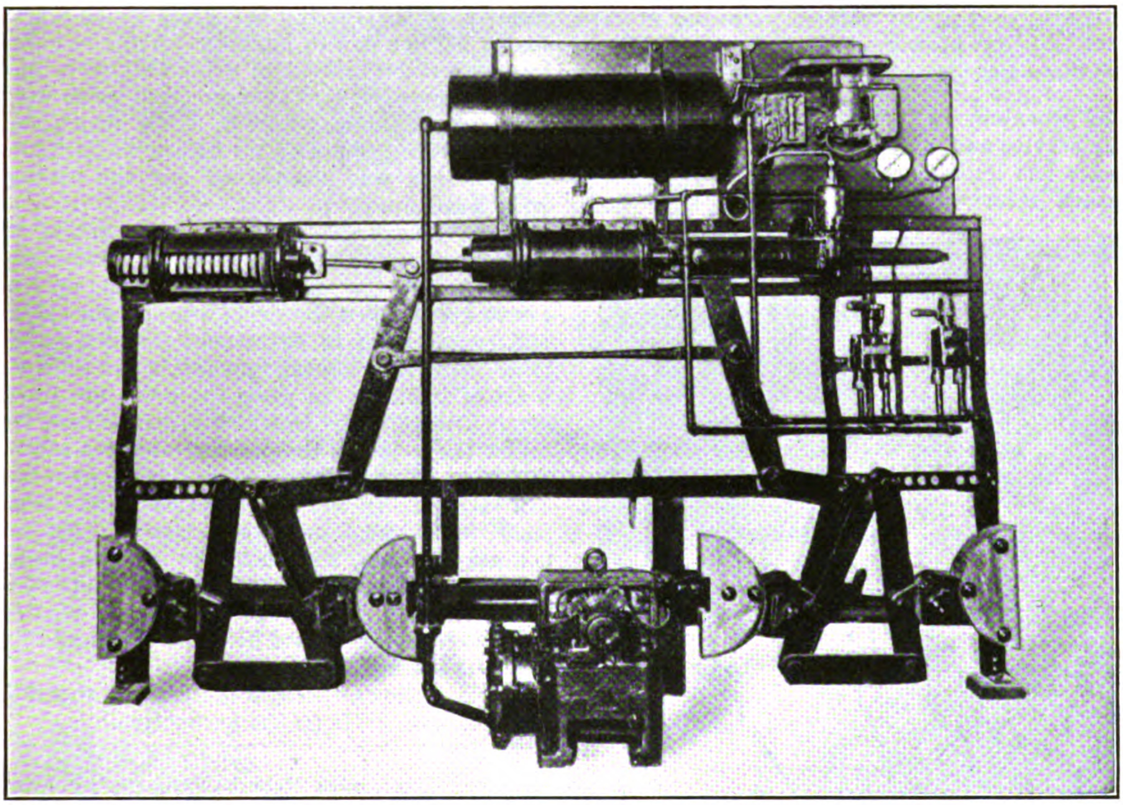
BY GEORGE OLIVER SMITH
Supervisor of Safety Doherty Organization

Instructing platform employees of street railway companies in the proper operation of the equipment in their charge has a direct bearing on the prevention of accidents and a consequent reduction in claim department costs.

Usually, the motorman is given a good deal of detailed instruction in the use of the electrical equipment and particularly in the proper operation of his controller. The writer has noticed many times that a motorman while operating his controller correctly appeared to be quite ignorant of the proper use of his air brakes and was paving the way for an accident, which in addition to involving property damage had a chance to cause personal injury.

The study of methods of preventing street railway accidents should cover car operation, and the motorman should be taught how to handle his air brakes. He should also be convinced that he can do a great deal toward applying the principle of "safety first" and assisting the claim department in its efforts to reduce accidents in which cars are involved.

An analysis of many accidents occurring over a period of several years in a city of about 300,000 population where the street railway company was operating nearly 300 cars showed that many of those classed as "collisions with vehicles, pedestrians, other cars, etc.," could have been prevented by proper handling of the air brakes. The subject was brought to the attention of the safety department of the company, and after consideration was referred to the central safety department of the parent organization, of which the local company was a part, for recommendations. After much thought and study the remedy appeared to be to provide for proper instruction in braking and the general use of air brakes. There was only a moderate amount of money available for the instruction school of the company, but from this a reasonable amount was appropriated for an air-brake instruction layout. Something had to be designed which would illustrate to a motorman just what the instructor was telling him and allow the student to follow by actual practice the course of the instructor's teaching. After consultation with the master mechanic it was found that only a few parts of the apparatus needed to be bought and that the balance could be taken from spare equipment on hand.



AIR-BRAKE INSTRUCTION EQUIPMENT

The photograph shown herewith illustrates the simple apparatus as it was finally installed. Each part of the regular car equipment was faithfully reproduced on a small scale. The regular cylinder was hooked in tandem with a sectional cylinder on one side and a slack adjuster on the other; the various equalizer and pull rods were also installed as shown, and quickly interchangeable miniature brakeshoes were put on to illustrate how brakeshoe troubles occur and why automatic slack adjusters are necessary. A small-sized compressor and a baby reservoir were installed and gages provided to show cylinder as well as reservoir pressure. The governor was mounted so that its operation could be explained and its function illustrated. Two types of motormen's valves were provided, and these are both connected up, in fact, the whole apparatus is made to operate so that actual service conditions may be shown the student as he is permitted to practise with the model. Standard air pressures are used, and every effort is made to duplicate a regular layout. The actual space occupied by the instruction model is very little compared with many elaborate air-brake instruction layouts, and the cost of the outfit complete was very reasonable.

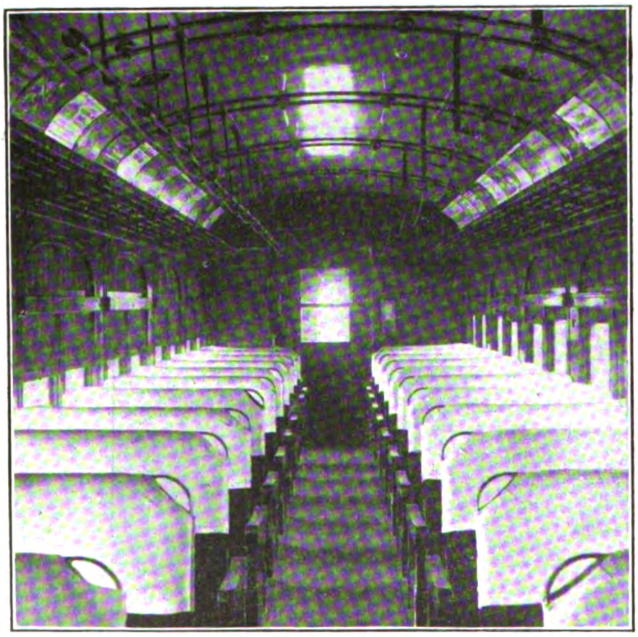
The outfit is located in the instruction school of the electric railway in question. Practically all men on regular runs and on the extra list, in addition to student motormen, have received this course in air-brake operation. As the apparatus has been in use only about eight months, there are as yet no figures available, but so far indications are that braking has materially improved and that there has been a lessening of accidents directly traceable to this cause.

Sanitary Covers Preserve Car Seat Backs

BY F. E. FISHER

General Superintendent Chicago, Ottawa & Peoria Railway, Ottawa, Ill.

The use of green covers for the seat backs of cars in regular daily service and white covers for the seat backs of special cars has improved the appearance of the interurban coach interiors on the Chicago, Ottawa & Peoria Railway, Ottawa, Ill. This feature is much appreciated by the patrons of the road. The washable canvas covers appeal to the public because of their hygienic value and, at the same time, they preserve the plush upholstery on seat backs, which otherwise would soon become soiled by passengers resting their heads against them. The improved appearance of the coach interiors is shown herewith. The company has found the use of these covers very satisfactory. The covers in white canvas cost 31 cents each, and in dark green canvas 36 cents. The dark green covers, used in the regular service, are changed every two weeks and are washed at a cost of 5 cents each, and the white covers, used exclusively for special parties, are washed after being in service for three trips. It is evident, therefore, that the expense of providing the sanitary covers is small in comparison with the satisfaction to the public which they afford.



VIEW OF C. O. & P. CAR WITH SEAT COVERS

Repairing Electric Locomotive Resistance Grids

BY THOMAS B. RAY

Electric Locomotive Repairman Pennsylvania Railroad, Sunnyside Engine House, Long Island City, N. Y.

There is a great deal of printed matter available which deals with arc welding both by the Bernardos method, using a carbon electrode, and the Slavianoff method, using a metal electrode. In very few articles are details taken up and the statements made are of a general nature. Having recently had some interesting experience in welding, both with acetylene and the electric arc, I shall describe the results, particularly with reference to the welding of cast iron.

After the electric locomotives on this road had been in operation for some time we had trouble with the resistance grids, on which the contact surfaces were burned badly. Following is a description of the method used in reconstructing the grids which were no longer fit for service due to burning. After removal from the locomotive the individual grids that were burned badly were scrapped. On an average eight grids were scrapped each time a set was rebuilt. Those which were slightly burned were ground on an emery wheel until all of the burned iron was cleaned off and the contact surfaces were lined up.

The repaired grids were then assembled temporarily on the bench so that the workman assembling the grids could see how the contact surfaces lined up. After a full set was assembled the grids were numbered, taken down and reassembled in permanent position on the locomotive. Now it is almost impossible for a man rebuilding a set of grids to see when the grids are lined up properly. The only way in which it can be done is to look up under the grids at the contact surfaces after assembly, and then only the lower edges of these contact surfaces can be seen. In sliding the grids on the insulated rods small particles of mica insulation can get between the contact surfaces, and such bits of mica cannot be seen from the bottom of the grids. These bits of mica cause poor contact and consequent burning of the surfaces. The average life of the grids after rebuilding as above is about ten months.

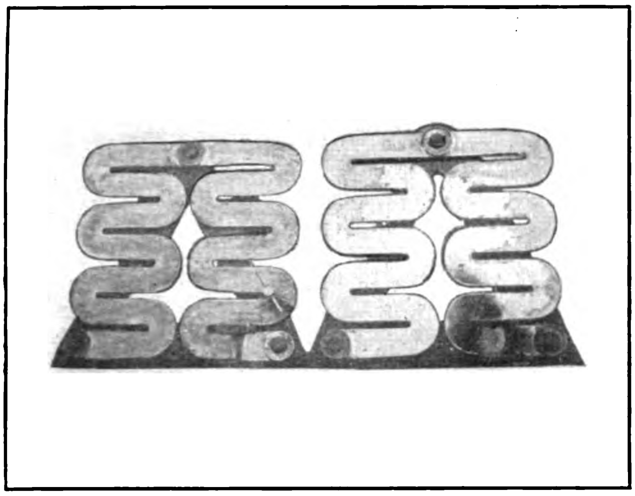
Table I shows the average cost of rebuilding one of these sets of grids on the locomotive.

TABLE I.

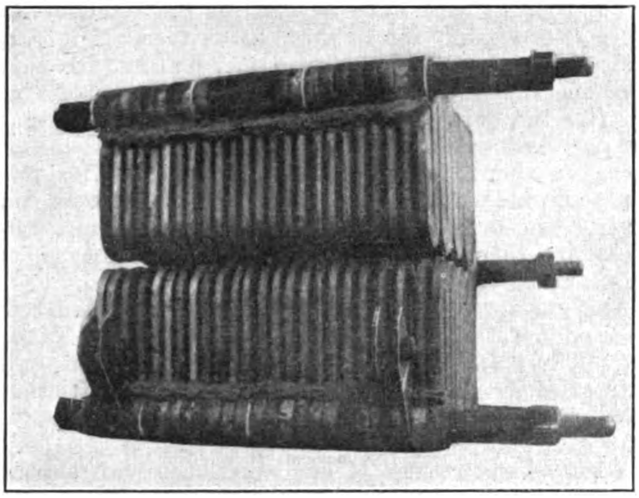
Removing burnt grids from locomotives, two men, two hours, at 50 cents per hour	$1.00
Cost of burned grids scrapped, average eight grids at $1.05 each	8.40
Grinding and cleaning contact surfaces, two men six hours and two men four hours, at 50 cents per hour	5.00
Total	$14.40

As a result of unsatisfactory experience with the maintenance of resistance grids by the method described it was decided to look into the matter of welding. Several sets of grids were welded by means of acetylene and they stood up well. For our conditions this method proved expensive and necessitated considerable delay in repair. While electric welding proved cheaper, it should be understood that I am not attempting to compare the two excellent methods but simply to give the results of the practice in these shops.

After a preliminary study of the subject we developed a routine of electrically welding the grids, details of



REPAIRING GRIDS—JIGS WITH GRIDS MOUNTED FOR WELDING (LEFT) AND WELDED (RIGHT)



REPAIRING GRIDS—GRIDS WITH FIRE CLAY BACKING IN PLACE

which are given later in this article, and as a result the cost has been cut down to the amount which is shown in Table II.

TABLE II.

Removing burnt grids from locomotive, two men two hours, at 50 cents per hour	$1.00
Grinding, cleaning and repairing grids, one man two hours, at 34 cents per hour	.68
Assembling grids for welding, one man, one hour, at 34 cents per hour	.34
Welding grids, one man three hours, at 34 cents per hour	1.02
Assembling grids on locomotive, two men three hours, at 50 cents per hour	1.50
Cost of electrical energy, 33 kw.-hr., at 1 cent per kilowatt-hour	.33
Total	$5.87

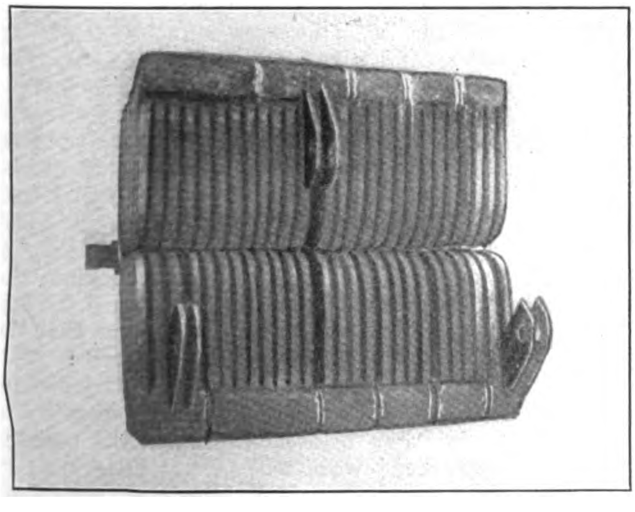
In comparing Tables I and II it will be noted that there are savings with the electric welding due to the elimination of scrap and to reduction in labor. Out of fifty-six sets of grids welded between March 1 and Nov. 1, 1915, there was an average saving of $8.53 per set as shown by the tables, or a total saving of $477.68 in seven months.

The procedure in connection with the repair of sets of grids in these shops is now as follows: After removal from the locomotive they are taken to the welding room and the grids are separated into four classes: good, slightly burned, badly burned, and broken or with contact surfaces burned off. The good grids are, of course, set aside for reassembling. The slightly burned ones are ground on a specially-designed emery wheel. The badly burned ones are ground until the contact surfaces are true and are used at the insulated joints, when the surfaces are separated by mica. The remainder of the grids are repaired no matter what their condition.

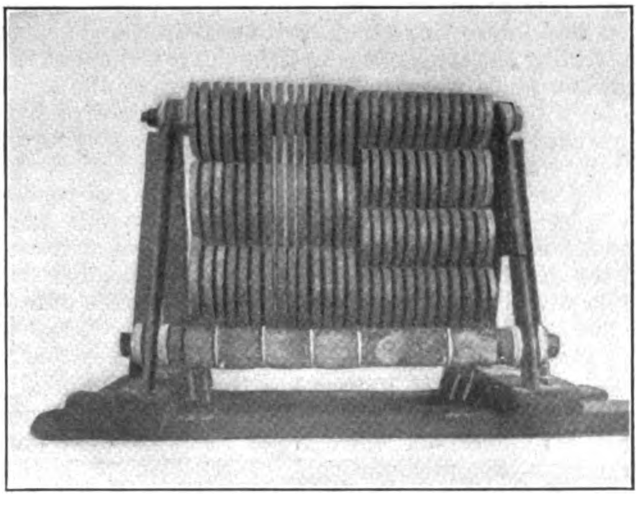
For repairing, the broken grids are mounted on jigs, made of ½-in. x 3-in. flat iron formed in triangular shape, bent on the flat, with three 1-in. studs to fit the holes in the grids. When the grid is placed on the jig there is a ⅜-in. clearance between the two. This space is allowed for the building of a mold around the break in the grid, the mold being made of old carbon brushes. After the grid has been lined on the jig the crack is forced open 1/16 in. and the grid is clamped to the jig with a screw clamp, to provide for contraction in cooling. After the weld has been made and the cast iron has cooled to a dull red heat the clamp is removed to prevent breakage by contraction.

An accompanying illustration shows two jigs with grids mounted on them; that on the left side having the grid lined up ready for welding, with the carbon mold and the screw clamp in place. The crack has been "V'd" out to permit puddling at the bottom and to save time. The jig on the right side contains a grid with the crack welded. The cross-section of the weld is slightly greater than that of the unwelded part. The average cost of this operation is 10 cents as compared with $1.05 for a new grid.

After repair and cleaning of contact surfaces the grids are assembled on temporary steel rods for welding. These rods are of high manganese steel, very hard and not affected by high temperature. In welding if cast iron is puddled through the rod holes it will not weld



REPAIRING GRIDS—GRIDS AFTER WELDING, WITH TEMPORARY RODS REMOVED



REPAIRING GRIDS—GRIDS MOUNTED ON SKIDS FOR CONVENIENCE IN HANDLING to the rods. If any burns are left on the inside of the holes after welding the rods will break them off, leaving a smooth surface in the holes. Other material has been used experimentally for the rods but with less success.

After the grids have been assembled for welding a fire clay backing is made for one side of the bottom surfaces, as shown in the second illustration. This prevents the melted iron from flowing down between the grids. The bottom and side edges of the contact surfaces are then welded and the rods are removed, as shown in the third illustration.

The grids are then assembled on the insulated rods with mica washers between the joints and the A-frames are put in place. After the grids have been lined up, a pair of skids are bolted to the set for convenience in handling around the shop. The insulation is then tested with 1000 volts alternating current.

Some of the results of our experience with electric welding may be of interest to the readers of the ELECTRIC RAILWAY JOURNAL. We find three obstacles to successful welding, as follows: sand holes, blow holes and slag piles.

Sand holes contain sand, carbon and burnt iron. Most of them can be distinguished by small, rugged holes or small cracks on the grid surface. They can only be removed by confining the arc to each hole until the impurities burn into a slag, which can be chipped out on cooling. The hole can then be filled in.

Blow holes are formed at cracks or joints in any cast-iron welding jobs and are due to failure to properly clean and line up the cracks or joints. Gas blows up through the weld leaving small pin holes, very difficult to get rid of. We find that dry borax can be used to form a slag over the holes while the cracks are being welded. The slag can then be chipped off and the holes filled.

Slag piles are formed by the slag given off by burned cast iron. The slag follows the arc and with skill it can be pulled out of the arc without breaking the latter. Such slag should not be overlooked as it produces large flat holes in the joint surfaces. As slag is brighter than the molten metal it can always be distinguished and it should be removed before the joint becomes too cool. Reheating joints to remove slag is bad as the weld may be fractured due to expansion and contraction.

In general it may be said that a good grade of cast iron can be welded if the section is not too large, with a resulting soft weld easily machined. For good results with cast iron the work must be clamped tightly and a heavy mold which can be preheated and which will hold the heat after welding must be built up. Chilling makes a weld hard and brittle.

Aside from the welding of cast iron to cast iron we have had interesting results with cast iron and copper. In welding the copper lugs to the grids we found at first that the welds were brittle. By shortening the arc to ½ in. with 150 amp., confining the arc to the iron until it reached a melting temperature and then bringing the arc in contact with copper and iron together we got good results. Both temperature of fusion and conductivity of the metals must be considered in this work. Copper oxide gas and copper slag are sources of trouble as the gas is heavy and masks the weld, and the slag, while slightly darker than the molten copper, is difficult to distinguish from it.

The University of Kansas has issued an engineering bulletin, No. 6, which contains three papers on Kansas fuels, the subjects of which are as follows: "Values and Proximate Analysis of Coal," "Discussion of Sulphur Contents of Bituminous Coal" and "Economic Effect of Washing Coal from the State Mine."

Locating and Wiring Crossovers

BY G. H. M'KELWAY

Line Engineer Brooklyn (N. Y.) Rapid Transit System

Very often when a crossover is to be installed, its location is taken up with the heads of the track and transportation departments only and nothing is said to anyone in the electrical department until it is desired to have the crossover wired. The result of such procedure is that the linemen find that the frogs in the trolley wire will have to be placed where they cannot be well supported, coming near the middle of sections instead of at or near the span wires. Then either additional poles must be put in or the old ones shifted so as to bring them to the proper locations, and both of these operations are expensive. In most cases there would have been no objection to placing the special work a short distance to one side or the other, where the frogs could be properly supported and the pull-offs brought to the poles; therefore the expense for new poles or shifting old ones could have been avoided.

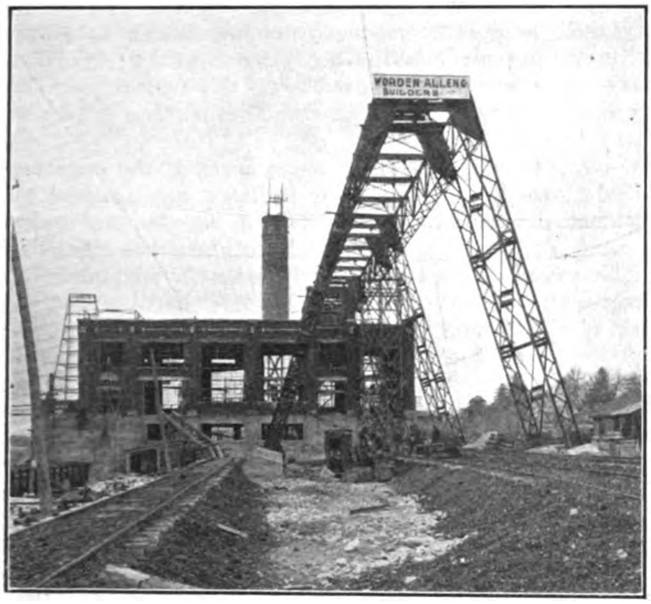
All that the transportation department cares about is that there should be sufficient room behind the crossover to enable a car to run in and be reversed. Distances of 10 ft., 20 ft. or even 50 ft. would make no appreciable difference to that department but it will make a decided difference to the electrical department.

The most provoking and inexcusable location for a crossover is just at the junction of two feeder sections where, if no change should be made in the electrical layout, one side of the crossover would be fed from one section and the other from another, therefore necessitating that both sections be alive if cars are to be operated over the crossover, and preventing the turning back of cars at the crossover if one section should have to be killed on account of fire or for any other reason. While such instances rarely occur, the writer has known of several of them. When they do occur the only thing to do is to shift the section insulators down a section or two and cut in splicing ears where they have been.

It may be said that there is no necessity for wiring crossovers. Several companies avoid doing so wherever possible, claiming that overhead frogs are nuisances and costly to maintain, therefore they should not be installed except where absolutely necessary. On the other hand, whenever there is a need for a permanent crossover (it is seldom worth while wiring a temporary one) it will be found advisable to wire it. If the crossovers are not wired the cars must coast over them at a comparatively high rate of speed with the resultant liability of their jumping the track or splitting the switch and so tying up the line for a while. Even if no such accidents happen there is usually a short delay to each car due to the time taken by the conductor in putting the pole on the second wire after pulling it down from the first one. Even if this can generally be done without stopping the car the pole will very often strike and hammer the span wire or hangers before it is put on the wire, calling for more or less maintenance on the overhead material. In all cases it will be found that the wire over the track on which the car operates just before taking the crossover will be worn quite thin by the grinding on it of the trolley wheels, because the conductors will keep the pole on the wire until the last possible moment. By this time but little more than the flanges of the wheel will be touching the wire. This causes rapid wearing away of the wire and danger of breaks in it unless it is renewed quite frequently, so that when all is taken into consideration the maintenance of the overhead work will be but little more if the crossover is wired than if it is left without wire, while accidents and delays will be avoided.

Two Large New Power Plants

Two power plants for generating wholesale energy, one by steam and the other by water power, are being built by the Ohio State Power Company within 1 mile of Freemont, Ohio, on the Sandusky River. A substantial part of the output of both plants is under contract to the Lake Shore Electric Railway and the American Gas & Electric Company's Ohio property, the Ohio Light & Power Company. The latter has contracted to use a minimum of 8,000,000 kw.-hr. a year, distributing it to Fostoria, Freemont, Tiffin and other neighboring cities, and the railway has contracted to use at least 17,000,000 kw.-hr. annually. Transmission circuits for light and power will be operated at 60 cycles, 66,000 volts, and the railway transmission will be at 60 cycles, 19,100 volts. The latter is rather an unusual potential but was adopted to permit the use of the substation apparatus formerly operated on an 18,000-volt, 25-cycle system.



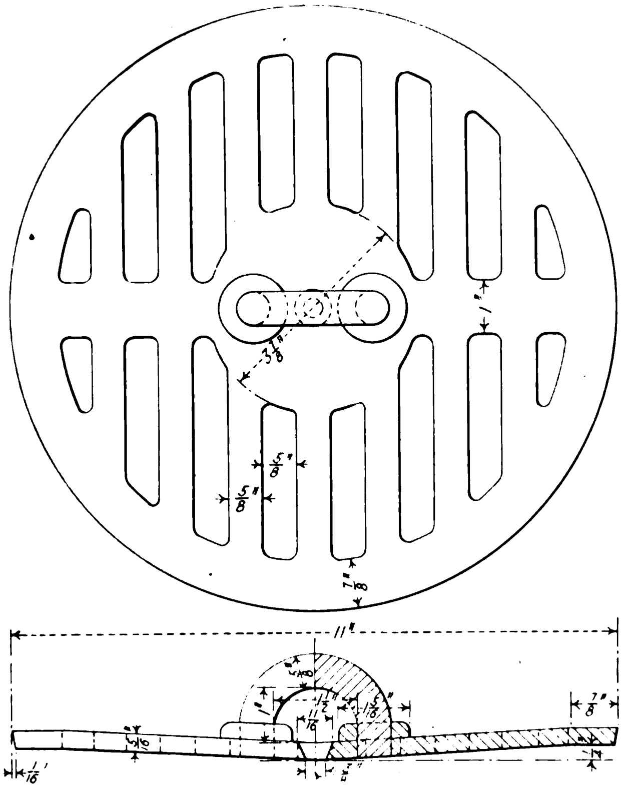
STEAM PLANT OF OHIO STATE POWER COMPANY UNDER CONSTRUCTION

The steam plant equipment includes three 6250-kva., 3600-r.p.m., 4000-volt, horizontal Allis-Chalmers turbogenerators with direct-connected exciters, four 750-hp. Babcock & Wilcox boilers operated at 250-lb. pressure and 125-deg. superheat, and equipped with a special type of underfeed stoker. The steam plant will contain transformer and switching apparatus sufficient to handle the entire output of both stations. The coal-handling facilities consist of a grab bucket operated from a Pawling & Harnischfeger monorail crane, which will take coal from cars or from a 2000-ton outdoor storage area and convey it to bunkers supported over the firing aisle. Ashes will be handled by the same crane. The ratio of maximum kilowatt-hours output to square feet of floor area in this plant will be as 1 is to 0.54, which is considered low for a plant of this size.

The water-power plant equipment includes three 1000-kva., 257-r.p.m., 4000-volt, water-wheel-driven generators with direct-connected exciters. The water wheels are of the Leffel horizontal type and operate under a 40-ft. head with water supplied through a 14-ft. steel penstock 3000 ft. long. The steam plant is located at a monolithic concrete dam which was constructed to supply water power for the hydroelectric plant being built 3000 ft. down-stream. Unusual features in these plants include the special underfeed stokers and the Allis-Chalmers reaction type turbine which is used to drive auxiliary pumps. This turbine is said to be the first of its type to be built in America. These two plants were designed and are being constructed by Woodmansee & Davidson, engineers and contractors, Chicago, Ill.

Non-Clogging Manhole Strainer

In the ordinary strainers supplied with sewer traps for manholes the holes are approximately ⅝ in. diameter, so that they rapidly fill with mud, and within a short time the holes are filled with surface water. To overcome this trouble a malleable-iron strainer with a wrought-iron eye cast in it has been designed, so that the strainer can be easily removed from the street with a hook, and water rapidly exhausted from the manhole. A sketch showing the details of the strainer is given herewith. Slots ⅝ in. wide have been provided in the strainer instead of round holes, so that the tendency to clog is largely eliminated.



PLAN AND SIDE ELEVATION OF NON-CLOGGING MANHOLE STRAINER

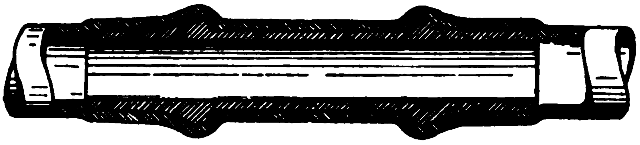
In attempting to remove strainers of the old type many of them were broken by bars, and the bells would often fall on top of the clay sewer pipes and cause obstruction. Again, often the strainer and bell were thrown away, so that sewer gas was liberated.

The saving which it is claimed will be effected by the use of the new strainers is considerable, as a cleaning gang will not be required to use a pump, and after heavy rainstorms, should any of the holees be filled with water, the strainers can easily be removed. By the time the cleaning gang reaches the last hole on a section, it can return to the starting place and remove the mud from the manholes. These strainers cost approximately 35 cents each.

The Liverpool (England) Corporation Tramways have had between 600 and 700 women applicants for positions as conductors. In spite of the recent numerous enlistments the tramway service is kept going without inconvenience.

Repair Couplings for Old Hose

A repair coupling, shown in the illustration, for reclaiming and restoring to service scrap rubber hose has been invented by Ralph W. Ledbetter, Birmingham, Ala., and its use is now effecting a considerable saving for the Birmingham Railway, Light & Power Company, Birmingham, Ala. The repair coupling, it is said, makes this scrap hose as good as new so far as pertains to further service, since all that is necessary to reclaim the hose is to cut it in two at the place where it failed or parted, and to unite the two ends by inserting a repair coupling in the same manner as applying couplings and nipples to new hose.



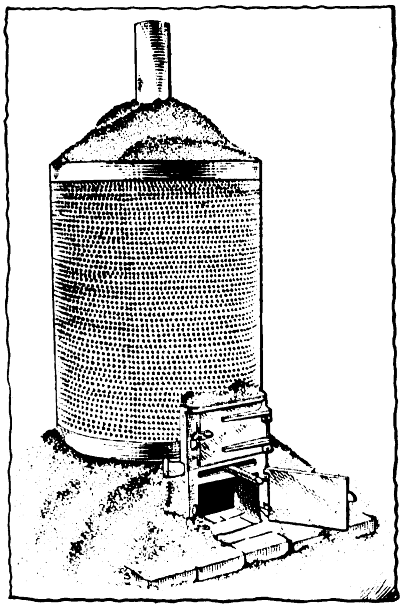
REPAIR COUPLING FOR AIR HOSE

Last summer the Birmingham Railway, Light & Power Company applied several repair couplings to its equipment as a test. The couplings proved so satisfactory that on Sept. 11, 1915, this company officially adopted it for use in reclaiming old rubber hose in lieu of applying new rubber air hose, with the following results:

274 ¾-in. air hose reclaimed, 3-ft. length, total 822 ft. .	
822 ft. ¾-in. air hose at $28.40 per 100 ft.	$233.45
274 repair couplings, 137 lb.., at $1.75 cwt.	2.40
Total amount saved in four months	$231.05

An Economical Sand Dryer

The sand dryer of the Martin Brick Machine Manufacturing Company, Lancaster, Pa., has been adopted by quite a number of electric railways. Its constructional and operating features are indicated by the accompanying illustration and the following paragraphs. This dryer is moderate in cost and is adapted to drying from ten to twenty tons daily.



CONTINOUSLY-OPERATING SAND DRYER

The dome of the dryer is of very heavy metal, so arranged that it will not be readily burned out by the hot sand lying against the outside and the fire within. The green sand is placed around the dome, or heater, inside the steel jacket; the arrangement of the dome being such that the heat is thoroughly circulated through the body of the sand, removing all the moisture and drying out the vegetable matter. The company has equipped its latest type of dryer with a heavy cast-iron pipe above the dome, allowing much sand to be put into the dryer at one time, thus materially increasing the drying capacity.

As the sand dries it falls out through the meshes of the screen and over the bevel ledge at the bottom, thus providing room for additional sand to be added and making the operation of the dryer continuous. It is said that this process will dry sand faster than one man can charge the drying bin and take away and screen the dry sand. Furthermore, the drier will not clog up, because wherever the sand dries, it is free to flow away from the drying bin. The fire chamber is large and provides for furnishing the greatest possible amount of heat for the fuel consumed. Any kind of fuel can be used, either anthracite or bituminous coal, or wood. A vibrating grate is also provided, so that the firebox can be readily cleaned.

Pacific Electric Railway Adopts the Coasting Recorder

The Pacific Electric Railway, the leading interurban system on the Pacific Coast, which operates 611 miles of single track with some 600 motor cars and about fifty electric freight locomotives, has begun to equip all its rolling stock with the Rico coasting recorder. These recorders will be used over the widest possible range of service—from high-speed interurban trains to local city operation.

Following the practice of other users of the coasting recorder, the Pacific Electric Railway has formed an efficiency department to analyze the records and to do all work necessary to raise and maintain the efficiency of the motormen. This department will be under the direct supervision of J. McMillan, general manager, with G. H. Grace as efficiency engineer. The order for this equipment was placed by Paul Shoup, president Pacific Electric Railway, with Alphonse A. Wigmore, Pacific Coast representative of the Railway Improvement Company.

Electrification of Railway Terminals

In a paper read before the Pan-American Congress N. W. Storer referred to the harmful effect of legislation on steam railroad electrification, stating that several cities had recently considered legislative compulsion for electric operation of railway terminals but that thus far none of them had required it and it was to be hoped that it would not be done. The electrification of the steam railways in a large city means much more than a mere change of motive power in order to secure the greatest possible advantages from it, and action compelling the change should not be taken hastily or ill-advisedly. The cost under such conditions might well require either confiscation of railway property or increased passenger and freight rates to pay the interest on the investment. It should be recognized as a principle that railways should not be forced to electrify their lines until they can see their way clear to justify the expense. When that time comes few of them will wait to be forced.

Bow Collectors Improve Service in Switzerland

Bow collectors are to be substituted for the trolley collectors on all cars of the Zürich (Switzerland) Tramways. For some time past the cars on one route have been operated with bow collectors, and according to the *Neue Züricher Zeitung* the delays due to the trolley wheels jumping off the wire and the repair and renewal costs have been so much reduced that the management has decided to change over all the cars to bow collectors before the end of next March.

NEWS OF ELECTRIC RAILWAYS

BEMIS DALLAS REPORT EXPECTED SOON

City Commissioners Outline Their Ideas With Respect to Proposed Report and Consolidation of Railway and Electric Properties

Mayor Henry D. Lindsley of Dallas, Tex., has issued a statement on the attitude of the Board of City Commissioners to the entire street railway question, and what it proposes to do in the matter of franchises if the report to be presented by Edward W. Bemis, who is now engaged in an inquiry, offers a logical solution of the various problems. Mr. Lindsley said in part:

"The Board of Commissioners expects the reports of Edward W. Bemis, on both the traction and electric lighting problems, to be completed and in the hands of the administration during the early days of February.

"The attitude of the city administration with regard to the electric lighting and traction problems is this: From Mr. Bemis' investigations we expect to know for the first time, from an independent, authoritative source, the facts with regard to these utilities. And we expect to have applied to these facts the judgment of a man who stands out conspicuously among public utility experts in the United States. The result should be a clear understanding of the matters, and a righteous conclusion with regard to them.

"The administration does not take the position that it is 'trading' with Stone & Webster, or the interests which that firm represents. That in the conclusion of this matter it is not a question of 'give and take.' That, on the contrary, the administration, with the help of Mr. Bemis, of our citizens and of every other factor available, should reach a conclusion of what is a just and fair settlement for the people of Dallas of the electric lighting and traction matters.

"When the administration has reached a conclusion as to a just and righteous settlement of the traction and electric lighting problems, from the standpoint of the people of Dallas, it will expect the Stone & Webster interests to accept such fair and just conclusion. If Stone & Webster are not willing to make an adjustment fair and just to the people of Dallas, then this administration will so state to our citizens, and will advise that no new contracts of any kind be made with the Stone & Webster interests. The administration is committed:

"1. To an ascertainment of the true facts.

"2. To an attempt, in the light of these facts, as the representatives of the citizens of Dallas, to adjust the traction and electric lighting matters in a fair and correct way.

"3. To acquaint the citizens of Dallas fully with that fact in the event a fair and correct adjustment cannot so be made.

"In this connection the administration wishes it understood that Stone & Webster have furnished to Mr. Bemis, and to his assistants, every facility for carrying on his investigations, have withheld nothing from his scrutiny, and have fully co-operated with the administration in its efforts to ascertain all of the facts relating to the traction and electric lighting matters.

"The administration is not willing that there shall be a consolidation of the electric lighting and street railway properties. The reason advanced for such consolidation have been carefully weighed, and the conclusion has been reached that it is not to the interest of the people of Dallas for these two distinct utilities to be merged into one.

"If, based on Mr. Bemis' report, a conclusion is reached, in so far as the administration is concerned, with the Stone & Webster interests, then a charter amendment will be submitted by the administration to the voters of Dallas at the election of April 4 of this year. At the same time there will be presented to the people of Dallas the franchise proposed to be passed with regard to the traction and electric lighting properties, in event the people of Dallas pass the proposed charter amendment."

INQUIRY INTO RAPID TRANSIT PAYMENTS

New York Investigating Committee Reviews Negotiations Preceding the Subway Awards—Railway Officers Testify

The inquiry by the Thompson legislative committee has been directed since last week into the details of the awards under the dual system contracts, to the terms of the financing of the proposed new construction and to the expenditures made for counsel. The principal witness on Feb. 2 was George W. Young, formerly a director of the Interborough Rapid Transit Company. Interrogated about the elevated railway reconstruction and third-tracking contracts Mr. Young said that he, Gardiner M. Lane and William A. Read strongly opposed the proposal advanced by Theodore P. Shonts, president of the company, to award the contracts to John F. Stevens. The estimated cost of this work was $20,000,000, all to be paid by the Interborough Rapid Transit Company, and Mr. Stevens was to be paid a 10 per cent commission, and was to have the right to sublet the work. Mr. Lane appealed from this proposal to J. P. Morgan, Jr. Finally a committee of five directors was appointed to inquire into the matter. The contract was not let to Mr. Stevens, as proposed, but subsequently a contract was made with the T. A. Gillespie Company for merely the third-tracking. Later Mr. Young, Mr. Lane and Mr. Read resigned as directors of the Interborough. Mr. Young's memorandum of what took place at the meeting of the directors at which the Stevens proposal was made. was read into the record.

The witnesses on Feb. 4 included H. M. Fisher, secretary of the company, and John H. Campbell, treasurer. Mr. Campbell testified that up to August, 1912, Mr. Shonts received a salary of $75,000 a year. The amount was then increased to $100,000. In 1913 the directors voted a lump sum to him of $125,000 and in 1914 he was voted $25,000 more. The minute books showed that these payments were for "services of an extraordinary character and great value to the company." Richard Reid Rogers, attorney for the company, also received $50,000 extra compensation in 1913 and E. F. J. Gaynor, auditor, received $10,000 in 1913 by special direction of the board.

On Feb. 7 Mr. Fisher testified in regard to the negotiations between the company and J. P. Morgan & Company, under which the latter stood ready at any time as syndicate managers to furnish the company $100,000,000 for rapid transit work. The payment agreed to for this service was $500,000, of which $250,000 was to be made to Morgan & Company and $250,000 to the other members of the syndicate. Mr. Fisher said that he was not familiar with the details of payment aggregating $63,128 in fees to members of two law firms representing a realty company which had opposed certain subway extensions.

Francis Lynde Stetson, to whom $50,079 was paid for legal services, said in discussing the payment made to him, that this was remuneration for drawing the new mortgage covering the elevated properties under which the Guaranty Trust Company was trustee. He explained that this was a voluminous document and said that if he had the work to do over again he would charge more. Mr. Shonts was excused from testifying until the return from Europe of his personal counsel, De Lancey Nicoll, who was familiar with all the rapid transit negotiations.

During the testimony on Feb. 8 it was brought out that two payments of $250,000 each had been made to J. P. Morgan & Company. The first one was under a syndicate agreement by which Morgan & Company pledged themselves up to a certain date to act as syndicate managers. The contracts for construction and operation were not concluded by the date fixed and a new agreement was concluded under which the financing is now being done. This requires Morgan & Company as syndicate managers to furnish about $70,000,000 more than was contemplated in the original underwriting. In this connection Harry P. Davison of Morgan & Company was quoted by the New York *Times* in part as follows:

"In 1910, I think, an agreement was executed with the Interborough. This firm agreed to supply $105,000,000, of which $30,000,000 was to provide for third tracking the elevated and $75,000,000 for new subways. The money could be had at any time; we had to stand ready to deliver it, regardless of conditions. At the end of two years the negotiations fell through and all the work was gone.

"There had been no provision for payment in such a case, and we submitted to the Interborough that we considered ourselves entitled to payment for our services. The company agreed that we were, and the sum was fixed at $250,000. We also asked that we be paid for our two-year commitment to supply $105,000,000 for construction. It is not customary to offer a call on $100,000,000 for nothing. I do not know anyone who can get such a call without paying for it. We were paid another $250,000 for that, and this money was divided among the syndicate. Had we supplied the money and taken bonds the $500,000 would have been deducted from our commissions.

"The new negotiations for the subways now building were taken up on a more comprehensive scale. We did something that had never been done before in this country, and which is not likely to be done again. That is, we formed a syndicate that was bound for five years to supply a total of $160,000,000. No matter what happened—regardless of whether there was a market for bonds, a war, a panic, 20 per cent money—we were obligated under the agreement to take a certain amount of bonds each year and to turn the money over to the company. We paid 93½ net; the syndicate paid 96; the public offering price was 98. I do not see now how the thing was accomplished; I know it could not be done again.

"Now that the transaction is nearly over—I believe there remains only $15,000,000 of the $160,000,000 to be taken—we are getting out from under the strain. It has been a painful experience, for we took bonds and paid 93½ for them when they were selling at 91. We paid 2½ per cent on the money left with us by the Interborough. At times that arrangement was advantageous to us; at others it was not. Call money has been bringing 1½ and 1¾ per cent for a long time, so the Interborough has done well to get 2½ per cent. The bonds were turned over to the syndicate members, who have had to carry them. If we could have kept them and received 5 per cent in interest, we would have made 2½ per cent over the interest we paid on the money. Whenever the opportunity offered the dealers have sold some of the bonds, always taking care not to crowd the market."

On Feb. 8 Mr. Fisher said that J. L. Quackenbush was general counsel of the company and that the legal department employed sixty attorneys and a total office force of about 200 persons. Mr. Quackenbush said he received $36,000 a year from the Interborough. He also received $1,100 a month from the New York Railways, $6,600 a year from the Third Avenue Railway, and $2,400 a year from two Long Island roads. His income for the year was $45,000. The annual legal expense account of the Interborough Rapid Transit Company amounted to between $275,000 and $300,000.

PLAN FOR TRAFFIC RELIEF IN DETROIT

To relieve the street railway congestion in the heart of the city as much as possible the Detroit Street Railway Commission has recommended to the Common Council a plan of curve connections, special work and some straight track construction in the downtown district. The recommendations are based upon the traffic survey made for the commission by Barclay Parsons & Klapp, engineers, New York City. The commission states in its recommendation that the plan does not propose to eliminate the operation of through east and west cars across Woodward Avenue unless thought desirable, although the lay-out of tracks if the recommendations are carried out would be such that all east and west cars could be looped. Traffic officials of the company have contended for years that something must be done in the way of loops to relieve the congestion caused by having practically 90 per cent of all the cars operated run past the city hall on every half trip. Under the present arrangement all east and west cars cross Woodward Avenue with the natural result that operation on all lines is slow and congested in the downtown district. The recommendations have been referred to the committee on public utilities.

WARNING TO RAILROADS

New York Commission Suggests That Railroads Consider Self-Propelled Cars to Meet Electric Railway and Bus Competition

The Public Service Commission for the Second District of New York, on Feb. 3 sounded a warning to the railroads of the State that they must find some more convenient and economical means for handling local passenger business to meet the competition of the electric railway and the automobile unless they want to see a continuance of the falling off in local passenger revenue that has marked the last few years. The commission urges the railroads to study the possibilities of the gasoline-driven railroad car. Commissioner Irvine said:

"The familiar local train, composed of locomotive, baggage and express car, and two or three coaches, is in a state of obsolescence. Such trains carry only those who have no other available means of transportation. Some cheaper, faster and more comfortable method of transporting local passengers must be adopted or else the railroads must continue to transport them at a loss in spite of wise economies and in spite of reasonable curtailments of service."

The opinion was rendered upon the denial by the commission of the complaint of Ralph Harter and other residents of Cortland, and points between there and Auburn on the Lehigh Valley Railroad, asking for earlier morning and later evening service into and out of Auburn. The case, says Commissioner Irvine, is typical of scores through that part of the State, gridironed by main and branch lines of railroad. As in many other cases, it has been shown that public convenience would be served by additional trains; yet the railroad has been able to show that even if the cost of this service could be barely met, it would be at the expense of revenue now being derived from the present trains, which are barely paying, and would result in a generally unprofitable operation.

Pointing to the fact that almost every village in the State can now be reached by an improved highway at all seasons of the year, and to the tremendous growth of the automobile, Commissioner Irvine said of the latter:

"A few years ago the summer toy of the rich man, it has now become the convenient passenger and freight vehicle of almost all classes. It is safe to assume that its use will not diminish."

The gasoline-driven railroad car is suggested by Commissioner Irvine as the solution of this problem of local railroad service, though he says that it has not yet been so thoroughly demonstrated under the topographical and climatic conditions of New York State as to warrant the commission in prescribing its use in this and other cases. Continuing he said:

"There is evidence in the record that gasoline cars have been operated on the Central New York Southern between Auburn and Ithaca at an expense of less than 29 cents per mile. This operation has not continued long enough, however, to determine the important factor of depreciation. If the solution does not lie in gasoline it must be found elsewhere, and it is high time that this and other railroads should seek it.

"It is not altogether creditable to the enterprise of the carriers that experience is so limited. The stretches of road we have been considering are not unfavorable to experimentation of this character. It is possible that the Lehigh Valley Railroad might not only meet the convenience of the complainants in this case, but aid materially in affording a solution of the local passenger problem if it should by actual experiment determine whether or not the solution lies in the direction indicated."

The local case involves two divisions of the road. One runs from Sayre, Pa., through Freeville to Auburn, and the other from Elmira through Freeville and Cortland to Canastota. Through the connection at Freeville there are now two trains each way between Cortland and Auburn, the earliest arriving in Auburn at 10.58 a. m., and the latest leaving Auburn at 4.50 p. m. The commission finds that to change these schedules would result in far greater inconvenience to patrons all along the lines, and at many connections with other lines, than could be gained for the complainants. It also finds that on the showing of revenues and expenses put in by the railroad an order involving an extra train to meet this complaint would not be equitable and would not stand a court review. The railroad showed that its actual out-of-pocket cost per train-mile for this service was 54 cents, with revenues per train-mile of 57 cents, thus leaving only 3 cents for overhead charges.

CLEVELAND RAILWAY SEEKING TO BUILD 24 MILES OF TRACK AT COST OF $905,427

At the regular meeting of the City Council of Cleveland, Ohio, on the evening of Feb. 7 the Cleveland Railway requested the approval of its plan to build 24 miles of new track at an estimated cost of $905,427. Permission was also asked to sell the old carhouse property at Superior Avenue and East 105th Street for $200,000. The Superior & East 105th Street Realty Company recently leased the property for a period of ninety-nine years, with the privilege of purchasing it after ten years for $210,000.

The street railway committee approved Councilman Schwartz's request to the street railway commissioner to investigate and report on the feasibility of giving the various lines distinctive numbers.

The Cleveland Railway and the officials of East Cleveland are again in a dispute over the paving question on Euclid Avenue. Because the franchise has only a few more years to run, the company does not want to lay a new pavement between its tracks unless an extension of the franchise is granted. Under the present franchise 3-cent fares are in force in East Cleveland, but the company refuses to consider a renewal at that rate. It is said that nothing but a 5-cent fare between points in East Cleveland and points within the city will be considered by the company. A portion of the city lying east of East Cleveland is served by the Euclid Avenue line, but after leaving the East Cleveland limits an extra fare of 5 cents is collected. This was the rate before the territory was taken into the city.

J. E. Smith, chairman of the committee on light of the City Council, has suggested that the Cleveland municipal light plant be enlarged and that power from it be sold to the Cleveland Railway instead of giving the company permission to replace equipment in the Cedar Avenue power house. He has suggested that $1,000,000 of bonds be issued to provide funds to enlarge the municipal plant sufficiently for this purpose.

FURTHER MOVES IN CANADIAN HYDRO-ELECTRIC PLANS

The Ontario Power Union and the Provincial Hydro-Radial Union will meet in Toronto, Ont., during the second week of the session of the Ontario Legislature, and Mayor Church says that the application for a subsidy from both Governments will be renewed. The Mayor stated that no money would be required while the war was on, and the municipalities would be satisfied with a guarantee.

The Toronto City Council on Jan. 24 heard on final reading the bill to authorize the ratification of an agreement between the city and other municipalities with the Provincial Hydro-Electric Commission for the construction of an electric railway from Toronto to London. The bill was indorsed by the ratepayers on Jan. 1.

A conference of representatives of the Councils of the municipalities along the Grand Trunk Railway branches between Berlin and Galt and between Berlin and Elmira was set for Feb. 5 in Berlin, at which Sir Adam Beck, chairman of the Hydro-Electric Power Commission, was to submit a proposition to secure the running rights over these lines to be used as feeders of the proposed radial main line between Toronto and London. Sir Adam Beck has notified the Berlin authorities that the Dominion Railway Commission will not consent to the construction of the Hydro lines parallel to existing branch lines, but he is confident that running rights will be granted over these branches. It is proposed to electrify these branches.

SEATTLE SNOWBOUND

For the first time in the history of street railway operation in Seattle, practically the entire service of the Puget Sound Traction, Light & Power Company, as well as the Seattle, Renton & Southern Railway and the municipal lines, was completely paralyzed by a snowstorm which continued for thirty-six hours. Aside from an intermittent service on the cable lines traversing Madison and James Streets and Yesler Way, virtually all the cars in Seattle ceased operation at midnight on Feb. 1. On Feb. 2 the cable lines were forced to suspend operation. So heavy was the snowfall that the efforts of five snowplows, a crew of 500 men with shovels and several improvised cars equipped for clearing the tracks, were unable to remove the accumulation of snow to permit operation of cars on the local Seattle lines. The Seattle, Renton & Southern Railway operated until midnight on Feb. 1, but despite the efforts of extra gangs of men service had to be gradually discontinued. Division "A" of the municipal line ceased operations at 10 o'clock on the night of Feb. 1, but the Lake Burien line, Division "C," continued to operate all day on Feb. 2 and well into the night.

Interurban traffic, controlled by the Puget Sound Traction, Light & Power Company, was completely suspended on Feb. 2. On the Seattle-Tacoma division service ceased about 11 p. m. on Feb. 2. Operation over the Seattle-Everett branch of the Puget Sound company's interurban system was discontinued on Feb. 2 and had not been resumed up to the time that this account was dispatched from Seattle on Feb. 4 by the resident correspondent of the ELECTRIC RAILWAY JOURNAL.

The Oregon-Washington Railroad & Navigation Company, on Feb. 2 and 3, ran four special steam trains for the accommodation of the residents of Georgetown, a suburb of Seattle, and those employed in Georgetown who live in Seattle. J. L. Brass, assistant general manager of the railroad, stated that the operation of these special trains would depend upon the weather and the ability of the Puget Sound Traction, Light & Power Company to move its cars to and from Georgetown.

The topography of the city of Seattle, with its many hills and dangerous grades, added infinitely to the difficulties which confronted the railway officials.

According to reports received in Seattle from other large cities in the State, troubles similar to those experienced in Seattle were confronting the railway managers in those cities. Walla Walla reported 30 in. of snow and traffic completely demoralized. Tacoma, Bellingham, Olympia, Aberdeen, Hoquiam and other places reported the suspension of railway service.

FURTHERING CINCINNATI'S RAPID TRANSIT PLANS

C. C. Harris, representing the Cincinnati, Milford & Loveland Traction Company, reported to the Cincinnati Rapid Transit Commission on Feb. 2 that a plan had been adopted for connecting this line with the rapid transit loop in the city. He said that the connecting line would pass through Ault Park and give rapid transit not only to the park but to Madisonville, Mount Lookout and Hyde Park East. It was proposed, after bringing the line in from Madisonville, the present terminus of the Cincinnati, Milford & Loveland Traction Company, to form a junction with the Cincinnati, Georgetown & Portsmouth Railroad and two lines of the Interurban Railway & Terminal Company. On the following day, however, the city park board refused to entertain a request for a right-of-way through Ault Park on the ground that it was donated to the city on the condition that it be used for park purposes only and that an electric line through the ravine, as proposed, would spoil one of the most beautiful portions of the ground.

Mr. Harris announced to the park board that if the loop is built and his road secures a proper connection, it will be extended to Columbus, Ohio, to provide a fast freight system. He said that the passenger business was on the wane, as evidenced by the fact that the company's earnings from passenger traffic in 1912 were $72,000, while in last year they were $48,000.

The Interurban Railway & Terminal Company and the Cincinnati, Georgetown & Portsmouth Railroad have planned to form a junction and connect with the proposed loop by means of one double-track line. This plan was reported to the Rapid Transit Commission on Feb. 2.

HOLYOKE ARBITRATION HEARINGS

L. D. Pellissier, president of the Holyoke (Mass.) Street Railway, took the stand late during the week ended Feb. 5 in the wages arbitration hearings, now under way after an interim of several weeks. He reviewed the policies of the company, with particular reference to official salaries. Mr. Pellissier told the board that he had entered the employ of the road in 1892 as a conductor at a daily wage of $1.75 for ten hours' service. He sketched the various steps in his advancement to president and general manager, in which capacities he receives an annual compensation of $7,500. The number of officers in the company had lately been reduced, and the official salaries now totaled $10,000 a year, compared with $14,000 formerly. Mr. Pellissier knew of no company of comparable size with so few officers. His duties included the purchase of about $100,000 in supplies yearly as well as close supervision of the company's other expenditures, amounting to about $500,000 a year. He also has charge of the Northampton Street Railway, for which he received an additional salary. To look after that property required two to three hours a day of executive attention. When the present interests took over the Northampton Street Railway it was in poor physical and financial condition, but the former had been much improved under centralized management.

The witness said that he worked twelve hours a day and seven days a week. Mr. Pellissier said that he had informed the employees on the Holyoke road that he was willing to meet the Springfield Street Railway rate of wages, but that the Holyoke company had always paid its men by the hour and would continue to do so. The company recently declared a 3 per cent dividend instead of the former 4 per cent semi-annual rate, the reduction being due to losses in the strike of 1915. The witness denied that spare men were obliged to remain at the carhouse from 5.30 a. m. until midnight in order to obtain seven hours' work a day.

Chairman Cottor announced that the company and the union had agreed that any award which may be made will date back to June 1, 1915. The hearing was adjourned until Feb. 9, when it was expected that Prof. Albert S. Richey of the Worcester (Mass.) Polytechnic Institute would submit expert testimony on the cost of living in rebuttal to the evidence of Arthur Sturgis, Brookline, Mass.

New Virginia Line in Operation.—The new line of the Petersburg & Appomattox Railway has been placed in operation from Petersburg to Hopewell, 10½ miles.

Lectures on Military Engineering.—The course of seven free lectures on military engineering practice under the direction of Major-General Leonard Wood, referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 5, page 285, will, through the co-operation of the United Engineering Society, be given in the auditorium of the Engineering Societies Building in New York.

Chicago Traction Experts Begin Work on Feb. 14.—The ordinance confirming the appointment of the Chicago traction commissioners has become a law, and the new commissioners, William Barclay Parsons, Robert Ridgway and Bion J. Arnold, plan to take up the work of investigating Chicago's transportation problem Feb. 14, 1916, with a view of making an early recommendation for improvements. Mr. Parsons was named chairman of the commission in the ordinance authorizing the appointments.

Wage Conferences in Detroit.—Officers of Division No. 26 of the Amalgamated Association of Street & Electric Railway Employees, have had some conferences with officials of the Detroit (Mich.) United Railway with reference to a request which the union is to present for an increase in wages. No public announcement has been made as yet by either company or men as to the extent of the increase desired. The agreement between the company and the union calls for arbitration of wage matters provided an agreement cannot be reached.

Proposed Lockport Agreement Disapproved.—The proposed agreement between representatives of the city of Lockport, N. Y., and the International Railway, Buffalo, N. Y., whereby the former would withdraw its objection to the one-man car service in Lockport providing the railroad company would construct a new freight and passenger terminal for the Buffalo & Lockport; Lockport & Olcott, and Buffalo, Lockport & Rochester lines, was disapproved when submitted to the Lockport City Council. It is said that an effort will be made to require the International Railway to place two men on the Lockport city cars.

Electrification of Twin City Terminals Reported.—Newspapers of St. Paul and Minneapolis, Minn., report negotiations under way between the Northern States Consumers Power Company and the Minneapolis General Electric Company, and the Great Northern Railroad which contemplate the electrification of the Union Station of Minneapolis and the terminals leading into it. Concerning the conference between L. W. Hill, president of the Great Northern Railroad, and H. M. Byllesby, Ralph Budd, assistant to the president of the railroad, is reported to have said: "I cannot divulge the nature of our conference with Mr. Byllesby. Naturally, the electrification idea presents itself in connection with his visit here, and I can go no farther than to say that we are considering such a proposition." This has been taken to mean that Mr. Byllesby has presented a comprehensive scheme of terminal electrification which is being looked upon with favor by the railroad officials.

PROGRAM OF ASSOCIATION MEETING

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association on Feb. 24 and 25, in the banquet hall of the Miami Hotel at Dayton. The business session will be held at 9 a. m. on Feb. 24. Reports of committees will be presented on Feb. 24. The program of addresses and papers for that day is as follows:

Address by Charles L. Henry, president of the Central Electric Railway Association and president of the American Electric Railway Association.

Paper, "City Manager Government and Its Relation to Public Utility Companies," by Henry M. Waite, city manager of Dayton, Ohio.

Address by Luke C. Bradley, assistant district manager of Stone & Webster.

At the afternoon session the program will be as follows:

Paper, "Comments on Electrification Applying Especially to the Norfolk & Western Installation," by Q. W. Hershey, engineer with the Westinghouse Electric & Manufacturing Company.

Address by Beecher W. Waltermire, chairman of the Public Utilities Commission of Ohio.

The program of papers for Feb. 25 will be as follows:

Paper, "Gas-Weld Rail Bonding," by J. Rowland Brown, engineer of the Ohio Brass Company.

Report of the Central Electric Railway Accountants' Association, by F. T. Loftus, president.

Report of the Central Electric Traffic Association, by A. L. Neereamer, chairman.

The presentation of these reports will be followed by the reading of the annual report of the secretary and treasurer and by the election and installation of officers for the ensuing year. The executive committee will meet immediately after adjournment.

At 6.30 p. m. on Feb. 24, an informal dinner will be given at the Miami Hotel for the members of the association and invited guests. The price for the dinner will be $2.50 per plate. The toastmaster will be Charles L. Henry. The address of welcome will be delivered by George W. Shroyer, Mayor of the city of Dayton. The speakers will include S. D. Hutchins of the Westinghouse Air Brake Company; Frederick H. Rike, president of the Greater Dayton Association; Arthur W. Brady, president of the Union Traction Company of Indiana, and ex-Governor James M. Cox, Dayton, Ohio. Those who plan to attend the dinner are requested to notify John F. Ohmer, Dayton, Ohio, of the number of plates they desire and to send check with their request.

Financial and Corporate

PHASES OF UTILITY ACCOUNTING

Division of Capitalization of Up-State New York Commission Points Out Its Practices Regarding Suspense Accounts and Security Issues for Replacements

The division of capitalization of the Public Service Commission for the Second District of New York in its report for the year ended Dec. 31, 1915, calls the attention of utilities to certain phases of accounting which will here be noted briefly. In the first place it is pointed out that steam railroads and to a less degree street railways have systematically subdivided their plant accounts, but for the majority of the remaining classes one or a very few plant accounts have sufficed. Now, however, many corporations are recognizing the shortcomings of too general records and are analyzing their plant accounts and thus making the commission's accounting rules retroactive. Charges improperly included in old undefined accounts are charged against surplus if such is large enough or with the commission's approval to a replacement suspense account to be amortized through income in accordance with a definite plan determined by the regulatory body.

In regard to depreciation the division except in security issuance cases has not passed upon the rules used by the utilities, but in such cases it has for each company considered the estimated accrued depreciation to date and recommended a definite rule to govern the establishment and maintenance of a reserve to cover the present deterioration and future accruals. When the sum of the accrued depreciation computed by the commission and the book value of the property retired but not written off exceeds the company's surplus and its reported depreciation reserve, the revised balance sheet would show a deficit, but the companies have been allowed to suspend such excess pending its elimination by annual income appropriations.

The division has recognized that the principle of equality between property investment and the securities against such is economically correct, but as a practical proposition it has believed that electrical corporations in particular should be allowed sufficient time, a period of years, in which to absorb early losses and in the meantime they could properly finance their development with additional stock or bonds. Hence companies have been allowed to issue securities for replacements, but they have been required to pay off such securities from earnings within a reasonable time or else acquire from earnings sufficient assets to make good their investment. It is said that this policy has enabled the utilities to continue service without interruptions from receiverships or reorganizations, to finance themselves at a minimum cost and to make them comparable to unregulated companies as far as the possibilities attendant upon external development are concerned.

RETURNS FOR RHODE ISLAND

In the preliminary annual report of the Rhode Island Public Utilities Commission for 1915 recently submitted to the Governor it was stated that the value of road and equipment reported by the street railway companies of the State was an increase of $2,107,975 over the preceding year, of which amount $640,812 was reported by the Rhode Island Company. The current assets reported by this company decreased, but the total assets increased $257,242.

The railway operating revenues of the Rhode Island Company amounted to $5,084,137, a decrease of $295,011, and the railway operating expenses totaled $3,438,274, a decrease of $985. The net operating income was $1,173,153, a decrease of $309,196, and the gross income was $1,294,909, which was a decrease of $332,099 from the amount reported the preceding year. The deductions from gross income amounted to $1,410,337, leaving a deficit of $115,428.

The only company operating cars within the State which paid a dividend was the Bay State Street Railway, and this company's dividend was a decrease of $564,223.

ANNUAL REPORT

Cleveland Railway

The statement of income, profit and loss of the Cleveland (Ohio) Railway for the year ended Dec. 31, 1915, follows:

I.—BASED ON ORDINANCE ALLOWANCES

		Cents per Car Mile
Operating revenues:		
Revenue from transportation	$8,386,801	
Revenue from operations other than transportation	81,680	
Total operating revenues	$8,468,481	26.11
Expense allowances:		
Maintenance allowance	$1,604,709	4.95
Operating expense allowance	4,035,065	12.44
Total expense allowances	$5,639,774	17.39
Net operating revenue	$2,828,707	8,72
Non-operating income	73,832	0.23
Gross income	$2,902,539	8.95
Taxes	488,064	1.50
Net income	$2,414,475	7.45
Interest	1,856,501	5.73
Surplus	$557,974	1.72
Special allowances	284,000	0.87
Net surplus	$273,974	0.85

II.—BASED ON DISBURSEMENTS

Operating revenue	$8,468,481	26.11
Actual expenses:		
Maintenance of way and structures	$902,108	2.79
Maintenance of equipment except power plant	714,632	2.20
Maintenance of power plant	90,972	0.28
Total maintenance	$1,707,712	5.27
Power	$738,580	2.28
Conducting transportation	2,526,961	7.79
Traffic	511	0.00
General and miscellaneous	808,950	2.49
Total operating expenses	$4,075,002	12.56
Total maintenance and operating expenses	$5,782,714	17.83
Net operating revenue	$2,685,767	8.28
Non-operating income	73,832	0.23
Gross income	$2,759,599	8.51
Taxes	488,064	1.50
Net income	$2,271,535	7.01
Interest	1,856,501	5.73
Surplus	$415,034	1.28
Obsolete equipment	209,000	0.64
Net surplus	$206,034	0.64

Of the above-stated total of $8,386,801 for revenue from transportation, passenger revenue accounted for $8,255,642. Exclusive of transfers the passenger revenue increased $266,129 or 3.68 per cent, while including transfers it increased $773,136 or 10.33 per cent. The gross income showed a gain of $806,636 or 10.43 per cent. The increase in maintenance allowance was $2,311 or 0.14 per cent, while the actual maintenance expenses decreased $220,726 or 11.45 per cent. The operating expense allowance increased $124,131 or 3.17 per cent, and the actual operating expenses gained $123,764 or 3.13 per cent. Taxes rose $21,068 or 4.51 per cent and interest $154,241 or 9.06 per cent. The total increases in operating expenses, taxes and interest amounted to $299,073 or 4.88 per cent, and the net increase in maintenance and operating expenses, taxes and interest was $78,347 or 0.97 per cent.

During the year the total number of fares increased $10,237,332 or 4.45 per cent, and rides 7,817,179 or 2.40 per cent, but transfers decreased 2,169,464 or 2.34 per cent. The ordinance car-miles (where the mileage of trail-cars is figured at 60 per cent of their actual mileage) increased 105,323 or 0.33 per cent, and the actual car-miles increased 393,597 or 1.17 per cent. The operating revenue per car-mile increased 2.31 cents, while the actual maintenance expenses per car-mile decreased 0.07 cent, and the actual operating expenses per car-mile increased 0.34 cent, taxes 0.06 cent and interest 0.46 cent.

During the first eight months of 1914 the rate of fare was "3 cents cash fare, 1 cent transfer and 1 cent rebate," but during the last four months of that year and in all of 1915 there was no rebate of the 1 cent charge for trans-

fers. Just what the effect of this change of fare was on the comparative figures is shown by the accompanying table of monthly totals:

MONTHLY PASSENGER REVENUE, PASSENGER REVENUE LESS TRANSFER RECEIPTS, AND FARES IN 1915, WITH INCREASES OVER 1914

	Passenger Revenue		Passenger Revenue Less Transfer Receipts		Fares	
Month	1915	% Inc.	1915	% Inc.	1915	% Inc.
January .	$635,853	8.57	$578,408	0.95*	18,431,753	2.04*
February.	587,867	11.01	534,307	1.18	17,052,978	0.04
March ...	672,839	12.55	611,925	2.66	19,527,042	2.23
April	669,967	10.61	609,049	0.86	19,391,440	0.49
May	707,024	9.26	641,214	0.56*	20,359,602	0.37*
June	700,575	12.38	635,284	2.23	20,455,054	4.11
July	715,337	11.01	648,963	1.04	20,820,989	2.99
August ..	711,069	12.33	645,261	2.28	20,669,652	4.41
Septebmer	690,185	6.31	626,267	6.05	20,145,282	7.60
October ..	736,559	9.01	669,241	8,79	21,570,476	10.19
November	704,033	11.55	640,685	11.40	20,673,166	12.96
December.	724,334	9.78	660,116	9.59	21,289,105	10.91
Total ..	$8,255,642	10.33	$7,500,720	3.68	240,386,539	4.45

*Decrease.

It is evident that the increases in the first eight months of 1915 over the corresponding months of 1914 were to a large extent due to the increased fare in the later periods, and the increases in the last four months of 1915 are a better indication of the real gain and the showing to be expected in 1916. The columns showing the number of fares are the most accurate measure of the increasing traffic enjoyed by the company during 1915 and most clearly indicate the good progress being steadily made. During the last four months of 1915 the company enjoyed a marked increase in travel, and the penny transfer charge promises to wipe out the allowance deficits if the city allows its continuance for that purpose. It may be noted that for October the earnings of the company were the largest in its history.

The interest fund was increased by surplus earnings of $45,546 in December, the balance in the fund at the end of the year being $542,652. The average maintenance allowance for the year was substantially 5 cents per car-mile. The allowance for December was about 4 cents per car-mile, and the December surplus was therefore considerably larger than it would have been if the allowance for the month had been equal to the average for the year. The increases in the interest fund from month to month have led some to hope that there might be a decrease in the rate of fare within a comparatively short time, but it has been said that the over-expenditure of the maintenance reserve, amounting at the end of the year to $593,149, ought first to be provided for from the interest fund.

During 1915 the company expended $1,975,896 for betterments. It is said to be impossible now to state how many new cars and motors will be required in 1916, for the City Council has entire control of the service. As stated in the ELECTRIC RAILWAY JOURNAL of Jan. 29, however, the track department has recommended, among various things, the renewal of about 28 miles of track at an estimated cost of $1,000,000 and the purchase of four automobile trucks, while the power department has recommended improvements totaling $507,840.

GOOD RECORD FOR NORFOLK & WESTERN

In regard to the operating results of the Norfolk & Western Railroad for the last half of 1915, the *Wall Street Journal* gives some particulars which are of especial interest on account of the electric service maintained between Bluefield and Vivian. During the six months mentioned, the road operated at a ratio of 56.8 per cent, as compared to 65.9 per cent for the same period of 1914. The train load has been steadily increasing from 635 tons in 1910 to 841 tons in 1915, and a gain is expected during the current year. The financial journal mentioned attributes a large part of the steady increase in train load to liberal expenditures for improvements, including the electrified section mentioned. The cost of electrification for this 30-mile section is said to be $3,600,000. Under electric operation one electric locomotive hauls the train with the aid of a pusher only on the steep grades, whereas, with steam, two Mallet type steam locomotives were used with a third as the pusher on the steep grades. The speed with the electric locomotives is practically double that of the steam operated train.

DES MOINES REFINANCING SETTLED

New Mortgage to Secure $15,000,000 of 5 per Cent Bonds, $3,483,000 to Be Now Issued—Old 5 Per Cent Bondholders Receive Favorable Preferential Offers

Under plans which have been completed for refinancing the Des Moines City Railway, which has accepted the new franchise described in the ELECTRIC RAILWAY JOURNAL of Jan. 29, page 205, a new mortgage will be made to secure a new issue of general and refunding mortgage 5 per cent twenty-year gold bonds. These will become first mortgage bonds upon the payment of the comparatively small amount of $367,000 of underlying bonds which will remain outstanding, the longest maturing in 1921. Under this financial plan, a total of $3,483,000 of bonds will be presently issued, and out of the proceeds of these the company is required to deposit $500,000 in cash with the trustee of the new mortgage to be expended for improvements and extensions.

The bondholders' committee for the old 5 per cent refunding mortgage gold bonds has made a contract with the railway, under which the owners of the $2,202,000 of bonds deposited with the committee are granted the opportunity to receive a full settlement in cash for their certificates of deposit, or the preferential right to purchase an amount of new bonds equal to the amount of their certificates of deposit at a lower price than that at which it is proposed the new bonds will be offered to the general public. The holders may exchange each $1,000 of certificates of deposit for $1,000 par value of new general and refunding mortgage bonds, bearing interest from Jan. 1, 1916, and receive a bonus of 5 per cent ($50) in cash and, in addition, $64.17 in cash, which is the amount of interest on the old bonds to Jan. 1, 1916, and interest on overdue interest to March 1, 1916. Or they may receive payment in full in cash for principal and interest and interest on overdue interest to March 1, 1916.

The committee, in so far as it personally owns or represents the owners of certificates of deposit, has elected to accept settlement in new bonds and cash, and recommends the same course to the other depositing bondholders. All holders of certificates of deposit are required to elect, prior to Feb. 26, 1916, whether they will accept part bonds and part cash or prefer to receive a full cash settlement. In view of the favorable terms, the committee, in so far as no preference is expressed prior to Feb. 26, will exchange the old bonds for new bonds and cash, and will hold such for delivery to the holders of certificates of deposit.

The committee has consented to the discharge of the receiver of the railway and the dismissal of all suits against the city of Des Moines, entered on behalf of the bondholders, and the committee has waived all defaults under the mortgage securing the bonds.

All the $2,202,000 now deposited under the control of the committee will be deposited as part of the security for the new issue, as will any additional underlying bonds which may be acquired. In case the amount of underlying bonds is reduced, there will be a corresponding increase in the amount of the new issue. The new bonds will be dated as of Jan. 1, 1916, will be due Jan. 1, 1936, and will be redeemable on any interest payment date at 105 and interest. The total authorized issue will be $15,000,000, with the provision that bonds may be issued to refund the underlying bonds, and $1,000,000 of additional bonds may be issued for the full cost of rehabilitation, extensions and additions. The remaining bonds, amounting to $10,150,000, may be issued for 80 per cent of the cost of further extensions and additions, but no bonds in excess of the amount to be issued forthwith can be issued except when the net earnings for the preceding twelve months have been equal to at least one and three-quarters times the annual bond interest charge.

The Harris Trust & Savings Bank, Chicago, has contracted to purchase from the railway whatever bonds are not taken by the old bondholders, and later on expect to offer these to the general public at a price higher than the 95 and interest price at which the bonds are now offered to the old bondholders.

Columbus Railway, Power & Light Company, Columbus, Ohio.—E. W. Clark & Company, Philadelphia, Pa., and Kissel, Kinnicutt & Company, New York City, are offering at 97 and interest $3,500,000 of first refunding and extension sinking-fund mortgage 5 per cent gold bonds of the

Columbus Railway, Power & Light Company, dated April 1, 1915, and due Oct. 1, 1940. The bonds are part of an authorized issue of $25,000,000, of which $3,500,000 will be outstanding upon the sale of the new bonds, $41,900 in the treasury, $6,654,700 are reserved to retire underlying liens, and the balance are reserved for additions and improvements at 85 per cent of the cash cost or fair valuation, whichever is less, but only when net earnings for the preceding twelve calendar months are twice the interest charges on all bonds outstanding, including those applied for. Of the present issue $1,552,900 will be used to retire underlying bonds, $1,439,000 for construction now completed, $250,000 for future construction and $300,000 for working capital.

Empire United Railways, Inc., Syracuse, N. Y.—The bondholder's protective committee, of which Arthur W. Loasby is chairman, has notified the holders of the Rochester, Syracuse & Eastern Railroad first mortgage 5 per cent bonds that $3,544,000 in bonds have been deposited out of $4,896,000 outstanding and that after Feb. 15 no bonds will be received for the protective agreement except by special permission.

Fostoria & Fremont Railway, Fostoria, Ohio.—Luce & Company, Boston, Mass., and Portland, Me., are offering at 93½ and interest $200,000 of first mortgage 5 per cent gold bonds of the Fostoria & Fremont Railway of 1910, due on Oct. 1, 1930.

Gary & Interurban Railroad, Gary, Ind. — The Supreme Court of Indiana has affirmed the decision of the Circuit Court of La Porte County in the case of Ferdinand Raff et al. versus the officers and directors of the Gary & Interurban Railroad. The case was brought by Raff and others to restrain the directors from merging the Gary & Interurban Railroad with other interurban lines in Indiana. Judge Tuthill of the La Porte County Circuit Court decided against Mr. Raff and sustained the merger. The case was then appealed by Mr. Raff to the Supreme Court.

Interborough Rapid Transit Company, New York City.—The Manhattan Railway is offering for sale $4,523,000, out of a total authorized issue of $5,409,000, of its second mortgage 4 per cent gold bonds, due on June 1, 2013, secured by its second mortgage made to the Equitable Trust Company of New York, as trustee, dated June 1, 1913, interest payable June 1 and Dec. 1. This mortgage was consented to and the issuance of these bonds authorized by order of the Public Service Commission for the First District, dated Feb. 3, 1916. Sealed proposals for the purchase of the whole or any part of the bonds will be received on or before Feb. 17, 1916. The bonds are to be issued to reimburse the Interborough Rapid Transit Company, the lessee of the lines, for permanent improvements made to the elevated structure.

Lima & Honeoye Light & Railroad Company, Lima, N. Y.—The Buffalo House Wrecking & Salvage Company, Buffalo, N. Y., bought the physical property of the Lima & Honeoye Light & Railroad Company for $14,380 at foreclosure sale held in Rochester, N. Y. The property includes two street cars, rails, ties, trolley and feeder wires, power house, engines, boilers and generators and the carhouse in Lima, N. Y. The latter is a frame structure 40 ft. x 60 ft. and the power house near Lima is a brick building 60 ft. x 100 ft. The road extends 4½ miles from Honeoye Falls to Lima. The right-of-way was sold for $25 and the lighting system brought $7,500. Isaac Joffee was referee.

Little Rock Railway & Electric Company, Little Rock, Ark.—J. R. Vinson, president of the Southern Trust Company, has been elected a director of the Little Rock Railway & Electric Company.

Northern Ohio Traction & Light Company, Akron, Ohio.—The Northern Ohio Traction & Light Company has applied to the Ohio Public Utilities Commission for authority to issue $518,400 of 6 per cent preferred stock, to be sold at not less than 95, the proceeds to be used for extensions of the generating capacity of the company, and for additions and betterments to its properties. It is said that officials of the company are working on details of a general mortgage covering all properties of the company to provide for future refunding and financing of improvements and extensions. The company has been financing its requirements by the issue of 6 per cent preferred stock, of the authorized amount of which $1,500,000 remains unissued. When the full amount of this stock has been sold it is the intention of the company to do all future financing by the sale of general and refunding bonds. With the refunding of underlying bonds and the inclusion of property now covered by them into the corporate organization of the Northern Ohio Traction & Light Company the general mortgage will become a first lien.

Philadelphia (Pa.) Rapid Transit Company.—The holders of the voting trust certificates of the Philadelphia Rapid Transit Company have expressed a desire that the Stotesbury management shall be continued and the voting trust agreement extended for a further period of five years. Accordingly an agreement supplemental to the original voting trust agreement of Feb. 20, 1911, has been prepared and is on file at the office of the Fidelity Trust Company, Philadelphia, agent for the voting trustees. The present trustees are Arthur E. Newbold, George H. McFadden and William P. Gest, and they have agreed to continue to act in their present capacity, provided the holders representing a substantial majority of the voting trust certificates or shares of the stock consent to the extension. Under the original voting trust agreement $22,853,900 of $30,000,000 of capital stock of the company was pledged.

Pittsburgh (Pa.) Railways. — The United Traction Company has again failed to pay the semi-annual dividend of 2½ per cent on its $3,000,000 of preferred stock. The protective committee which was formed in February, 1915, when the company first passed its dividend, has been reorganized with the addition of Howard A. Loeb and Charles Biddle, Philadelphia. Holders of the preferred stock are asked to deposit their stock with the Philadelphia Trust Company. All the $17,000,000 of common stock of the United Traction Company is owned by the Pittsburgh Railways, which is controlled by the Philadelphia Company.

Schenectady (N. Y.) Railway.—The Schenectady Railway has called for redemption on March 1 the $2,000,000 of outstanding first mortgage 4½ per cent forty-year gold bonds of Sept. 1, 1901, at 110 and accrued interest, to be paid at the Banker's Trust Company, New York City.

Seattle, Renton & Southern Railway, Seattle, Wash.—Judge Frater in the King County Superior Court has allowed a claim of $140,000 held by the Puget Sound Traction, Light & Power Company against the Seattle, Renton & Southern Railway for power furnished. Judge Frater has denied the motion directing the receivers to appeal to the Supreme Court from the decision of Judge Ralph C. Kauffman, who found the Seattle, Renton & Southern Railway hopelessly insolvent.

Southern Iowa Railway & Light Company, Albia, Iowa.—The sale of the property of the Southern Iowa Railway & Light Company under foreclosure which was postponed from Dec. 18, 1915, was held on Jan. 20. The purchaser was Charles Smallwood, representing the eastern bondholders.

United Railroads, San Francisco, Cal.—In a statement which he issued on Jan. 31, Charles N. Black, vice-president and general manager of the United Railroads, said: "Our receipts for January, 1916, show an enormous decrease as compared with the same month for the last four years. Our maintenance charges have been reduced to a minimum, and the only possible saving in operating expenses lies in the curtailment of service. If this is found to be necessary it will be entirely due to the unregulated competition of the jitney buses. I desire to impress upon every man in the service of the company with all the force in my power the seriousness of the present situation, and I appeal to every one of you to help solve the problem."

United Railways & Electric Company, Baltimore, Md.—The directors of the United Railways & Electric Company have authorized an issue of $2,750,000 of five-year 5 per cent notes subject to approval by the Public Service Commission. The proceeds of the issue are intended to take care of all the larger financing of the company for the next five years, including the payment and retirement of $500,000 of Baltimore, Catonsville & Ellicott's Mills first mortgage 5 per cent bonds, due on July 1, 1916, and $1,000,000 of two-year 5 per cent notes due on June 1, 1916. As the company has no floating debt the sale after payment of the bonds and notes will leave the company with the proceeds of $1,250,000 in notes to take care of improvements. The Safe Deposit & Trust Company will be the trustee, and the principle and interest of the notes will be payable at the banking house of Alexander Brown & Son, fiscal agents for the company. The notes will be dated Feb. 1, 1916, and will mature on Feb. 1, 1921, but will be redeemable in part or whole at any time upon thirty days' notice at 101 and interest. They will be in the denomination of $1,000. M. Ernest Jenkins, Baltimore, has been elected a director of the company to succeed H. Crawford Black, resigned, and J. E. Aldred, who is chairman of the board of the Consolidated Gas, Electric Light & Power Company and the Pennsylvania Water & Power Company, has been elected a member of the executive committee to succeed Mr. Black.

DIVIDENDS DECLARED

Boston (Mass.) Elevated Railway, quarterly, 1½ per cent.

Detroit (Mich.) United Railway, quarterly, 1½ per cent.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1½ per cent, original preferred; quarterly, 1½ per cent, first preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.					
1m., Dec., '15	$67,306	*$34,478	$32,828	$17,606	$15,222
1 " " '14	65,509	*29,753	35,756	17,462	18,294
12 " " '15	788,832	*400,510	388,322	212,495	175,827
12 " " '14	777,752	*375,219	402,533	209,122	193,411
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.					
1m., Dec., '15	$105,343	*$63,836	$41,507	$29,784	$11,723
1 " " '14	89,012	*66,141	22,871	29,337	†6,466
12 " " '15	1,087,344	*727,731	359,613	357,762	1,851
12 " " '14	1,085,096	*699,723	385,373	339,409	45,964
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
1m., Dec., '15	$300,315	*$164,527	$135,788	$41,189	$94,599
1 " " '14	278,561	*151,427	127,134	40,048	87,086
12 " " '15	3,113,175	*1,846,437	1,266,738	476,281	790,457
12 " " '14	3,066,298	*1,886,746	1,179,552	479,460	700,092
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.					
1m., Dec., '15	$1,475,889	*$760,857	$715,032	$405,890	$309,142
1 " " '14	1,341,385	*666,266	675,119	372,263	302,856
12 " " '15	14,590,124	*7,788,455	6,801,669	4,506,082	2,295,587
12 " " '14	14,006,484	*7,549,898	6,456,586	4,212,852	2,243,734
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.					
1m., Dec., '15	$224,254	*$139,223	$85,031	$65,706	$19,325
1 " " '14	203,510	*124,269	79,241	62,523	16,718
12 " " '15	2,636,364	*1,505,787	1,130,577	792,414	338,163
12 " " '14	2,513,620	*1,457,020	1,056,600	758,859	297,741
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.					
1m., Dec., '15	$238,667	*$141,274	$97,393	$62,982	$34,411
1 " " '14	215,997	*108,860	105,137	71,748	33,389
12 " " '15	2,466,969	*1,473,592	993,377	756,315	237,062
12 " " '14	2,623,827	*1,616,214	1,007,613	701,949	305,664
GRAND RAPIDS (MICH.) RAILWAY					
1m., Dec., '15	$112,010	*$74,316	$37,694	$12,475	$25,219
1 " " '14	125,913	*64,732	61,181	12,162	49,019
12 " " '15	1,176,450	*832,799	343,651	165,187	178,464
12 " " '14	1,286,568	*829,637	456,931	161,778	295,153
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.					
1m., Dec., '15	$57,929	*$40,889	$17,040	$15,942	$1,098
1 " " '14	50,073	*38,657	11,416	15,634	†4,218
12 " " '15	737,850	*475,422	262,428	189,839	72,589
12 " " '14	676,922	*467,809	209,113	186,417	22,696
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., Dec., '15	$204,364	*$116,881	$87,483	$42,946	$44,537
1 " " '14	197,278	*111,055	86,223	31,079	55,144
12 " " '15	2,143,903	*1,318,834	825,069	510,587	314,482
12 " " '14	2,240,308	*1,353,732	886,576	499,671	386,905
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., Dec., '15	$482,938	*$255,280	$277,658	$182,824	$44,834
1 " " '14	514,493	$255,483	259,010	182,974	76,036
12 " " '15	5,511,345	*3,073,628	2,437,717	2,208,356	229,361
12 " " '14	6,273,171	*3,263,883	3,009,288	2,172,678	836,610

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*Includes taxes. †Deficit.

Traffic and Transportation

NOT ALL BUS COMPETITION UNJUST

Commission Allows Motor Bus Operation for Through Routes—Cannot Carry Local Passengers Between City Points

The Public Service Commission for the Second District of New York on Feb. 4, upon an opinion by Commissioner Devoe P. Hodson, holds in effect that where a bus line operates partly within and partly without a city, the public convenience and necessity sought to be satisfied by such operation must be considered by the commission to include the territory outside the city as well as that inside, though the statute as it at present stands limits the authority of the commission over the operation of bus lines to cities.

LeRoy D. Becraft asked for approval of a bus route through the streets of Corning and continuing outside the city to the village of Painted Post. James F. Adams submitted a similar application for a route to the New York Central shops outside of Corning. The commission has approved both routes over the objection of the Corning & Painted Post Street Railroad, though it exacts the condition that neither line shall carry local passengers from point to point within the city.

These two cases were heard and decided together and Commissioner Hodson says that the convenience and necessity which are sought to be satisfied in these cases are not confined to the residents of Corning alone, but relate also to the public generally, in so far as the through routes of the petitioners are required for continuous transportation into and through the city, and that the limitation of the present law to the streets of the city does not preclude the consideration of proposed routes in their entirety. This is particularly so as in the present case, where it is made to appear that suburban travel over a part of the line is not properly accommodated unless the same can be continued over the city streets.

Of the objection of the electric railway that the granting of the certificate would interfere with its rights as an already established common carrier, Commissioner Hodson says that though it is the function of the commission to prevent to the full extent of its powers all unjust competition with, and unfair assaults upon, the business and invested capital of a public service corporation, yet this rule cannot be so extensive in its operation that all competition shall be considered unjust, or that for one to engage in a perfectly legitimate undertaking shall be considered as invading the vested rights of another public utility.

SEDALIA SOLICITS TRACTION BUSINESS

Gas and Electric Canvassing Methods Utilized to Increase Street Railway Usage

The City Light & Traction Company, Sedalia, Mo., operated by Henry L. Doherty & Company, has started a novel movement in soliciting street railway business by means of a house to house canvass. This practice has long been in use by gas and electric companies for the purpose of securing both good-will and additional business, but this is thought to be the first case of the kind where it has been used by a railway. Harry D. Frueauff, general manager, in a recent letter describes the plan as follows:

"We have started on a new stunt which we trust will produce results. It is a house to house canvass on the traction department. We have prepared some blotters giving the time-table of the cars as the calling card for our solicitor and as a means of opening up a conversation. His efforts will be devoted to finding out in what way the street car schedules or conditions do not meet the views of the patrons. He will also make a special effort among the laboring class to have them lay aside a certain amount each pay day to be invested in tickets. His time will be spent in outlying districts from which we get our travel.

"I think the plan will work out satisfactorily, for I know we have always made friends and customers for the gas and electric departments by canvassing and finding out the causes of complaints and then showing patrons that we are interested in correcting them. I see no reason why this should not work out to advantage in the traction department. We have found that many laboring people buy a few tickets at pay day and when these are gone they walk. I am hopeful that we can get them to invest more by calling to their attention the saving to be made."

Accident in Ohio.—A collision between a passenger car and a freight car on the Youngstown & Southern Railway just south of Youngstown, on Feb. 3, resulted in the injury of about twenty people.

Bay State Fare Hearings Resumed.—The Massachusetts Public Service Commission gave a continued hearing in the Bay State Street Railway fare case on Feb. 8. The entire day was devoted to the presentation of financial and engineering evidence supplementing testimony already heard. A résumé of the proceedings, which included an exhaustive study of the cost of rush-hour service, will be printed in a later issue.

Skip-Stop Recommended for Dallas.—The use of the skip-stop system in the business district has been recommended by Prof. E. W. Bemis, employed by the city of Dallas, Tex., to report on means for relieving traffic congestion. The Dallas Consolidated Electric Street Railway and the Northern Texas Traction Company have both expressed their willingness to adopt this practice if the city officials approve it.

Hearing on One-Man Car Operation.—Bentley W. Warren, Boston, counsel for the Massachusetts Street Railway Association, appeared before the legislative committee on street railways, on Feb. 3, in support of a bill to allow street railways to operate one-man cars, subject to the approval of the Public Service Commission. Mr. Warren stated that operation in accordance with the provisions of the bill would reduce operating costs in sparsely settled districts.

Accident Fakers Indicted.—The grand jury of Jackson County, Mo., recently returned indictments against four persons on the charge of making fake claims against the Metropolitan Street Railway, Kansas City, for damages. Two of the indicted persons were women, who had alleged that they had been injured, and had settled with the claim agent. One of those indicted was the lawyer who worked up the case; the other a man who testified to the grand jury that he had seen the women while they were lying injured on the street after the accident.

Portland Jitney Ordinance Enforceable.—The new jitney ordinance in Portland, Ore., is now enforceable. The mandate of the Supreme Court, in which the jitney ordinance was held valid, has been filed in the Circuit Court, and the judgment of the upper court has been made the judgment of the lower court and enforcement has been started. It is reported that up to Jan. 21 ninety-six jitney drivers appeared before Jitney Inspector Gill for permits. Of this number, forty machines were found safe and the drivers capable. The others will be re-examined as soon as certain defects are corrected.

Strip Ticket Order in Trenton Affirmed.—Judge Buffington has filed an opinion in the United States Appellate Court affirming the decision of the New Jersey District Court, which refused to grant the application of the Trenton & Mercer County Traction Corporation, Trenton, N. J., for a preliminary injunction to restrain the Board of Public Utility Commissioners from enforcing an order for the continued sale of the six tickets for 25 cents. The case will again be before the court on final hearing. The history of this case was reviewed briefly in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1915, page 1236, and Dec. 25, 1915, page 1258.

One-Man Cars Likely in Seattle.—The Puget Sound Traction, Light & Power Company, Seattle, Wash., has addressed a communication to the Public Service Commission relative to the establishment of one-man cars on some of the lines in Seattle. Commission members have not stated what their attitude will be in the matter, but have intimated that a thorough investigation will be made at an early date. The establishment of a one-man car service on one of the lines in Olympia was followed by a formal complaint to the commission. The result was that two men were placed back on the cars, pending an investigation.

Fifteen Per Cent Increase in Speed in Cleveland With Skip Stop.—In its pamphlet report for the year ended Dec. 31, 1915, the Cleveland (Ohio) Railway said in regard to the skip stop: "With the co-operation of Mr. Witt—indeed, on his initiative—a so-called skip-stop system has been put into effect on substantially all the lines of the company. Its adoption has resulted in a very material decrease in operating cost per car-mile. The average speed of our cars in 1911 was 9.6 miles in the base-table hours, 9.6 miles in the rush hours and 9.6 miles at night. In 1915 the average speed was 11 miles in the base-table hours, 10.2 miles in the rush hours and 11.5 miles at night. This is an increase of nearly 15 per cent." Mr. Witt was street railway commissioner of Cleveland, but relinquished his office on Dec. 31.

Petitions for 6-Cent Fare in Rhode Island.—A petition has been filed with the Rhode Island Public Utilities Board by the Bay State Street Railway, Boston, Mass., asking for authority to increase fares to 6 cents on all the lines of the road in the former State. In its petition the company states that its financial condition demands an increase in fares, and in the general lines of reasoning the company's request follows the petition now before the Massachusetts Public Service Commission. It is proposed to readjust all existing fares and to nullify all reduced-rate tickets other than those sold to school children. The principal city affected will be Newport, the interurban fare from Newport to Fall River being increased from 25 cents to 30 cents by the proposed tariff. The company desires to place the new rates in effect on March 6, 1916, but a number of public hearings will be required before that time.

Longport Demands Cars or Jitneys from Atlantic City.—The City Commissioners of Atlantic City, N. J., a pro-jitney body, disposed of one phase of Atlantic City's trolley-jitney problem when they refused to bond, route and otherwise regulate the licensed jitneys in that city to afford the Atlantic City & Shore Railway some form of serious protection. Disconcerting evidence of that developed recently when Longport at the lower end of the Island, appealed to the City Commission to do something to save that resort from disastrous consequences of Atlantic City's pro-jitney policy. Longport's board of rulers sent to the Atlantic City Commission resolutions charging that the failure of the latter to regulate there has forced the Atlantic City & Shore Railway to limit and curtail its service to Ventnor, Margate and Longport, greatly inconveniencing inhabitants. The Longport authorities ask that Atlantic City take immediate steps whereby the electric railway may be able to mantain adequate service to the lower beach.

Further Advertising of Louisville's Suburban Lines.—By means of display advertisements and reading notices inserted in the Louisville newspapers, the Louisville & Southern Indiana Railway and the Louisville & Northern Railway & Light Company are endeavoring to stimulate incidental or tourist travel in the winter months. "Loop the Loop for Sight-Seeing" is one of the catchy phrases used, while the companies' standing slogan, "Take the Big Red Car," is also in evidence. As noted some time ago, when the Ohio River was at flood stage, the companies carried such advertising. Now, however, the scenic possibilities of the loop trip are emphasized in the reading notices also. These refer to the view from the top of Silver Hills, to the new waterworks under construction, to the Howard ship yards where oxen are still used in moving timbers, to the Government's quartermaster's depot and to the various manufacturing plants and points of interest which are to be reached readily from the lines of the companies. In each case directions are given as to taking the cars and the time of leaving the station.

Mayor Cited for Contempt in Jitney Case.—Counsel for the jitney men of Houston, Tex., have filed a petition with Judge William Masterson of the Fifty-fifth District Court asking that Mayor Ben Campbell and the City Commissioners be cited for contempt of court for alleged violation of the court's orders in the original jitney suit. Judge Masterson, in the suit of Steve McCormack, et al., vs. Mayor Ben Campbell et al., in the spring of 1915, held that the city ordinance then in force, requiring a $10,000 bond, was unconstitutional, as jitneys could not be made insurers of passengers. At that time the city agreed to change the ordinance to eliminate this feature. Now by requiring a $2,500 bond in the latest ordinance counsel for the jitneymen declare the city is violating the letter of Judge Masterson's order. The court is asked to enter the judgment "now for then," in which case the bond feature of the present ordinance would be eliminated, meanwhile the temporary injunction granted in the case of G. W. Beardsley et al., against the city still stands, pending a decision of the Supreme Court in the San Antonio jitney case.

Louisville "Jim Crow" Measure Reported.—The "Jim Crow" bill, fathered by Senator Knight of Louisville, has been favorably reported by committees to both House and Senate of the Legislature, amended, however, so as to make it apply only to Louisville, "cities of the first class." Since the introduction of the measure conductors of the Louisville Railway have been taking a census of their passengers. The reports show that there is no uniformity of ratio in the travel, the same cars at different stages of their routes being occupied first by a majority of one and then by a majority of the other race. There is equal diversity of proportions at various hours of the day. This promises, it is stated, to make the provision of the bill requiring the conductor to change the dividing line to separate the whites and blacks, as conditions require, a constant cause of friction. There is much opposition to the bill in Louisville.

Springfield Service Improvements.—C. V. Wood, president of the Springfield (Mass.) Street Railway, has announced that before March 1 a number of important changes in car routeing will be placed in effect in the business district to relieve congestion on Main Street and provide additional facilities for rapid transit. Five routes will be diverted from Main to Dwight Street, a parallel thoroughfare to the eastward, and in the evening rush hour forty extra cars will be run via Dwight Street, besides fifty-seven extras on Main Street. At present ninety-seven extra cars are operated on Main Street in this period, only five extras being run through Dwight Street. Between 5 and 6 p. m. at present 130 regular cars are operated through Main Street and twelve through Dwight Street. Under the new schedule 110 regular cars will be operated through Main Street and forty through Dwight, making an increase of eight regular cars on the two streets. Other minor changes in routeing will be adopted. Prof. Albert S. Richey of the Worcester Polytechnic Institute has been in consultation with the company's officials relative to the redistribution of traffic. A new type of transfer designed by Robert E. Cosgrove, freight and passenger agent, will shortly be placed in use at Springfield.

Modification of Car Flash Signal.—The Public Service Commission of the Second District of New York, after a long test of an experimental signal system prescribed to it for the Schnectady-Albany cars in response to the complaint of the Colonie Improvement Association and others, has agreed to the modification of the system. A year ago, upon complaint of residents of Colonie that the Schenectady cars would pass persons desirous of boarding them at stations, the commission ordered the company to equip part of its line with a signal light which could be operated by the prospective passenger from the station and which would show some distance up the track. It also ordered that the lighting facilities at the stations be improved. The operatives of the railway, under the supervision of the commission's experts, now report that the signal light and the lights for illumination at the station have proved confusing. They assert that the new lights for illumination at the stations are of sufficient brilliance readily to reveal persons waiting for the cars, and that furthermore these lights have been equipped with a switch, accessible to the person waiting, with which the lights can be turned on and off to signal a car to stop. In view of all these circumstances the commission has permitted the railway to discontinue its experiments with the signal lights ordered last spring, as it considers the facilities now installed ample to assure the stopping of any car at any station.

Personal Mention

Mr. **C. W. Blackington** has been appointed general foreman of the Memphis (Tenn.) Street Railway.

Mr. **George W. Wilson**, treasurer of the International Railway, Buffalo, N. Y., has been elected secretary of the company, to succeed Mr. John A. McKenna, resigned.

Mr. **F. T. Leversuch** has resigned as general manager of the London & Port Stanley Railway, the London-owned hydro-radial line running between London and Port Stanley, Ont.

Mr. **John A. McKenna**, secretary of the International Railway, Buffalo, N. Y., has resigned to accept the position of secretary of the United Gas & Electric Corporation, New York City.

Mr. **Charles D. Bell** has resigned as secretary, superintendent and chief engineer of the Arkansas Valley Interurban Railway, Wichita, Kan., to engage in business for himself in that city.

Mr. **D. P. Abercrombie, Jr.**, who has been secretary and treasurer of the Connecticut Valley Street Railway, Greenfield, Mass., has been elected vice-president and general manager of the company.

Mr. **A. D. McWhorter**, master mechanic of the Memphis (Tenn.) Street Railway, has also been made superintendent of overhead lines, taking over in part the work of E. D. Martinez, electrical engineer, deceased.

Mr. **C. Elmer Bown** has been selected by the finance committee of the City Council of Pittsburgh, Pa., as street railway expert to assist in deliberating upon the transit situation in that city. Mr. Bown is a lawyer by profession.

Mr. **J. J. Dempsey**, superintendent of transportation of the New York Consolidated Railroad, Brooklyn Rapid Transit System, and president of the New York Electric Railway Association, has been elected a director of the company.

Mr. **Charles W. Hazelton** has been elected president of the Connecticut Valley Street Railway, Greenfield, Mass., to succeed Gen. F. E. Pierce, resigned. Mr. Hazelton is a director of the Turners Falls Power Company and the Crocker National Bank, Turners Falls, and is at the head of a manufacturing business in Montague City.

Mr. **J. E. Aldred**, chairman of the boards of Consolidated Gas, Electric Light & Power Company and Pennsylvania Water & Power Company, has been elected a member of the executive committee of the United Railways & Electric Company, Baltimore, Md., to succeed Mr. H. Crawford Black, who recently resigned as a director of the company.

Mr. **Ralph M. Henderson**, until recently manager of the Albuquerque (N. M.) Traction Company, has assumed the position of general manager for the New Mexican Company, succeeding Mr. R. P. March. Previous to his recent position in Albuquerque Mr. Henderson was for years connected with newspapers in Albuquerque, El Paso and other cities in the Southwest.

Mr. **Allan F. Edwards**, vice-president in charge of purchases of the Detroit (Mich.) United Railway, to which position he was appointed in 1913 by the management, was formally elected vice-president of the company by the board of directors at the recent annual meeting. His duties as treasurer and head of the purchasing department have not been changed, but his title now is vice-president and treasurer. A portrait and a biography of Mr. Edwards were published in the ELECTRIC RAILWAY JOURNAL of Oct. 25, 1913.

Gen. **F. E. Pierce** has resigned as president of the Connecticut Valley Street Railway, Greenfield, Mass. General Pierce has long been prominent in public life. He was connected with the First National Bank, Greenfield, for eleven years, and was postmaster of Greenfield for twenty years. He had been president of the Connecticut Valley Street Railway since its organization. He served in the Massachusetts Militia for more than twenty-five years, retiring about two years ago with the rank of Major-General. During the Spanish-American War he commanded Company L, of the Second Regiment, and participated in the battles of El Caney, San Juan and Santiago de Cuba.

Mr. Travis H. Whitney, secretary of the Public Service Commission for the First District of New York and just appointed by Governor Whitman to be a member of the commission, was tendered a complimentary luncheon on Feb. 3. Fourteen of a party sat down at table, and Chairman Oscar S. Straus attended. The toastmaster was Mr. George S. Coleman, counsel of the commission. Chairman Straus made a short address, in which he spoke most highly of Mr. Whitney's ability and character, and said he was glad to welcome him to the commissionership. Mr. Whitney was addressed by each of the guests in turn, all of whom have been closely associated with him in his work. At the close he expressed his appreciation in a few words.

Mr. A. J. Bemis, Chicago, will hereafter make his headquarters in St. Cloud, in charge of the A. G. Whitney interests, as general manager of the St. Cloud Public Service Company, the Union Power Company and the Light & Power Company of St. Cloud, Minn. The St. Cloud Public Service Company embraces the electric, gas and street railway enterprises in St. Cloud, Sauk Rapids and Waite Park. The other two companies operate in about twenty other towns, including Brainerd, Annandale, Paynesville, Cokato, Maple Lake, Dassel, Howard Lake, Eden Valley, Watkins, Kimball, Waverly, Rockville, St. Joseph, Richmond and Cold Springs. Additions to the hydroelectric plant of the company are contemplated, which may mean the construction of an additional power house on the Mississippi River. Mr. Bemis will retain his connection with the Vicksburg Light & Traction Company at Vicksburg, Miss., and the Mineral Point (Wis.) Public Service Company, and will continue to act as consulting engineer with the various banking interests with which he has been associated.

Mr. Philip J. Kealy, who has been serving as the company's representative on the board of control provided for by the new franchise granted to the Metropolitan Street Railway, Kansas City, Mo., has been elected president of the successor company, the Kansas City Railways, to succeed Mr. John M. Egan, who assumed the presidency of the company in 1910 with the understanding that he should be permitted to retire upon the completion of the rehabilitation. Mr. Kealy was born in Bloomington, Ill., on July 2, 1884. He was educated at the Lewis Institute and the University of Illinois, and was then engaged by the Board of Supervising Engineers, Chicago Traction, and in the capacity of field engineer made the survey for most of the crossings on the north and west sides of the city. From 1907 to 1914 he was in the service of Mr. Bion J. Arnold and took part in much of the important valuation work undertaken by Mr. Arnold, including the valuation of the property of the Chicago Consolidated Traction Company, and had a prominent part in the preparation of the Chicago traction report. He was assistant in charge of the valuation of the Seattle (Wash.) Electric Company, the International Traction Company, Buffalo, N. Y., the Chicago Suburban Railway, the Chicago (Ill.) Suburban Railway, the Toronto (Ont.) Railway, the Chicago Telephone Company, and the Metropolitan Street Railway, Kansas City. In 1912 he prepared in connection with the reorganization of the International Traction Company, Buffalo, N. Y., an analysis of the company's capital expenditures for the previous eleven years which was approved in toto by the Public Service Commission for the Second District of New York. His work as Mr. Arnold's assistant in the valuation of the property of the Metropolitan Street Railway, Kansas City, began in 1912 and upon its completion he was retained as engineering adviser to the receivers in the franchise negotiations that followed, being with Mr. L. R. Ash, city engineer of Kansas City, author of the Kealy-Ash plan of settlement. He was subsequently named as the company's representative on the board of control provided for in the new grant. The Metropolitan Street Railway operates 263 miles of line in Kansas City, Mo., and in Kansas City, Kan., and Mr. Kealy is the youngest president of so extensive a property in the United States. It is announced that in addition to president of the company he will continue as its representative on the board of control. A portrait of Mr. Kealy was published in the ELECTRIC RAILWAY JOURNAL of Feb. 5, page 267, in connection with the address "What Constitutes Utility Values?" made at the mid-year meeting of the American Electric Railway Association in Chicago on Feb. 4.

Photo by Gilbert & Bacon

W. S. TWINING

Mr. William S. Twining has been appointed director of the department of city transit of Philadelphia, Pa., by Mayor Smith of that city to succeed Mr. A. Merritt Taylor, resigned. Since 1910, when he resigned as chief engineer of the Philadelphia Rapid Transit Company, Mr. Twining has been connected with Ford, Bacon & Davis, New York City, on important work on heavy electric traction and power development in the neighborhood of large cities, and for more than two and one-half years he has been, through his connection with Ford, Bacon & Davis, consulting engineer to the department of city transit of Philadelphia. Mr. Twining was chief engineer of the Philadelphia Rapid Transit Company and of its predecessor, the Union Traction Company of Philadelphia, from the time of the organization of the latter company in 1895 until 1910, and is one of the best-known electrical and mechanical engineers in this country. It was under his direction and supervision that the Market Street subway and the elevated railway in Philadelphia were built. Mr. Twining was born on Feb. 20, 1865, and was graduated from Allegheny College with the degree of C. E. in 1887. He acted as instructor in physics and engineering in Allegheny College for three years following his graduation and then entered the employ of the railway engineering department of the Thomson-Houston Company, Boston, Mass., for which he had charge of electric railway construction in Indianapolis and Toledo. In the latter part of 1891 he assisted in equipping the Harlem Bridge, Morrisania & Fordham Railway, now a part of the Union Railway, New York City, with electricity, and in the following year was one of the engineers in charge of the electrical equipment of the Atlantic Avenue Railway, now a part of the Brooklyn (N. Y.) Rapid Transit System. In 1893 he was appointed assistant to the chief engineer of the People's Traction Company, Philadelphia, and while connected with that road was largely responsible for the design of the Delaware Avenue power station. Mr. Twining is a member of the American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society of Civil Engineers, Franklin Institute of Philadelphia and the American Electric Railway Association. Mayor Smith in commenting on the appointment said: "Mr. Twining has been engaged with Mr. Taylor in the present transit plans, and virtually is a part of the department of city transit. Mr. Taylor was among those who recommended Mr. Twining. I consider him the ablest man I could get for the place. So far as his politics is concerned, I do not know whether he is Republican, Democrat or mugwump."

OBITUARY

G. G. Sutherland, vice-president of the Arkansas Northwestern Railroad, is dead.

E. D. Martinez, electrical engineer of the Memphis (Tenn.) Street Railway, is dead.

Howard A. Foushee, vice-president and counsel and one of the organizers of the Durham (N. C.) Traction Company, operated by Henry L. Doherty & Company, died at his home in that city on Jan. 31. Mr. Foushee was born in Roxboro, N. C., forty-seven years ago, but has been a resident of Durham for twenty-three years. He was a well-known lawyer and for several years was a judge of the district bench.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Citizens Railway Company, Clarksville, Tenn.—Incorporated in Tennessee to take over the Clarksville & Dunbar Cave Railway. Capital stock, $5,000. Incorporators: M. L. Cross, W. E. Beach, W. A. Chambers, John J. Conroy and C. W. Bailey.

FRANCHISES

Martinez, Cal.—The Martinez & Concord Interurban Railway has asked the Council for a franchise to construct a line in Martinez in connection with its proposed line from Martinez to Concord. Bids for the franchise will be received by the Town Clerk until March 6. [Jan. 15, '16.]

***Atlanta, Ga.**—The Federal Construction Company, Atlanta, will ask the Council for a franchise to build a line beginning on Williams Street at the city limits to Merritts Avenue, on Merritts Avenue to Orme Street, on Orme Street to West Cain Street, on West Cain Street to Bartow Street, on Bartow Street to Nassau Street, on Nassau Street to Spring Street and on Spring Street to either Walton or Marietta Streets, Atlanta. The company proposes to build a line from Atlanta to Creighton, via Roswell, Alpharetta and Cumming, 50 miles. It is the purpose of the Federal Construction Company to assign and transfer its franchise to the Atlanta & North Georgia Railroad, which was chartered two years ago, and which is now being organized.

Brooklyn, N. Y.—Mayor Mitchel has approved the franchises requested by the Brooklyn Rapid Transit Company for its proposed Metropolitan Avenue line, the Fresh Pond Road extension and the Eighth Avenue line. The franchise for the Atlantic Avenue line has not as yet been approved.

Buffalo, N. Y.—Attorneys Adolph Rebadow and Carleton E. Ladd have asked the Public Service Commission for the Second District of New York for its approval of the transfer of the franchises owned by the defunct Buffalo & Susquehanna Railroad to the Wellsville & Buffalo Railroad. The attorneys represent C. A. Finnegan, who purchased the Buffalo & Susquehanna Railroad. [Dec. 18, '15.]

Little Falls, N. Y.—The Little Falls & Johnstown Electric Railway has asked the Legislature for a five-year extension of time on its franchise to construct its proposed line from Little Falls to Johnstown.

New York City.—The Hudson & Manhattan Railroad has asked the Public Service Commission for the First District of New York for permission to abandon that part of its franchise which calls upon it to construct a spur from its main tracks to connect with the Interborough subway at Ninth Street. The company has also asked for an extension of two years on its franchise to extend its line from Thirty-sixth Street up Sixth Avenue and under Forty-second Street to the Grand Central Station.

***San Angelo, Tex.**—It is reported that the Interstate Electric Company of New York has asked the Council for a franchise to construct a line in San Angelo, and that such a franchise will soon be submitted to the voters. E. A. Fitkin, president.

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—A tentative proposition has been made to the city of Birmingham by J. S. Pevear, president of the Birmingham Railway, Light & Power Company, to construct a line from Birmingham to Warrior River, about 20 miles. Such a line is being advocated by M. W. Brush, president of the Chamber of Commerce, and others. It is estimated that the line would cost about $300,000.

Pacific Electric Railway, Los Angeles, Cal.—Recent flood waters near Newport washed out over 1000 ft. of track of the Southern Pacific Company and the Pacific Electric Railway. The damage is estimated at from $15,000 to $20,000. A railroad bridge was also washed out, the loss being from $10,000 to $20,000.

***San Francisco, Cal.**—A suggestion that the city consider a plan for an electric line to the Union Iron Works and the Hunters Point district has been made to the engineering department by Alexander Russell and J. M. Kepner, representing the Chamber of Commerce.

Capital Traction Company, Washington, D. C.—With a view to establishing a more flexible service over its Pennsylvania Avenue and Fourteenth Street lines the Capital Traction Company has applied to the Public Utilities Commission for authority to construct a terminal loop around G. A. R. statue, at the intersection of Seventh Street, Louisiana Avenue and C Street Northwest. Certain cars moving east over Pennsylvania Avenue would use this point as a terminal, and the arrangement, it is stated, probably could be utilized for speeding up the headway during rush hours if necessary.

Jacksonville (Fla.) Traction Company.—A committee of three has been appointed by the Board of County Commissioners to co-operate with the City Commissioners relative to the construction of an extension by the Jacksonville Traction Company of its line from the present terminus at Ortega to the camp grounds at Black Point.

Macon & Birmingham Railway, Macon, Ga.—Double daily electric passenger train service between Macon and LaGrange has been inaugurated by this company, trains departing from and arriving at the Macon Union Station.

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—Officials of this company have announced that the construction of the East Lewiston extension will be begun about Feb. 15. The company plans to extend the line to Delsol Park and the Fair Grounds, and, if possible, service to the park will be provided before summer. It is stated that arrangements are being made for new cars to be used on the extension as soon as it is built.

Tri-City Railway Company, Moline, Ill.—The Greater Moline committee will ask this company to build a line from Fourth Street, Moline, Ill., across the proposed Fifteenth Street bridge to the Rock Island arsenal.

Wichita Railroad & Light Company, Wichita, Kan.—This company has agreed to double track its line from the Douglas Avenue bridge west to Seneca Street and pave the tracks.

Cumberland & Manchester Railroad, Barbourville, Ky.—It is reported that this company, which is constructing a line between Barbourville and Manchester, may extend the line to Beattyville. M. E. S. Posey, Barbourville, chief engineer. [Dec. 25, '15.]

Idlewylde Park Railway, Baltimore, Md.—About two-thirds of this company's line from York Road to Idlewylde Park has been completed and it is expected that operation will be begun by March 1. [Sept. 18, '15.]

St. Paul Southern Electric Railway, St. Paul, Minn.—This company will soon issue $1,200,000 in bonds to finance the construction of an extension to Rochester.

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—A hearing has been set by the Public Utilities Commission of Missouri on the application of the Kansas City & Tiffany Springs Railway, which is planning to build northward from Kansas City. It is likely that the matter of authority to purchase a small piece of track of the Quincy, Omaha & Kansas City Railway, between Gower and Trimble, may be taken up, although no definite negotiations for such purchase are in progress. If this piece is bought, it is said that the company may use it as part of an electric road to continue northward to Albany, and perhaps later to the Iowa line, through a very rich farming district. These plans do not involve entering St. Joseph.

Missouri & Kansas Interurban Railway, Kansas City, Mo.—Plans are being perfected by this company for the construction of a line from Olathe to Ottawa, 26 miles. The proposed extension has been under advisement for the past two years.

United Railways, St. Louis, Mo.—A trolley line, connecting with the Laclede Avenue line of this company at Laclede Avenue and Kings Highway and carrying passengers to and from the art museum, bird cage, the lakes and lagoons and the baseball, tennis and golf grounds in Forest Park is one of several proposed park lines for which plans and specifications are being prepared by President Kinsey of the Board of Public Service. The estimated cost of the line is $229,000. Mr. Kinsey is preparing a report giving the estimated cost of each of the proposed lines which he expects to submit to a committee appointed by Mayor Kiel within the next two weeks. It is stated that the United Railways is willing to construct the proposed line and operate cars without charging an extra fare. A transfer would be given passengers from the Laclede Avenue line.

Public Service Railway, Newark, N. J.—It is reported that this company plans to build an extension of its line to Port Newark Terminal. The company has been considering two routes, one an extension of the tracks in South Street and the other a line from the Lincoln Highway to Avenue R.

International Railway, Buffalo, N. Y.—This company has purchased the ground in the Payne hill in North Tonawanda and will use the earth to construct the fill for the new four-track trolley line to be built between Buffalo and Niagara Falls. It is estimated the company will get 395,000 cu. yd. of gravel and earth from the cut. The company has also entered into an agreement with the State authorities for permission to use all the dirt taken from the Erie barge canal enlargement through Tonawanda and North Tonawanda.

Long Island Railroad, New York City.—The Public Service Commission for the First District of New York has ordered the elimination of eight dangerous grade crossings on the Far Rockaway branch of this company's line. It is estimated that the cost of the improvements will be about $1,150,000, of which one-half will be paid by the company and one-quarter each by the State and city.

***Canton, Ohio.**—Business men of Osnaburg and residents on the road between Canton and Osnaburg are contemplating organizing and incorporating for the purpose of securing franchises and eventually operating either a trackless trolley system or an electric interurban line between the two cities.

Lake Erie & Northern Railway, Brantford, Ont.—Operation has been begun by this company between Galt and Brantford. The line connects with the Canadian Pacific Railway main line at Galt. Work will be continued on the overhead equipment from Brantford to Port Dover. The track has been completed and it is expected trains will be operating by spring.

Philadelphia, Pa.—The contract for the construction of foundations for the elevated railway on Frankford Avenue from Unity to Dyre Streets has been awarded by the department of city transit to Edwin H. Vare, Philadelphia, at $23,870. The contract for the steel superstructure and appurtenant work on Frankford Avenue from Unity to Dyre Streets has been awarded to the American Bridge Company, Philadelphia, at $257,475. Awards on these contracts have been delayed awaiting approval of plans by the Public Service Commission of Pennsylvania. Bids for this work were opened Dec. 7 and Dec. 14, respectively.

Schuylkill Electric Railway, Pottsville, Pa.—The work on this company's line between Pottsville and Frackville is progressing rapidly. At St. Clair a subway is being constructed for the new road where it will pass under the Reading Railway. Track has been laid from Frackville to New Castle.

Houston, Richmond & Western Traction Company, Houston, Tex.—Construction will be begun on Feb. 20 between San Antonio and Seguin, the first section of this company's proposed line from San Antonio to Houston. Electric power for operating the line will be developed by hydroelectric plants to be constructed on the Guadalupe River. E. Kennedy, president. [Jan. 15, '16.]

Laredo Electric & Railway Company, Laredo, Tex.—Work has been begun by this company relocating its track in Laredo. The track will penetrate the business section of the city hereafter instead of passing down side streets.

Petersburg & Appomattox Railway, Petersburg, Va.—Operation has been begun on this company's line from Petersburg to Hopewell, 10¼ miles. T. M. Wortham, Richmond, president. [Nov. 13, '15.]

Radford-Willis-Southern Railway, Radford, Va.—At a recent meeting of the stockholders of this company, held in Radford, the directors were instructed to have the charter of the road amended to allow the extension of the line from Willis to Mount Airy, N. C. The road, with the addition, will extend from Radford through Montgomery, Pulaski, Floyd, Carroll and Patrick Counties, Va., and Surry County, N. C., to Mount Airy. No definite plans have been made as yet for the building of the extension, and no right-of-way has been secured. If the extension is built the line will have a total length of about 75 miles. Three miles of the road have been graded near Snowville. Williams Brothers, Roanoke, are the contractors for the first section of the road. At the same meeting the stockholders authorized the issue of $300,000 in bonds to complete the first section of the line. No provision has been made for the extension. John L. Vaughan, Shawsville, president. [Aug. 21, '15.]

Green Bay & Eastern Railway, Manitowoc, Wis.—The engineering contract for this company's proposed line from Green Bay to Sheboygan via Manitowoc has been awarded to the Western Engineering & Construction Company of Milwaukee. [Jan. 15, '16.]

Sheboygan Railway & Electric Company, Sheboygan, Wis.—Plans are being considered by this company for the construction of an extension of its line from Elkhart through Kiel and New Holstein to Chilton, 19 miles.

SHOPS AND BUILDINGS

Louisville (Ky.) Railway.—The company has put a large piece of property at Seventeenth and Walnut Streets, formerly the company's shops, on the market. There are several brick buildings and half of the block is covered.

POWER HOUSES AND SUBSTATIONS

Interborough Rapid Transit Company, New York City.—The Public Service Commission for the First District of New York has requested the Interborough Rapid Transit Company to make provision for supplying electric current to the New York Municipal Railway Corporation for the operation of its lines under the dual system contracts. These contracts allow the New York Municipal Corporation to purchase power for ten years after the new system is placed in operation. The Interborough Rapid Transit Company will have power-house capacity to produce much more current than it will need for the operation of its own system, and the commission therefore suggests that it will be a saving both to the companies and to the city if it should allow the New York Municipal Railway Corporation to purchase the needed power. In this connection the New York Municipal Railway Corporation recently submitted a proposal to the commission to purchase power from the Transit Development Company at a flat rate of 1 cent per kilowatt-hour. The commission disapproved this proposal on the ground that the flat rate was too high. No reply has been received up to the present time from the Interborough Company.

Columbus Railway, Power & Light Company, Columbus, Ohio.—This company has purchased a 6500-kw. turbo-generator of the Curtis type which will generate at 4150 volts and will be installed in the Columbus power station. The company will also build a new power line to South Columbus which will cost approximately $70,000. This will be a three-phase, part underground and part overhead, 13,300-volt line, designed for a 5000-kw. load capacity. A new railway substation is also being constructed in West Columbus which will contain a 500-kw. rotary converter, and is designed to serve also as a switching station for the power and light service. When this new substation is put in service an old steam station will be shut down and dismantled.

Lehigh Valley Transit Company, Allentown, Pa.—A contract has been placed by this company with the Westinghouse Electric & Manufacturing Company for one 10,000-kw., three-phase, 60-cycle, 13,200-volt steam turbine to be installed in its Front Street generating station.

Manufactures and Supplies

ROLLING STOCK

Albany Southern Railroad, Rensselaer, N. Y., has ordered two express cars.

Johnstown (Pa.) Passenger Railway will order shortly ten new double-track cars.

Virginia Railway & Power Company, Richmond, Va., has ordered four cars from the Southern Car Company.

Piedmont Railway & Electric Company, Burlington, N. C., has ordered two cars from the Southern Car Company.

Corning & Painted Post Railway, Corning, N. Y., has ordered four cars from the Southern Car Company.

Consolidated Street Railway, Cottonwood Falls, Kan., expects to purchase a gasoline or electric car during 1916.

New York State Railways (Syracuse Lines), Syracuse, N. Y., are considering the purchase of fifteen or twenty-five new steel cars.

Cumberland & Westernport Electric Railway, Cumberland, Md., is reported as expecting to purchase three interurban cars.

Manhattan & Queens Traction Corporation, New York City, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 15, 1915, as expecting to purchase additional cars, has ordered through H. L. Doherty & Company, New York, seven cars from the Cincinnati Car Company. The order was placed with the W. R. Kerschner Company, Eastern sales agent for the carbuilder.

TRADE NOTES

Edmund F. Saxton has opened offices to conduct a general consulting engineering practice at the Pennsylvania Building, Philadelphia, Pa.

H. K. Porter, Southern sales agent for the U. S. Metal & Manufacturing Company, Hurt Building, Atlanta, Ga., has resigned to accept a position with the Hyatt Roller Bearing Company, Newark, N. J.

H. S. Norris, special sales agent for the U. S. Metal & Manufacturing Company, New York City, has resigned from that position, effective Feb. 15, to become manager of railway sales for the C. A. Willey Company, railway paint specialties, Long Island City, N. Y.

Midvale Steel & Ordnance Company, Philadelphia, Pa., has made an agreement to purchase the entire capital stock of the Cambria Steel Company for a cash price of $81 a share. Par value of the stock is $50 a share. As the Cambria company has 900,000 shares outstanding, the purchase will involve $72,900,000 in cash.

Trussed Concrete Steel Company, Detroit, Mich., on Jan. 25-28 held the first annual convention of its branch managers at the main plant at Youngstown, Ohio. Representatives gathered from every section of the country and also from far distant countries, including Japan, Hawaii, South America and Porto Rico, to co-operate in forming improved methods which would render greater service to the clients of the company. The general program of the convention included business questions every morning and afternoon. The opening address of Julius Kahn, president, was followed by a number of other addresses.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued bulletins listing its types of wires and cords.

Brown Hoisting Machinery Company, Cleveland, Ohio, has issued catalog D, 1916, which describes and illustrates its overhead tramrail systems, trolleys and electric hoists. The Brownhoist monorail man-trolley is used for transporting various kinds of materials from and to cars, boats, storage yards and buildings, and the different floors of the buildings. It may be adapted for transporting coal and ashes in power houses. The trolley travels on the lower flange of an I-beam track and is operated by one man who rides in the trolley cab. The trolley is enabled to reach the different points in the yards and buildings by the use of switches, turntables and transfer cranes in connection with the I-beam tracks. It can be equipped with grab bucket or with one, two or four hooks.

SEATTLE MAYOR ON MUNICIPAL OWNERSHIP

H. C. Gill, Mayor of Seattle, Wash., in his annual message to the City Council recommended the adoption by the Council of some plan for the extension or abandonment of municipal operation of street cars and the submission of the plan to the voters at the general election in November. Mayor Gill said:

"The situation with reference to the city's car lines remains practically unchanged from that of a year ago, except that the City Council has dismissed the matter of the purchase of the Seattle, Renton & Southern Railway. This makes Division 'A,' if possible, a little more of an outcast and orphan than it was then. Possible sale of the Seattle, Renton & Southern Railway will place us in a position where this line can be utilized as was originally contemplated. By next October the bridges across the Lake Washigton Government Canal will be completed and the question of extending Division 'A' into Ballard will come before you. We cannot afford, merely as a matter of pride, to operate Division 'A' at a large loss daily to the taxpayers any longer than is necessary to a final solution of the whole question. I have only to suggest that if the plan of extending this line to Ballard is finally submitted it must also be extended either by common user or otherwise to the south.

"A plan by which patrons of the Ballard line would be dumped at Stewart Street, the downtown terminus of Division 'A,' would be unfair and unworkable. Division 'C' bids fair in time to be a profitable suburban line, although, in my opinion, all street car transportation is about to give way to some sort of automobile, and this should cause the most serious reflection on any proposed large expenditure of money. Having in view that uncertainty, and the financial risks involved, I believe that when it comes you should find some solution of the whole matter and submit it to the people for a vote, at the time of the State elections next fall."

NO INTERFERENCE IN PITTSBURGH SUBWAY MATTER BY COMMISSION

The Public Service Commission of Pennsylvania has dismissed the request of the Pittsburgh (Pa.) Subway Company that it suggest a form of ordinance for passage in the City Council, which would enable the company to construct a subway in Pittsburgh. The opinion dismissing the petition was prepared by Chairman Ainey and was concurred in by the other members of the commission. It is in part as follows:

"The city of Pittsburgh and the Pittsburgh Subway Company are not in accord on this project. No agreement has been reached, either actually or tentatively, and confessedly the purpose of this application is to persuade the municipality into making an agreement with the petitioner.

"This undertaking when realized will burden for many years the future of the city of Pittsburgh and the responsibility of seeing that the project is financially balanced and that the plans are adequate to secure the desired relief, rest very properly upon the city authorities and we are not disposed in this proceeding to interfere with or assume that responsibility.

"For this commission to approve the form contract submitted by petitioner would mean to approve a mere husk. For us to attempt to supply the real meat would be to act without sufficient evidence and without the consent of essential parties.

"It is evident that the Legislature had in mind a case where there was a proposed 'contract or agreement' concerning which the municipality and public service company were in substantial accord. To relieve them of the uncertainty as to whether the commission would approve 'such contract or agreement' the public service company might, in advance of the formal passage of the ordinance covering such agreement, apply to this commission to ascertain if the terms were acceptable and what, if any, conditions would be imposed."

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FREQUENT SERVICE AND GROSS RECEIPTS

According to Commissioner Frank Irvine, Public Service Commission of New York, Second District, the steam railroad train, composed of locomotive, baggage and express car and two or three coaches, is in a state of obsolescence. This statement was made as part of a decision on a demand for greater local service on the Lehigh Valley Railroad in and out of Auburn, N. Y., and the commission points out that the gasoline-motor car or some other system with small units and low operating expenses must be used unless the steam roads want to see their local traffic go to the interurbans or to the autobus or private automobiles. The stimulating effect of frequent service on gross receipts is a lesson which the steam railroads learn slowly. They have been brought up on the doctrine of the importance of long trains in through freight service and have difficulty in understanding that any other principle is advisable in passenger service. In this particular case, the commission declined to order the railroad to provide more transportation because it showed that the operating cost of the train described above was 54 cents per train-mile, whereas the receipts from the trains now in use were only 57 cents, leaving not enough margin for overhead charges. The situation described by Commissioner Irvine prevails on many other steam railroads. The track is there. All that is needed is some system of small units. Receipts of 57 cents per train-mile seem good to the average interurban electric railway manager, and if any one of a number whom we know were placed under similar circumstances we believe that we could tell what he would do.

THE HUMAN SIDE OF THE CORPORATION

The annual banquet of the Washington (D. C.) Traffic Club is an interesting event in steam and electric traction circles in that city. At the banquet held recently one of the addresses was delivered by W. F. Ham, vice-president of the Washington Railway & Electric Company. One of his main pleas was for an appreciation by the public of the fact that the corporation is not a soul-less affair, because it is made up of individuals from one end to the other. The stockholders who form the corporation are certainly human, as are the directors who attend to affairs for them. The directors select human officers who, in turn, appoint human experts to supervise the details of operation. Finally there is the rank and file of human employees who do the every-day work in all branches of the service. From stockholder to laborer there is nothing but humanity. While Mr. Ham's purpose in calling attention to the above fundamental fact was to impress it upon the public to the end that the corporation might be considered as something more than a mechanism for extracting money from the public, there is a suggestion in it for the corporation also. Involving as it does the welfare and happiness of so many human units, it is highly important that the corporation should furnish each of these units with the maximum opportunity for development. Corporations differ radically along this line. Some are almost like educational institutions in that the workers are developing mentally, and in their respect for themselves and for their work. In others only a few receive credit for achievement and are stimulated to manifest individuality and initiative. The one gets heart service from the employee, the other time and lip service only.

SECURITY HOLDINGS OF BANKS

The extent to which the banks of this country invest their funds in various classes of securities is good evidence of relative investment values, but in this matter one must be careful to observe trends rather than short-time changes. For instance, the careless analyst will loudly declare that steam railroad bonds are in disfavor because the report of the Comptroller of the Currency for the year ended June 30, 1915, shows railroad bond holdings to have increased only 1.74 per cent during the year, while public utility bond holdings rose 13.7 per cent. Yet in the preceding year the same critic undoubtedly condemned public utility bonds because the banks decreased their holdings of such issues by 19 per cent but added 9.4 per cent to their railroad bond holdings. We mention these facts simply to demonstrate how unwise it is to be either over-enthusiastic or depressed because of simply one year's showing. As a matter of fact, since 1912 public utility bond holdings have shown a net increase of 10 per cent, while railroad bond holdings have risen only 4.4 per cent. Undoubtedly steam railroad bonds have in late years been tending to lose their primacy as investments, while utility issues have enjoyed an increasing popularity. Whether this trend is to be maintained, however, and whether electric railways are to share proportionately in general utility prosperity are questions that are not yet definitely answerable. The same factors that have made for a decline in railroad bond holdings are present in the electric railway situation, and if the securities in the latter field are not to decline in popularity the public must more fully realize the unfairness and injustice of attacks on electric railway investments. Certainly it is in the interest of the public that electric railway issues be just as sound and attractive investment propositions as those of any other class of utilities.

NEW YORK TRACTION AFFAIRS

New York traction affairs have been considerably in the limelight during the past few months, and particularly during the past few weeks. Commencing with the investigation of the Public Service Commission, First District, which was followed by beneficial results, the committee has been turning its attention to traction affairs, especially as to the ways in which the subways now under construction have been financed. It has secured various data in regard to the expenditures before and after the contracts for the new subways were signed as well as the salaries paid to various Interborough executive officials, and is now devoting itself to an investigation of the conditions surrounding the third-tracking contracts of the elevated railway. Much of the information elicited up to date is old and a great deal is inconclusive, as the testimony is not all in, so that it would be unwise for anyone yet to say that a scandal will develop. Those who know the care with which the able representatives of the city who had charge of its interests during the negotiations preliminary to the present subway contracts discharged their duty, will be very skeptical that any loophole was left for excessive charges to the city until such a condition is definitely proved. Undoubtedly, the city is committed to a large expenditure as its part of the subway improvements, but the acclaim which greeted the conclusion of these contracts showed that the public at large believed then and undoubtedly believes now that no other municipal improvement is so important to the city's welfare, and that the expense will be far more than counterbalanced by the increase in taxable real estate values. It might have been better to have undertaken this work gradually, that is to say, by building certain sections at a time, but there were obvious objections to such a piecemeal method of construction at the time the contracts were under consideration, and the city is assured now of a well-balanced system of subways which should be of inestimable benefit to it in its development.

Comptroller Prendergast, who had a great deal to do with the original contracts, has issued a statement showing in detail that the city's interests are fully conserved as regards excessive "construction expenses" under the present contracts, and that the "one notorious matter" which has been brought out by the committee is the seemingly large percentage of profit allowed to the contractor for the third tracking of the elevated railway. This expense, according to a former director of the railroad company, the president of the company said was necessary in order to take care of certain commitments and obligations. No further explanation has been made of this expenditure, but light will undoubtedly be thrown upon it through the testimony of Mr. Shonts, who, it is understood, will go on the stand within the next few days.

The legislative committee is particularly concerned with the aspect of the city's interest in the subway contracts, but we trust that in view of the broad nature of the inquiry the directors of the various companies engaged in the work will make a full statement to their stockholders of all extraordinary expenses incurred in connection with the contracts. It is only natural to expect that in an undertaking of this kind there would be many large disbursements for legal and other expert opinion as well as for financing the undertaking, but the stockholders should have asurance that these have not exceeded in amount what was reasonable under the circumstances.

GROSS RECEIPTS ARE NOT PROFITS

A number of the New York daily papers have been finding the current legislative committee investigation of the methods of financing the new subways in New York excellent "copy," and have had a good deal to say about the "profits" which the bankers have made in handling the bonds of the Interborough Rapid Transit Company and in guaranteeing the financing. An analysis of the figures thus quoted would indicate, however, that the newspapers in question deduced their figures of "profits" by taking the figure at which the bonds were purchased and the figure at which they were sold and multiplying the difference by the entire issue of bonds, then adding such additional allowances as were made to the bankers for commissions, readiness to finance, etc. We are not considering here whether the entire amount of profit received by the bankers was too much or too little under the circumstances, although it might be well to point out that the financing of an issue of $100,000,000 is rather a large undertaking even for Wall Street, and that as the number of banking firms which could handle an issue of this kind is limited, it is natural to assume that the profits demanded would be larger than where the number of bidders was greater.

But even omitting this phase of the question, it must be remembered that bankers, like others engaged in commercial undertakings, have operating expenses, interest, etc., which have to be paid before "profits" are realized, and a confusing of the difference between gross receipts and profits in banking would be just as absurd as in the railway or newspaper business. Even where a payment of $500,000 was made to a firm of bankers for readiness to finance the subway during the early negotiations which came to naught, it is improper to say that the payment was equivalent to profit. It is true no money was actually advanced to the operating company by the bankers under the contract, but every operating man knows that "readiness to serve" in the lighting and railway business costs money and is a legitimate charge to the consumer, and it is easy to understand that in a fluctuating money market the "readiness to serve" by the banker to the extent of being prepared at any time to take $100,000,000 of 5½ per cent bonds undoubtedly involves considerable actual expenditure as well as the sacrifice of profits which could have been earned by the use in other ways of the idle capital.

ELECTRIFICATION OF STEAM RAILROADS FOR PROFIT

In the early electrifications of short sections of steam roads, direct financial returns were not the primary objects in view. The long tunnel was the *bête noire* of the steam railroad, and the B. & O. in Baltimore, the Great Northern in the Cascade Range, the Grand Trunk between Sarnia, Ont., and Port Huron, Mich., and the New York Central, New Haven and Pennsylvania in New York, were all forced to electrification as the solution of the tunnel ventilation problem. While advocates of judicious electrification welcomed the rapid development in the art which was necessary under these circumstances, they deplored the fact that the economics of the situation had to take second place. In later, and more voluntary, electrifications financial considerations have predominated.

These remarks are prompted by the discussion at the heavy electric traction session of the mid-winter convention of the American Institute of Electrical Engineers last week. One speaker remarked that instead of criticising details of an achievement like the Norfolk & Western installation, which was under discussion at the time, its over-all significance should be appreciated. Here is a case where electric locomotives are doing what steam locomotives had never done and could not do, hoisting coal better than it had ever been hoisted before. Another speaker thought that this was not enough, implying that the criterion of success is not "does it work?" but "does it pay?"

Evidence is accumulating to show that electrification not only "works" but pays as well, under conditions conducive to profit. The Butte, Anaconda & Pacific has demonstrated this to the satisfaction of all concerned, as is shown not only by financial statements but by the action of the Chicago, Milwaukee & St. Paul. While no direct figures have as yet been given out by the Norfolk & Western, the excellent operating record reported for the road for the latter six months of 1915 undoubtedly reflects the effect of electrification in increasing the capacity of the track in the Bluefield region.

There are many other opportunities for large profits in applying electricity to hoisting problems, as Charles F. Scott called them in the discussion referred to, to say nothing of suburban installations, like that in Philadelphia, in which the multiple-unit train has the opportunity to demonstrate its superiority to any type of locomotive. In the Philadelphia case the profit resulted from the possibility of postponing large expenditures for enlarging the "neck of the bottle" over the Schuylkill River.

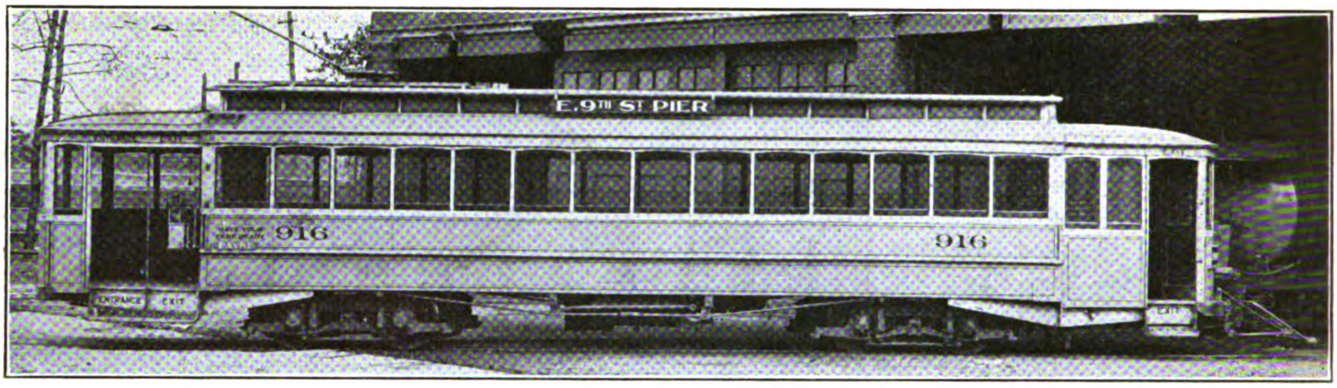
We look for a tremendous development in steam railroad electrification during the next few years. Between 1890 and 1900 there was a wholesale electrification of the horse railways of the country because large profits were seen to be within reach. This followed a period of preparation or scientific development. The past fifteen years have been the corresponding preparatory period for the application of electricity to the steam road, because there electricity is going to pay also. As soon as capital loosens up a bit in this field there is bound to be some interesting progress.

BY-PRODUCTS OF THE SAFETY MEDAL COMPETITION

The recent award of the Anthony N. Brady medal, the second which has been made, suggests a query as to the benefits to be derived from such competitions. The electric railways have not as yet manifested a lively interest in the competition for the the Brady medal, partly because the plan is new and probably also on account of lack of interest in competitions in general. We understand, also, that some of the competitors do not make particularly forceful presentation of their claims. It is possible that the managements of some roads do not consider it dignified to enter a competition of this kind and, as it were, plead their cases before the court of award. It is necessary, however, that something of this sort be done, as it is a physical impossibility for any committee to be omniscient in regard to the safety records of electric railways. Moreover, a number of the competitors have been among the leading roads in the country, a fact which establishes a precedent in this line.

Now, entirely aside from the possibility of securing the medal or "honorable mention" in the competition, there are certain by-products which make the effort worth while. The preparation of the statistics in the standard form prescribed by the committee of the American Electric Railway Association is valuable in that it permits at least a crude comparison of the results of safety work on a numerical basis. Of still more importance is the "account of stock" which must be taken in making an adequate presentation of the efforts made to reduce accidents. To "see oursels as ithers see us" occasionally is beneficial. The old fable of the pot of gold hid in the field is not inappropriate in this connection. It will be remembered that a father, dying, left to his son a field in which he said a pot of gold was buried. In diligently plowing for the gold the son so increased the fertility of the field that, although the coveted prize never materialized, the indirect reward was equally profitable.

So in this safety competition thorough preparation for the competition should prove its own reward, as one competitor this year testified it had done. More evidence in the same direction was furnished by another company which, although barred from the competition, nevertheless put in a comprehensive report which was prepared because last year's experience demonstrated the value of the study necessary in preparing the brief. It is not to be expected that a majority of the roads in the country will compete for the medal every year. But there is no reason why every road should not make an annual study of its accident situation and, when the record seems sufficiently creditable, why it should not "go in" for the medal. If then the Brady medal foundation does no more than stimulate the electric railways to the making of periodical and thorough safety inventories it will have proved to be a benefit to the industry.



CLEVELAND REBUILT CAR—VIEW OF CAR BEFORE REMODELING

Cleveland Modernizes Fifty Cars

Double-End, Composite-Underframe Cars Were Rebuilt into the Front-Entrance, Center-Exit Type in Response to a Popular Demand—The Alterations Made and the Shop Procedure Are Described

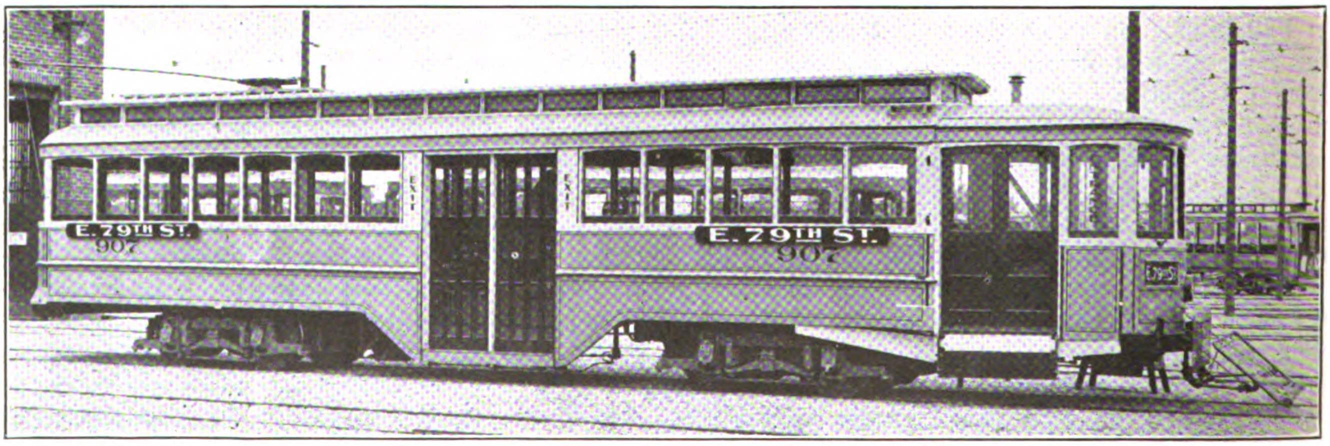
POPULAR demand and a desire on the part of the Cleveland Railway to accede to it, resulted in the recent purchase of fifty front-entrance, center-exit cars and the remodeling of fifty double-end cars into this type. Never in Cleveland's experience with the various types of cars, has any one type attained such immediate popularity as the front-entrance, center-exit car which was placed in experimental service early in 1915. This car was described on page 364 of the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1915. In but a very short time after the first car of this type was put in service, its advantages from every standpoint became so apparent that the public requested more of them, they were popular with the trainmen and the transportation department experienced greater ease in making schedules. In the March following, a contract for fifty new cars was placed with the Kuhlman Car Company of Cleveland, and plans were completed for remodeling fifty old double-end cars. In connection with the front-entrance, center-exit type of car, it is of interest to note that the arrangement was conceived by Peter Witt, former street railway commissioner for Cleveland, after consulting with a number of motormen and conductors.

The peculiar advantages of the Cleveland front-entrance, center-exit type of car were brought out in the article in the issue of Feb. 20, already mentioned. The present article concerns itself principally with the methods employed in rebuilding the double-end cars into the new type. Soon after getting settled in the new repair shops, the mechanical department began to convert fifty double-end wooden cars into the front-entrance, center-exit type. The old cars selected for remodeling included twenty-five that were put in service in 1908 and twenty-five others that were put in service in 1898. The latter were originally fourteen-bench open cars, which were later rebuilt into the closed type shown in an accompanying illustration. Both types of cars had wooden outside sheathing below the belt rail, and the twenty-five cars built in 1898 were framed for a concave side sheathing. The over-all length of the original cars of both types was 52 ft., but in rebuilding this was reduced to 49 ft. 3⅜ in. through the elimination of the rear vestibule. The other principal dimensions are as given in the above table.

DIMENSIONS AND OTHER DATA OF REBUILT CLEVELAND CARS

Length over corner posts,	38 ft. 2½ in.	Height of entrance doors	6 ft.
Truck centers	24 ft.	Step height front vestibule,	15 in., 14 in., 9 in.
Wheelbase	4 ft. 6 in.	Step height center exit,	13¼ in., 12¼ in., 12½ in.
Floor to rail	38 in.	Passengers seated in summer	54
Width over side plates,	8 ft. 2 in.	Passengers seated in winter	53
Width over belt rail,	8 ft. 4¾ in.	Passengers standing	78
Height inside	7 ft. 9 in.	Total passenger load	132
Height of exit doors	7 ft. 3 in.	Wheel diameter	33 in.

Essentially, the remodeling of these double-end car

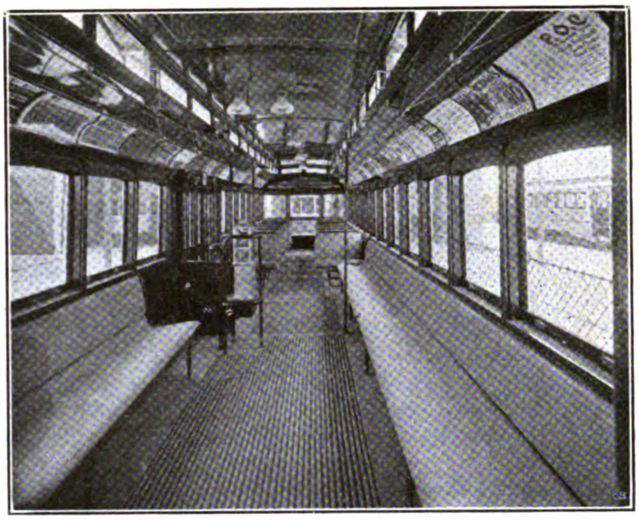


CLEVELAND REBUILT CAR—VIEW OF REMODELED CAR COMPLETED bodies included a change in the location and size of the entrance doors in the front vestibule, the provision for the center exits, the reconstruction of the rear vestibule to make them form part of the main car body and a rearrangement of the seating plan in the front half of the car. The door in the front vestibule was originally 2 ft. 2 in. wide, and it was installed beside the vestibule corner post. The changes in this entrance included an increase in the width of the opening to 4 ft. and its shift from the front vestibule corner post to a position beside the body corner post. No changes were made in the platform arrangement or dimensions, but at the line of the bulkhead between the front vestibule and the main car body, pipe rails and stanchions were provided to form a 36-in. aisle.

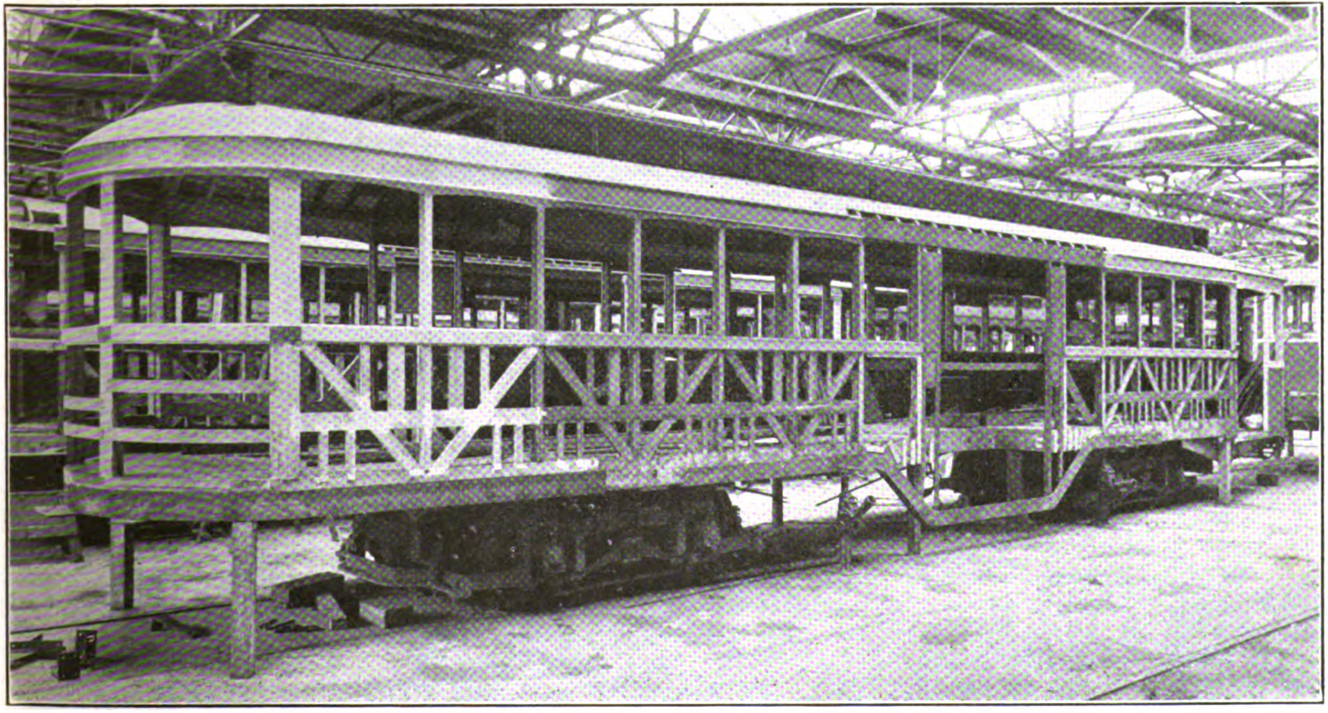
In place of the cross-seats in the front half of the body, two longitudinal seats were installed, one for seven passengers on the exit-door side, and the other for fourteen passengers on the side opposite the exit and extending from the front bulkhead to a point beyond the center-exit well. About 3½ ft. of the available seating space beside the exit door was utilized for the conductor's fare box and stand. The center of the exit-door well is 13 ft. 3 in. from the center of the rear body bolster, and the well is 25 in. wide by 5 ft. 5 in. long. Only such changes were made in the underframe at this point as were necessary to provide the exit well and reinforce the underframe around the opening. These changes included two new wooden floor beams, 2½ in. x 6¾ in., and 3½ in. x 6¾ in. in size respectively, bolted together and placed at each side of the well. A ⅝-in. x 3-in. rectangular, strap-iron frame was also installed on the car underframe beside the exit well to support the air-compressor equipment. The longitudinal floor member along the well was formed of a 4¾-in. x 6¾-in. wooden sill framed between the beams at each side of the well. The transverse floor members which had to be cut to provide for the well, were in turn framed into this longitudinal member.

A steel frame, the details of which are shown in one of the accompanying illustrations, was provided to carry the stresses around the center exit. The longitudinal members included the offset angle side sill and the side plate. Both extend on each side of the exit to the first window post. The vertical members included two built-up, steel panel posts flanking the the exit and steel side sheathing in the first panels at each side of the opening. With this plan of reinforcement only two window posts had to be removed to provide for the exit, and for these the two steel panel posts flanking the opening were substituted. These panel posts were riveted to the 5/16-in. x 3½-in. x 5-in. angle side sill and the side plate. The steel angle side sill is continuous across the exit opening and extends 4 ft. 4 in. toward the front of the car and 6 ft. 6¾ in. toward the rear, along the 5-in. x 8-in. wooden side sill, to which it is bolted both horizontally and vertically by ¾-in. bolts spaced at 12-in. centers.

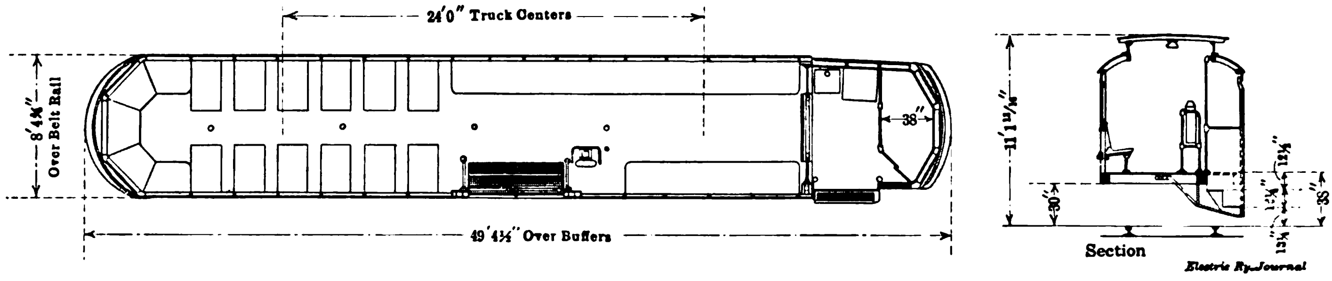
A ⅛-in. side plate, extending from the sill to the belt rail and from the panel post to the first window post each side of the exit opening, also reinforces the car side at this point. At the window posts these plates are stiffened with ⅛-in. x 1¼-in. x 1¼-in. angles which bolt to the old wooden posts and rivet to the side sheets. The panel posts are formed of two 2-in. x 2-in. x 3/16-in.



CLEVELAND REBUILT CAR—INTERIOR VIEW OF REMODELED CAR



CLEVELAND REBUILT CAR—VIEW OF CAR DURING REMODELING



CLEVELAND REBUILT CAR—GENERAL FLOOR PLAN AND CROSS-SECTION

angles, spaced 10 in. back to back. Below the belt rail the web connecting these two angles is the steel side sheathing plate, and above the belt rail a separate web of the same thickness and 10 in. wide extends to the underside of the letterboard. At the belt rail this web is spliced with a ¼-in. x 9-in. x 12-in. plate, and at the letterboard it is spliced with a 3/16-in. x 9-in. x 10⅝-in. plate. The two steps in the exit well are supported on 3/16-in. x 1½-in. x 1½-in. angles. These frame into two 3/16-in. carrier plates which extend 25 in. into the car body and form the panels each side of the exit well. The steps are built with 1⅛-in. wooden treads and 16-gage steel risers.

The letterboard is formed of 5/16-in. x 6-in. sheet steel, and it extends on each side of the exit door opening along the wooden side plate, to which it is bolted, to the first window post. The letterboard is heavily reinforced with a 5/16-in. x 2-in. x 2½-in. angle extending full length. The 3/16-in. x 2-in. x 2-in. inside angles in the panel posts are also bent continuous over the exit and also riveted to the letterboard, thus reinforcing sufficiently to carry the side plate stresses. Four double-leaf folding doors close the 5-ft. x 6⅝-in. exit, and they are operated from the conductor's stand. On each side of the exit well are pipe rails and stanchions which extend from the floor to the deck sill. A curved pipe-rail stand was also provided on which to mount the fare box.

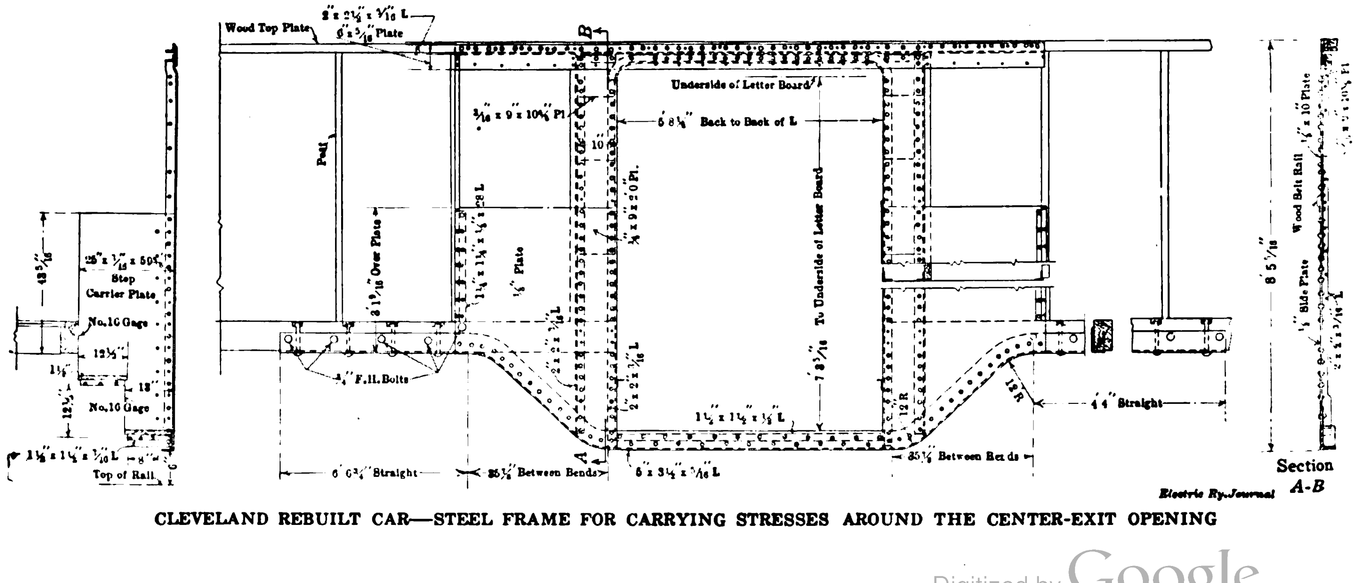
Practically the same steel sections around the center-exit opening were employed in the remodeled cars as were designed for the new front-entrance center-exit cars which were built by the Kuhlman Car Company. The design of these sections was based on mathematical calculations modified by experience and by the exigencies encountered in applying them to the two types of remodeled cars. The design of the panel posts on each side of the door opening was maintained practically the same as that used in the new cars. In connection with the cars with the concave sides, however, it was necessary to place the steel sheathing on each side of the opening, inside of the outside sheathing line. This permitted the installation to be made without distorting the plates to conform to the side of the car. The concave side was then constructed outside of this plate, the general appearance of the old car being thus retained.

The location of the exit door opening was also selected to conform, in the best practical way, to the sizes of the windows. These were balanced against the width of the door opening, and the door posts were also made of a width to correspond. The width of the door opening was determined by the number of folding doors which it was practical to use without their projecting too far beyond the car body line when they were in the open position. It was also desirable, of course, to obtain a maximum door opening at this point, and this, too, was a factor borne in mind in arriving at the 5-ft. 6⅝-in. exit opening.

As mentioned earlier in the article, the rear vestibule was cut away and the body underframing extended to give the remodeled car an over-all length of 49 ft. 4½ in. The change added space to the main car body sufficient for seven built-in seats around the rear end. In rebuilding this end of the car, the body corner posts were shifted 3 ft. from their original positions in the old car, and new window posts were substituted for them. The extension of the underframe was reinforced along the side sills and the buffer with a ⅜-in. x 3½-in. x 6-in. angle, and the ½-in. x 3½-in. x 5-in. angle center sills were spliced and extended to frame into this buffer. Wooden cross-bearers 3½-in. x 6¾-in. in size, in turn, frame into these center and side sills to complete the floor framing. The changes at this end of the car body also necessitated rebuilding the roof and extending the monitor deck. In one of the accompanying illustrations the new work on the old car-body framing is shown.

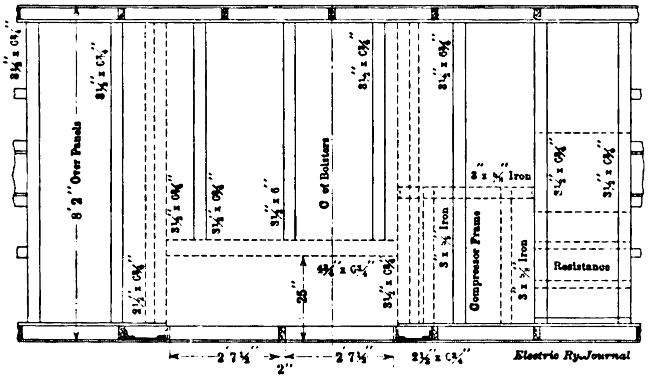
REMODELING PROCEDURE

The reconstruction of fifty double-end cars into the front-entrance, center-exit type was no small task to be undertaken by a mechanical department that was already busily engaged in maintaining and repairing more than 1500 cars in the regular service. In order to



CLEVELAND REBUILT CAR—STEEL FRAME FOR CARRYING STRESSES AROUND THE CENTER-EXIT OPENING do this work and at the same time not disorganize the forces handling the regular repair work, the remodeling of this equipment was "sandwiched in," so to speak, and no fixed schedule of reconstruction was adopted. Cars were taken from regular service and brought into the shop two at a time, so that a small force of men could be employed continuously in the rebuilding operations. Upon the arrival of the car at the shop two laborers removed the rear vestibule, the rear bulkhead, the seats, the fare-box stand, etc. While this was being done, carpenters were cutting out the side wall of the car preparatory to the insertion of the steel center section which supports and incloses the center-exit steps and doors. These carpenters also reconstructed the heavy car framing and relaid the floors, following which the change in the front-door opening, which includes the installation of new doors and steps, was undertaken.

After the completion of the wood framing around the center-exit opening and well, the steel center section, which was partially assembled in the machine shop, was fitted and bolted in place. The variation in dimensions, which is certain to be present in old cars, made it more practical to set up the large 1/8-in. panels on each side of the doorway and mark them in place, after which they were cut and drilled to suit the steel frame. The steel bumper channels and angles were also assembled on the car and bolted to the wooden underframing. This latter operation was carried on simultaneously with the construction of the rear-end framing. When these operations were completed, the work of remodeling was brought up to the point where the car-wiring force could proceed with the installation of the Cleveland Railway's standard large unit lighting system. Nichols-Lintern signals were also installed on the rear dash of the car, and the push-button wiring system was repaired and extended.



CLEVELAND REBUILT CAR—FLOOR FRAMING AT CENTER OF CAR—DOTTED LINES SHOW THE NEW FLOOR MEMBERS

After the wiring and carpenter work were completed the interior finishers installed the center-exit doors, the interior finish and panels, repaired the headlining and did all the general interior work. The old heater ducts were removed and the Cleveland Railway's standard type of duct installed. The car was then thoroughly repainted outside and revarnished inside to conform with the general color scheme used by the Cleveland Railway.

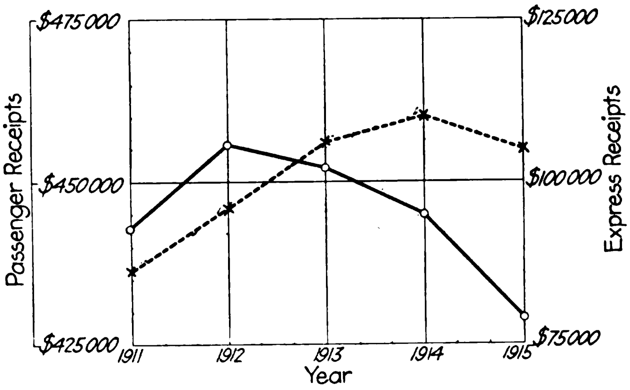
Hunter illuminated signs were also applied to the front vestibule, and a special type of side sign was installed at the belt rail on the step side and at both ends of the car body. The final stages of the reconstruction included the reinstallation of the air compressor and air piping, the application of the grid resistances and the adjustment of the brake pull-rods and levers. While the body was undergoing the various remodeling stages, the trucks also were overhauled so that when the car was restored to service it was practically as good as new.

The time required for the various reconstruction operations outlined in the foregoing was about six weeks. As indicated on the schedule showing the number of men employed on the various stages of remodeling and the sequence of their operations, the complete force at any one time was relatively small.

Two laborers on tearing down, one inside, one outside.
Two men to build rear end.
Two men to tear center and lay floor.
One man to build front.
Three men on iron work.
One man on wiring for lights.
Four men to finish inside.
Two men on door connections.
Two men on roof and general outside.
Two men to place frame and set doors.
Two men on painting.
Two men on equipment, motors, etc.
Two men on brakes.
Two men on pipe fitting.
Two men on truck work.

Five Years' Growth of Freight and Passenger Receipts

THE relative earnings from freight and passenger business on a 100-mile interurban system operating branch lines out of a large city into contiguous territory are shown on the accompanying chart. Considering the year 1915 as abnormal, the relative merits of the two classes of traffic are clearly indicated. While the freight earnings are from a strictly interurban express and milk business, they show a uniform increase from 1911 until 1914, whereas the passenger business showed a marked increase up to 1912, but since that time has been gradually falling off. During the abnormal business conditions existing in 1915, both the earnings from freight and passenger traffic showed a decrease of approximately 6 per cent from the maximum gross earnings for any one year to the minimum. On the other hand, for the entire five-year period, earnings from passenger traffic decreased 3 per cent and earnings from freight traffic increased 19 per cent. The total increase in freight traffic from 1911 until the close of 1914 was 25 per cent. In other words, this chart brings out quite clearly the stability of freight traffic and, at the same time, the possibility of increasing earnings by stimulating this class of traffic. In the instance cited it is believed that if the company had been handling a general freight business instead of a strictly express business, a greater increase would have resulted, and the per cent of decrease, even during the abnormal conditions existing in 1915, would not have been as great.



Solid line, passengers; dotted line, express and milk

CHART SHOWING GROWTH OF FREIGHT AND PASSENGER RECEIPTS

According to estimates which have been prepared since the new year, the San Francisco-Oakland Terminal Railways suffered a loss during the calendar year of 1915 of $350,000, attributed to the competition of jitney buses. During December the loss on this account amounted to $1,200 a day.

Railway Military Preparedness*

Dependence of Military Operations on Facilities Afforded by Steam and Electric Roads—Proposed Military Transportation Commission and Its Duties—Assistance Required of Railway Officials

By LIEUT.-COL. CHAUNCEY B. BAKER, Q. C. U. S. A.

IN any plan looking to the employment of the resources of our country in the general scheme of national defence, the transportation facilities take first place. Upon the prompt and methodical transfer of men, munitions and supplies depends the first principle of military success—to be first on the ground to be contested with superior forces and armament. It is needless to point out the part which railways have played in all wars from the Crimean to the present titanic struggle in Europe. During the early part of the civil war, the railway service, though promptly performed, suffered from the complaints and rivalry of different corporations and from the want of a uniform basis of compensation. A tariff was arranged in 1862 for military transportation which was sufficient to pay the expenses of the roads and some profit besides, though the rates were below those received for ordinary business. In almost all cases the service was performed with promptness and efficiency.

The railways of Great Britain correspond more nearly in methods of ownership and operation to those of the United States than those of any other countries involved in the present war. These are and will continue to be operated by their own officials and employees. On Aug. 4, 1914, the War Office published a declaration which provided for taking in charge the management of all railways in Great Britain. Its powers are exercised by an extensive committee composed of managing directors. This committee was selected from the officials of the railroads. Such restrictions as were necessary were placed upon commercial traffic, and these were removed as rapidly as practicable. In reality, there is no military organization of the railways in Great Britain. The roads are placed at the disposal of the government, but are left in the hands of those most familiar with administration and operation. The central committee of managers serves as an intermediary between the War Department and the railway systems. It assures unity of direction and controls the execution of the service.

To arrange for the settlement of accounts, a basis was agreed upon between the government and the railroads to the effect that the latter should receive in compensation the difference between their net income during the period of the year preceding the war and the same period during the operations of the war. Lately this plan has been slightly modified by using the average of the three-year period before the war as a basis of comparison.

In France, between Aug. 2 and Aug. 5, 1914, more than 3000 trains ran over the Paris, Lyons and Mediterranean lines and nearly 1500 over the Orleans company's lines. On Aug. 5, though the mobilization was not completed, the process of concentration was begun to convey the troops from their mobilization depots to the front. From this date to Aug. 19, more than 4000 trains were run on the Eastern Railway alone, the maximum number per day being 395. The concentration necessitated the running of nearly 2000 military trains composed of 57,000 cars over the Orleans company's lines. These trains carried 600,000 officers and men, 144,000 horses and 40,000 carriages and guns. From more than one regulating station 200 trains per day were dispatched, an average of more than one every eight minutes. Army corps, active and reserve, were thus sent to the front in twenty days. In addition, the railway lines had to effect the transportation of the territorial troops, which in infantry alone, amounted to 145 regiments. All this transportation was carried out in great order and without any particular difficulty.

TRANSPORTATION REQUIREMENTS OF UNITED STATES FIELD ARMY

Table I shows the equipment required to move the various units in our service. For the movement of a field army (about 82,000 men) consisting of three infantry divisions, one cavalry division and a brigade of field army troops would require 6229 cars, made up into 366 trains. To move our field army would require 0.7 per cent of the locomotives in operation on American lines, 4.2 per cent of the passenger equipment, and 0.2 per cent of the freight equipment.

TABLE I—RAILROAD EQUIPMENT REQUIRED TO MOVE VARIOUS ORGANIZATIONS OF THE ARMY AT WAR STRENGTH

	PERSONNEL					RAILROAD EQUIPMENT REQUIRED						
	Officers	Men	Animals	Vehicles	Guns (Complete)	Pullman	Coaches	Baggage	Box	Stock	Flat or Gondola	Total Cars
Infantry regiment	55	1,890	177	22	..	5	43	5	15	9	8	85
Cavalry regiment	54	1,284	1,438	26	..	8	28	8	25	72	9	150
Artillery regiment, light	45	1,170	1,157	32	24	9	23	9	25	58	46	170
Artillery regiment, heavy	45	1,173	1,571	35	24	10	24	10	25	78	47	194
Artillery regiment, mountain	45	1,150	1,229	..	24	7	23	7	30	61	..	124
Engineers, pioneer batt.	16	502	165	12	..	2	12	2	10	8	4	38
Signal corps field	9	171	206	15	..	2	4	2	5	10	5	28
[1]Infantry division	736	22,285	7,660	775	48	76	487	76	245	383	301	1,568
[2]Cavalry division	458	10,259	12,231	414	24	63	218	63	210	611	137	1,302

[1]Comprising three brigades infantry, one regiment cavalry, one brigade of light artillery, one pioneer engineer and one field battery signal corps and wagon trains.

[2]Comprising three brigades cavalry, one regiment horse artillery, one pioneer engineer and one battery signal troop and necessary wagon train.

To move a field army would require 2115 passenger, 385 baggage, 1055 box, 1899 stock and 775 flat cars, a total of 6229 cars.

Table II on page 349 shows the gross weights of supplies required for one infantry division and one field army for thirty days.

PROPOSED MILITARY TRANSPORTATION COMMISSION

It is believed that the organization of a military transportation commission composed principally of officials of the various steam and electric railway associations would be of great value to the office of the Quartermaster General in reaching conclusions in regard to rail transportation. This bureau should include in its membership not only representatives of the operating departments of the railroads, steam and electric, but at least one representative each of the freight traffic department, accounting and construction departments. Nominations for members of the committee representing the operating department and the construction de-

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*Abstract of address at meeting of Massachusetts Street Railway Association, Boston, Feb. 9, 1916.

TABLE II—SHOWING GROSS WEIGHTS OF SUPPLIES REQUIRED FOR ONE DIVISION (INFANTRY) AND ONE FIELD ARMY FOR THIRTY DAYS.

One Division		Pounds
Clothing and equipage		300,960
General quartermasters' supplies		448,440
Candy and tobacco		4,242
Rations		3,292,800
Forage:		
Hay		3,222,240
Oats		2,472,210
Ordnance supplies:		
Other than ammunition	21,666	
Ammunition	93,500	
		115,166
Medical supplies		7,924
Signal supplies		120,000
Engineers' supplies		162,000
Total		10,145,982
One Field Army		
Clothing and equipage		1,134,017
General quartermaster's supplies		1,689,722
Candy and tobacco		15,984
Rations		12,531,523
Forage:		
Hay		17,516,100
Oats		13,641,730
Ordnance supplies:		
Other than ammunition	81,637	
Ammunition	352,308	
		433,945
Medical supplies		29,858
Signal supplies		452,160
Engineers' supplies		610,416
Total		48,055,455

partment should be made by one of the general associations; of the freight traffic department, by the American Association of Freight Traffic Officers; of the passengers department, by the American Association of General Passenger and Ticket Agents, and of the accounting department by the Association of American Railway Accounting Officers. These nominations, it is thought, should be subject to the approval of the Secretary of War. Whatever new legislation may be necessary for co-ordination should apply equally to the steam and electric roads.

The quartermaster corps, under the law, deals with all features of the military service in connection with rail transportation, with the exception of military railways in the field of operations, which are assigned to the corps of engineers. It is believed that the commission proposed could operate effectively and intelligently and accomplish satisfactory results by co-ordination with the transportation division of the Quartermaster General's office.

SCOPE OF THE COMMISSION'S WORK

Many difficulties that obtain in connection with the transportation of troops and supplies generally have occurred through the lack of co-ordination of the functions of the railways themselves in military movements. Solicitors of the railways, passenger and freight, by every means possible try to procure business over their particular roads, often to the detriment of the efficiency of the movement of troops and supplies. General, freight and passenger agents often fail to co-ordinate their labors, and all of them at times fail to co-operate with the operating branch of the roads.

It frequently happens that the facilities for loading and unloading at points of entraining or detraining are wholly insufficient. Even when the physical features are satisfactorily accomplished, the matter of preparing and accomplishing bills of lading and settlement of accounts is burdensome. It is believed that a railway commission would effectively find a solution for many of these difficulties. With that object in view the Quartermaster General's office has endeavored to come in touch with the various railway associations, with a view to outlining some effective plan.

When war was threatened between Mexico and the United States, the American Railway Association agreed to appoint a committee that would assist the department in the movement of troops and supplies, and it is believed that such an arrangement would have been in a measure effective.

Sec. 6 of the act to regulate commerce (34 Stat. 587) provides that in time of war or threatened war, preference shall, upon demand of the President of the United States, be given over all other traffic, to the transportation of troops and munitions. Primarily the military operation of railways will be confined to the lines of communication, which, under the field service regulations, will be built, repaired and operated by the engineer corps. In addition to the construction and operation of military railroads, strictly speaking, there are many features in the operation of railroads back of the base that can be and should be definitely provided for in time of peace.

1. A distinct understanding between the War Department and all the carriers should be reached concerning the tariffs for military traffic, including freight, passenger, baggage and animals. This should be so established as to render the invitation of bids unnecessary and should have the approval of the government and the roads in advance of the outbreak of war. Separate tariffs should be provided for time of peace and time of war. These tariffs should cover every class of trains, including hospital trains, service and armored trains, and should have the simplest possible basis for their building. Preferably a mileage basis should be used.

The proper officers of the War Department have been in conference with the principal passenger associations in the country, and the department feels that so far as steam railroad passenger traffic is concerned, it is on the point of effecting an agreement that will include all the United States except New England. It is believed, however, that with the appointment of a board as proposed progress would be much more rapid. A commission acting for the electric lines in any community should have authority to provide rates of compensation and to enter into negotiations fixing tariffs for military business of every character.

2. As a result of any agreement as above outlined the simplification of the settlement of railway accounts will naturally follow. Much of the difficulty now experienced is due to disagreements as to the interpretation of tariffs and classifications, and a clear and specific basis, simplified as proposed, would obviate all controversy.

3. The physical operation of the railroads in carrying troops and supplies to mobilization, concentration and embarkation points. The necessity of co-ordinating departments is too apparent for argument, as is a complete understanding between the military and railway authorities.

The proposed commission should have a representation from the operating branch of the railroads who would have authority to represent the roads in all features pertaining to operation; in effecting rules and preparing plans for movements of troops and supplies to any point, the desirability of withdrawing empties over neighboring lines so as to avoid congestion, all features of the operation of roads, and providing the rolling stock in advance so far as possible.

The quartermaster corps has effected an arrangement agreeable to the American Railway Master Car Builders' Association which provides for certain placard markings on the cars which will indicate the character of the stores, the bureau to which they belong and particular class of stores of the various bureaus. These marks give practically the full information of the bill of lading. The value of this is readily understood by those who had experience in this class of work in 1898.

4. A definite arrangement should be made with the proper railway officials in regard to the provision of facilities at entraining points, with spurs, switches, side tracks, extra lines, loops, platforms and all facilities for handling troops and supplies on reaching such points.

5. Collection and preservation of all information of military value concerning railroads, street railways, buildings, telegraph lines, equipment, docks, yards and appurtenances of the railway systems of the United States. The quartermaster corps has gathered a quantity of information along these lines, including data on terminal facilities, various classes of sleeping cars, kitchen cars, baggage cars, freight equipment, engines, etc., and has prepared schedules from military stations to points of mobilization, concentration and embarkation.

6. It is considered desirable to provide a reserve corps for the quartermaster corps to establish the relations outlined between the railroads and the army. This corps should include a large number of railroad officials and employees in all branches of railway service, including construction and operating branches, traffic departments and the accounting branch. Such a reserve corps could be commissioned into the service and called immediately at the time of mobilization, and would be engaged in directing the movement of bodies of troops and war supplies and all the functions pertaining to the movement of troops and supplies by rail. It would thus form a link between the army and the railroads and electric lines. If the suggestion of such a reserve is favorably received, it is believed that the nominations for positions in such corps should be made by the various railway associations and organizations, after filling such requirements as the Secretary of War may consider necessary.

General. The plan proposed requires no new or radical legislation. The object can be attained through the methods outlined with the assistance of the railway authorities and with practically no new legislation except that providing a reserve corps. The other features of this plan could be carried out without introducing the feature of the reserve corps.

The operation of military and commercial trains is not essentially different. The main difference consists in the provisions of entraining and detraining. The details of instructions, so far as military requirements are concerned, should be generally along the lines required of the officers and employees of the quartermaster corps handling the details of transportation. In matters of construction and operation the same general methods would be effective as in commercial work.

As the result of personal experience it can be said that the chief difficulties are due to a lack of understanding and in no instance to an unwillingness to respond promptly to the requirements of the military service. It is believed that the reserve here suggested, to be utilized in the capacity of auxiliary officers, would effectively co-ordinate the operations of the railways and the military establishment.

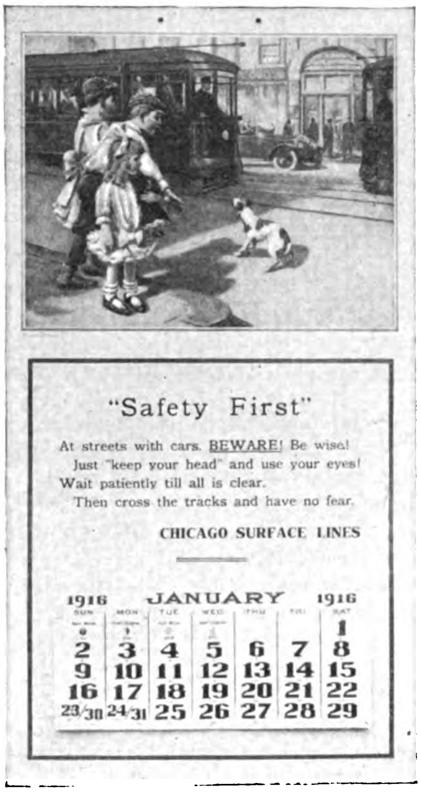
UTILIZATION OF SEA COAST TROLLEYS

The author referred appreciatively to the article in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1915, in which the main ways in which the trolley systems of the country can be utilized were concisely covered. It was pointed out that these lines can be utilized in handling men, supplies and munitions, in mobilization, in concentration and in strategic manoeuver. These lines from Maine to Virginia touch the coast at intervals every few miles. Their strategic advantages should be carefully studied and the practicability of utilizing armored cars, carrying guns, howitzers and machine guns should be carefully examined by those familiar with the problems of ordnance, engineering and coast defence. It is believed that were the American Electric Railway Association or some other general association, as suggested by General Bancroft, to propose to the War Department the willingness of the roads to assist in co-ordinating their work for defence, the way would open toward a complete understanding which would result in the full use of all the facilities afforded by the electric lines.

Chicago Surface Lines Safety Calendar

Distribution of the Calendar in the Public School Expected to Reduce Street Accidents

EVERY school room in the city of Chicago is to be presented with one of the attractive safety calendars just issued by the Chicago Surface Lines. This arrangement has been made by the railway company with the superintendent of the public schools, and it is hoped that the illustration in colors and the verse contained on the calendar will prove of educational value to the school children. In some of the schools the verse has already been set to music and other verses added so that they may be sung. The object of the jingle was to appeal particularly to the children, and it is believed that, together with the picture, it will prove of value in reducing accidents. The picture is a special painting prepared and published by the Manz Engraving Company, Chicago, and copyrighted by the Chicago Surface Lines. Arrangements may be made for reprints of the illustration and the verse upon application to the railway company and by payment of a nominal royalty. The calendar is reproduced in halftone in the accompanying illustration.



"Safety First"

At streets with cars. BEWARE! Be wise!
Just "keep your head" and use your eyes!
Wait patiently till all is clear.
Then cross the tracks and have no fear.

CHICAGO SURFACE LINES

1916 JANUARY 1916

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31	25	26	27	28	29

CHICAGO SURFACE LINES SAFETY CALENDAR

The London (England) Electric Railway is equipping many of the passenger lifts at its stations with a semi-automatic control. From the beginning of their installation all these lifts had limit switches actuated by the movement of the cars to bring them automatically to rest at the landing. Furthermore, the attendants in the elevator could throw the gate-controlling lever to the open position while the car was moving and the gates would then open of themselves by pneumatic power when the landing was reached. The elaboration of this system that is now being used consists of the control of the elevator and gate from the landings, no attendants traveling with the lift.

Traffic Circulars

The Author Describes the Art of Planning a Trolley Folder That Will Attract Travel—Suggestions Are Made on Methods of Securing Efficiency in Distribution—Some Data on Cost Are Given

By **FINLEY H. GREENE**

Secretary the Matthews-Northrup Works, Buffalo, N. Y.

SOMETIMES it seems as though an operating official is too close to the details of managing a trolley road successfully to plan and produce a folder. In manufacturing lines they say the best way to compile a catalog is to take all the inquiries the customers have sent in for a year and make the new book answer them. Probably the traveling public could suggest the best kind of folder for the electric road. Let us see how they can be got to work on the proposition.

We shall assume, to start, that the road goes to a place of some importance and that it is well equipped and the cars are run at frequent intervals. The problem now is how to say in the most effective and efficient way: "Come on, people, and ride on our nice cars; we are running them, anyway, and may as well have them filled."

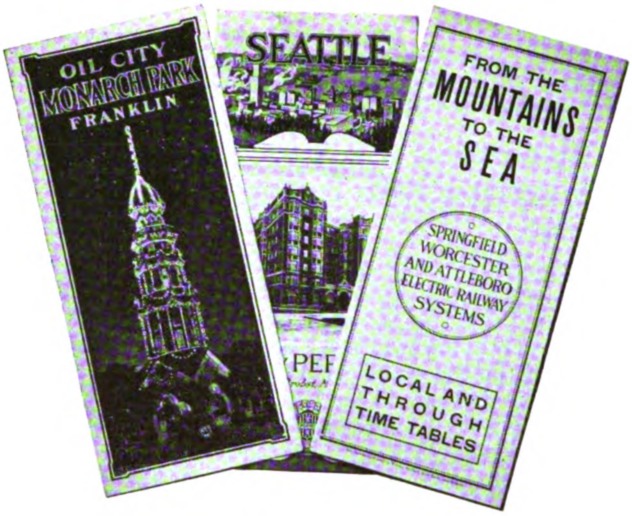
The commercial traveler steps up to the folder rack in a hotel to look the folders over. He wants to go to Auburn or Sidney or Kokomo, and make a stop or two en route. He knows where he wants to go, but he doesn't know the name of your road, so (Rule One), display the names of the important towns at top of front cover and put the name of the road at the bottom. The roads on the Pacific Coast seem to do this more than their Eastern brothers, but this may be occasioned by the heavy tourist travel out there, and also because the Peck-Juda people usually have about three full-size racks in each hotel, where we have only one in the Eastern section of the country.

The page size should be 4 in. x 9 in. (Rule Two), so the folder will stick up above the crossbars of the folder racks and fit the pocket at the same time. If the plan of distribution includes folder racks in the cars, they can just as well be made to accommodate a 4-in. x 9-in. size of folder as any other.

Folders of this kind are issued primarily to furnish the time of all cars to and from all stations, but it is using space to fine advantage, if available, to devote a page or two to cuts and write-ups of the prosperous cities reached and the attractive resorts and scenery en route. A plan successfully followed for years by the Cleveland, Painesville & Eastern Railway was to have the two-page title in colors taken from the company's general descriptive folder, and run on the time-table forms by the color printer who handled the big folder as well. Then the local printer later ran in the time-table changes, using one color only. There was no space for type talk about the scenery along the road, but the pictures incorporated into the title pages in color gave the traveler a good hint at what to expect. Handled in this way, an attractive time-table folder in colors on the two outside pages cost the company practically no more than smaller lots of plain black time folders, because the forms had to be run in large lots, and, of

ELECTRIC RAILWAYS
OF
CENTRAL NEW YORK
Electric Railways in operation
Electric Railways under construction
Steam Railroads
New Barge Canal
Erie Canal, where location differs from New Barge Canal
LAKE ONTARIO
OSWEGO
Oswego
LEWIS
ONEIDA
HERKIMER
HAMILTON
WARREN
Lake George
Glens Falls
Rome
Syracuse
Utica
Little Falls
FULTON
Gloversville
Johnstown
Sacandaga Park
SARATOGA
Saratoga Springs
ONONDAGA
Auburn
MADISON
MONTGOMERY
SCHENECTADY
Schenectady
Troy
Albany
RENSSELAER
OTSEGO
Cooperstown
CORTLAND
Cortland
CHENANGO
Norwich
SCHOHARIE
ALBANY
TOMPKINS
Ithaca
DELAWARE
GREENE
COLUMBIA
Catskill
CHEMUNG
TIOGA
VERMONT

TRAFFIC CIRCULARS—TYPICAL MAP FROM TRAFFIC CIRCULAR



TRAFFIC CIRCLARS—THREE EFFECTIVE FOLDERS

course, the color plates had already been made for the general pictorial folder.

The road mentioned operates along Lake Erie from Cleveland to Ashtabula and reaches many fine resorts, so the two-page title was designed and engraved to carry the company's station at Willoughby, the Lake County Court House at Painesville and the ore docks at Ashtabula. Then a bird's-eye map, in colors, of the whole operating territory was printed to cover eight pages, sheet size 32 in. x 9 in. The remaining six pages were taken up with black halftones and type matter. This folder was used in selling property and locating cottages along the shore, securing pictures, etc.

As colors on a folder are always more effective than plain black and white, their use becomes simply a question of expense. In general, it might be said that one color usually is employed for time-table editions but that colors are required in pictorial folders to make them so attractive that they will force themselves onto the attention of people who don't know they want to go where you want them to go. The difference is that a time-table is a utilitarian thing, that tells a man when he can go. He's more than half sold on the proposition to start with. But here's this beautiful countryside and the babbling brook, and the cool lake nestling in the woods. The railway manager knows about them, and his problem is to describe them as befits their beauty so the people in town will come off their porches and ride out along the line to see and enjoy.

The size and general form of the folder can be gaged by the shape of the territory covered. If the line is straightaway, like the C., P. & E. from Cleveland to Ashtabula, that's a long, narrow folder, 32 in. x 9 in. Or if the field squares up pretty well, make it a square sheet 16 in. wide and 18 in. deep, so it will fold to 4 in. x 9 in.

Without exception, there should be a map. People want to know where they're going, and their ignorance of locations, even near home, may be appalling to the average railway man. But he should remember that locations are a part of his business, and the traveler may have arrived from Russia two years ago and spent the interim sewing in a New York loft. How many people can sketch the relative locations of Albany, Troy, Schenectady, or Washington, Baltimore, Philadelphia?

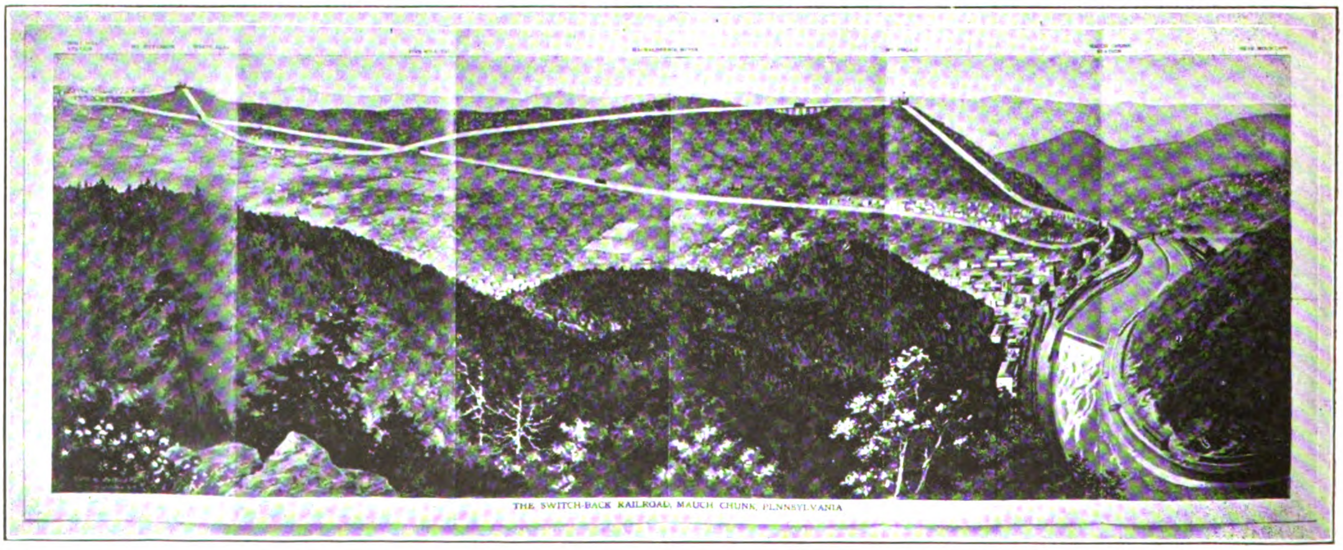
And while a patron can see where he is going with a black map on a time-table, it is advisable to picture the country in colors on the map and in the general folder. A clever artist will make a bird's-eye view of the territory that will bring out all the natural beauties in four colors. Usually, on a map, we find black used for the foundation plate, which carries all names of places and connecting lines; blue for water, buff or olive for a tint over the whole surface of the land, then using red for the line of the road issuing the edition. Beautiful examples of color maps of this kind are those of the Duluth Street Railway, Spokane & Inland Empire, New York State Railways, Schenectady Railway Company and Ohio Electric Railway.

It is a serious mistake (Rule Three) to print time on the pages of a general folder if it is issued in large quantities. In case the time changes, the beautiful folder is wasted. Some years ago, an official in Illinois led me into the stationery storage room and showed a boy at work trucking folders to the furnace. "Never again for me," he said; "the folders were doing good work, and I want more of them at once, but I shall put pictures into the time pages and issue a time-table separately."

When a color map is engraved, the black plate should be made so it can be run without the colors in the time-table editions.

EFFICIENCY IN DISTRIBUTION

We know how time-tables are displayed in folder racks at all points along the line and especially at junction


THE SWITCH-BACK RAILROAD, MAUCH CHUNK, PENNSYLVANIA

TRAFFIC CIRCULARS—BIRD'S-EYE VIEW OF MAUCH CHUNK RAILWAY FROM TRAFFIC CIRCULAR points and terminals, but the suggestion is made that this distribution should not stop at that. Time-tables should be displayed along the connections and at points beyond terminals. For instance, a road operating out of Buffalo should have time-tables in the racks at Erie, Dunkirk, Westfield, Jamestown, Niagara Falls, Hamilton, Tonawanda and Lockport.

It is somewhat more difficult to distribute pictorial editions so that each copy will count. Every Sunday school, business house and fraternal society likely to go on a picnic should receive a copy by mail. One day a week, Friday usually, it is advisable to run a reading notice in the newspapers calling attention to the trip and offering the folder. Display of expensive pictorial editions in the cars has usually been found too expensive, because it does not get the copies into the homes where the trips can be planned, and it often is pointed out as waste circulation to give a man a folder when he is already taking the trip. One trolley official has analyzed his distribution of folders to a fine point. He mails new time-tables to the sales managers of all large concerns in his cities and to all their traveling men whose names he has, while the pictorial folder goes out each spring to another officer of the same concerns, but it has been learned by personal calls that this official has charge of the company picnic. This same trolley official has found that it pays him, just before the Fourth of July each year, to distribute his pictorial folder in the best residential section of the city. He takes care to reduce waste by having his own men do this work. He instructs them to ring the bell, and when it is answered say just ten words as they hand in a folder: "Lake ——— (naming the resort) is a fine place to spend the Fourth." Of course, he gets an enormous traffic on the holiday. He might get most of it anyway, but he figures he has the public started, going to his resort, and his experience and records prove that they keep going all summer. Folders are mailed out of town on receipt of 4 cents in stamps.

SOMETHING ON COST

Now, this article would not be complete without a few words about the cost of a suitable folder. First comes the map. It is advisable to have a good one stamped in wax, with all names clean and clear. People's eyes are trained to read newspaper type, and maps are always better when all names are set up in type and punched into a wax pattern. It is true that this process is more expensive to start with than a copy drawn by hand on tracing cloth and photoengraved onto zinc, but the names drawn by hand often vary in size and style and become hard to read when reduced into the printing plate. The cost of a map should be considered separately from the printing price of the folder—say $150 for a black map and $350 if in four colors. Another advantage of the wax map is that no drawing is required. The engraver prepares his own rough copy and then cuts lines with a graving tool and stamps the names with type.

The next cost to consider in issuing a time-table is setting the type. This usually is expense to be incurred but once, for most printers are willing to keep it standing in the forms ready to print, so the type may be used again for subsequent editions simply by correction of the items affected by time changes. For the pictorial folder there is no time to set, but we have instead the halftones to engrave for illustrations and the descriptive text to compose, but this usually is straight reading matter than can be set by machine. After the map is made and type set, the time-table usually can be run in a 10,000 lot for $50 to $100, depending on the number of pages. The color folder is, of course, more expensive.

The question often is asked whether it is better for a road operating to points of historic interest to name them right in the map or run reference numbers there and index the names in the margin. Our experience shows that historic points mean as much traffic as some cities and should have as prominent a showing on the map.

"Saturday Evening Post" Answered[*]

A Criticism of One of Its Recent Editorials Telling What "Good Service" Really Is

BY JOHN A. BEELER, DENVER, COL.

CITY TRAVEL

> Seems to us we have not dropped into any American city any time the last ten years without finding it in more or less of a throe over local transportation. Occasionally it is jitneys, but usually it is the street cars. It might help some if a few basic facts were generally understood.
>
> In the first place, there is no such thing as a good city street car service. There never has been and probably there never will be. Perhaps the nearest approach to it is in Washington; but in Washington there are really no rush hours. The only rush that occurs in Washington is the rush for the pie counter when a new administration comes in, every four or eight years.
>
> Elsewhere the typical situation is that a majority of those who ride at all want to ride in certain limited periods, morning and evening. If facilities were provided to carry them all comfortably, with a seat for every passenger, those facilities would lie idle the greater part of the day and bond interest would be in default. Obviously, there is no good street car service unless there is always a seat for every passenger.
>
> That is like looking for a dodo or any other unobtainable object. The practicable goal is, not a good service but one that is least bad. For a good service there must be other means of transit than the standardized 5-cent surface, elevated or subway scheme, because if those schemes provide equipment to carry the rush-hour crowds in comfort they will not earn a return on their investment. If they do earn a return on their investment they will not carry the rush-hour crowds in comfort.
>
> The 10-cent motor buses do not take very extensively, but the time is almost at hand when everybody with 10 cents will have an automobile. That may prove the solution.—*From "Saturday Evening Post," Jan. 8, 1916.*

THE above editorial appeared in the *Saturday Evening Post* of Jan. 8 this year. Now the *Post* is a real paper and I, being a traction manager for the best part of my life, became deeply interested when I read the sweeping statement that "In the first place there is no such thing as good street car service."

I rubbed my eyes and reread the article, noting especially the definition which in the writer's opinion constituted good service, viz.: "Obviously, there is no good street car service unless there is always a seat for every passenger."

The article then goes on to show the practical impossibility of complying with this requirement, at the same time leaving the thought, probably unintentionally, that there is very little if anything worthy of commendation in traction companies.

Now, even though contrary to the belief of editorial writers generally, traction men have some feeling. True, they may not be the most sensitive people in the world, but to be summarily dismissed, once and for all, bag and baggage, in a single sentence to ignoble condemnation seems like a trial without judge or jury with only the executioner present.

Why not just say "weighed and found wanting"? That would be shorter and more concise. But that would not do, for the subject has not been weighed. If it had, the condemnation would, at least, not have been so sweeping.

In the first place, I want to mention some "basic facts" that should, I believe, underlie good city street car service.

The frequency of the headway, the scope of the system in the territory served, the routeing of the lines, the transfer privileges, the smoothness of the tracks, the character of the rolling stock, the courtesy of the employees, the price charged for the service, etc. Any one of the above might rank equally important with the seat requirement if it were not for the fact that they are taken as a matter of course.

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[*] Text (slightly modified) of a letter sent by the author to the *Saturday Evening Post.*

Suppose the rule was a seat at all times for every passenger. During certain hours of the day and night probably two-thirds of the present street car service in the United States could be discontinued and yet provide the required seat. True, the present rush-hour service would have to be increased. Possibly a sufficient saving could be effected in the non-rush hours to do this. However, would this really be an improvement? Isn't the frequency and the regularity of the service during eighteen or twenty hours a day a more important factor than "always" a seat for everyone during the rush-hour period?

Nearly every business has its rush period. When a man steps into a popular café he may have to wait for an unoccupied table. At the barber shop he waits for his turn as "next"; in a big store it is sometimes necessary to wait for a clerk. We stand in line at the teller's cage at the bank, at the post-office, at the ticket window, etc.

Now, Mr. Editor, you probably say in answer to this: "Yes, but even after I wait for the car I cannot get a seat." That may be true during the rush hours. But on the other hand, neither do we always get the particular table at the café desired, or the barber preferred, or our favorite salesman, or the best seat in the house. At the best we take our chances after waiting. Why condemn only the street car company and not these things generally.

To maintain a good service during the non-rush hours and also to provide seats for everyone during the rush hours is indeed a very difficult and expensive task, but Denver has practically solved this question, and the great majority of her citizens, if asked, will state emphatically that she enjoys good city street car service in this and in every other respect. As every street railway man knows, seats during the rush hours means not only extra cars, but extra power plants, extra equipment, more substations, more transmission and feed lines, more carhouses, more men—all involving heavier operating expenses and greater overhead charges, including interest, insurance, taxes and depreciation on additional plant and equipment.

By far the greatest problem with most companies is the securing of men to man the cars for the rush hours only. If a company has to pay a whole day's wage for one or two trips, it would, with a 5-cent fare and a free transfer, soon be bankrupt, as the *Post* shows. But great advancement is being made throughout the country, even in this matter of more seats during rush hours, and it may yet be solved without raising the fare during the rush hour in order to encourage travel at other hours, which plan would be unpopular. To-day, in Denver, an average of more than 90 per cent of all passengers carried during rush hours secure seats, except for an average distance of about six blocks. During rush hours we double the seating capacity by attaching large, commodious, light-weight trail cars to the regular motor cars, and on certain lines we more than double it by adding additional trains of this character.

These trail cars are manned with conductors recruited from the Denver University and the various high schools. The hours do not interfere with the studies of the young men, who are thankful for a few hours' work for which they receive the regular wage rate. It makes better men of them, besides assisting many a worthy young man through school and college, and their duties are performed in a manner entirely satisfactory to the company and to its patrons.

About ten years ago I inaugurated this service, gradually increasing it from time to time, until it now covers practically the entire system. It has proved beneficial not only to the young men, but to the regular men by reducing the extra list. It is approved by parents, teachers and the public, and it has enabled the company to solve the rush-hour problem without encountering the minimum wage proposition.

Of course there are badly-managed traction companies, giving poor and inadequate service, but should all traction service be condemned on this account? After all, what industry has made greater strides in advancing health, happiness and prosperity than the trolley by making it possible for those of moderate circumstances to live in the fresh air and sunshine and yet retain their city employment? Philadelphia is an example of marvelous traction development and improvement, which should be a matter of special pride to the *Post*.

Where is there any one thing for which a person can secure as much for his money as from a traction company? I anticipate your answer here. You will say the *Saturday Evening Post*, and it is truly marvelous what you do furnish the reader for 5 cents. You are only enabled to do this, however, by the large revenue received from your valuable advertising pages. Thus, after all, it is advertising which makes it possible for you to furnish your remarkable service. Were the traction companies able to secure a like proportionate gross revenue from advertising they could almost afford to carry patrons free.

The conclusion reached by the editor, that the solution may lie in the fact that when everyone with 10 cents will have an automobile, is not likely to be realized, especially in cities of any importance. Denver, with its broad, smooth streets, has considerable congestion now with only 7000 autos on the streets. If every family owned its own auto some 50,000 machines for the 225,000 people would be required, and the congestion during the rush hour would be intolerable. But how much more so would it be in the larger and more densely populated cities of the East? Every avenue and thoroughfare would be choked for hours. One day's trial would demonstrate the futility of this. The dear old traction car with all of its faults would be welcomed back with outstretched and eager arms, as in Chicago after a day or two cessation of operation on account of the recent strike, or as it was in Denver after the great deluge of snow in December, 1913.

The regrettable thing is that one rarely if ever sees a word of commendation for traction companies, men, or service in any of our great periodicals, when there is so much that could in all fairness be said in their behalf.

Endowment for Fellowship in Electrical Engineering

Under the terms of an endowment made by Clarence Mackay, of New York City, jointly with his mother, Mrs. John W. Mackay, the University of California has established two John W. Mackay, Jr., fellowships in electrical engineering, of an annual value of $600 each. The fellowships are open to all properly qualified university graduates. The object is not to facilitate ordinary engineering or scientific study, but to enable students who have completed a college course to do advanced research work in electrical engineering, with a view to aiding the advance of the application of electricity to scientific and industrial purposes. A form for use in applying for a John W. Mackay, Jr., fellowship in electrical engineering may be obtained from the recorder of the faculties, University of California, Berkeley, Cal.

Traffic Studies in Lafayette, Ind.*

The Author Describes the Results of Recent Street Railway, Private Automobile, Jitney and Pedestrian Traffic Counts on a Loop Line Connecting Two Distinct Districts of a City of 20,000 Inhabitants

By D. D. EWING

Assistant Professor of Electrical Engineering, Purdue University

IN view of the present general interest in transportation and highway engineering problems, it is thought that a brief summary of the data thus far obtained in a traffic study recently made at Lafayette, Ind., may be interesting to electric railway, highway and municipal engineers.

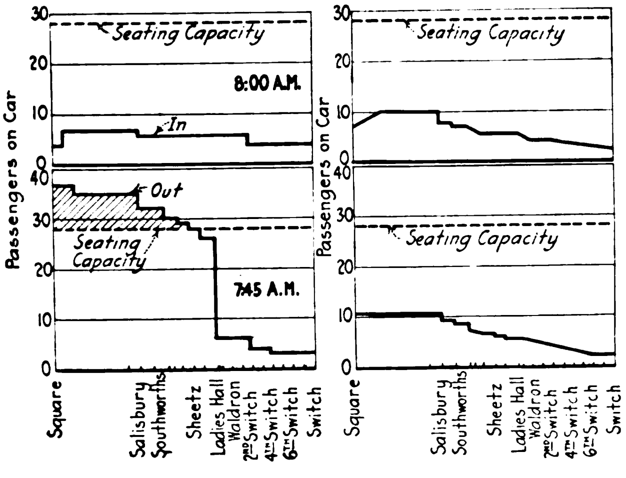
The objects of the study are the determination, in so far as is possible, of (1) the sufficiency of the present street car service; (2) the magnitude of the jitney-bus operations and their effect on the street car service; (3) the character, the volume and the hourly, daily and seasonal variations of the traffic passing over the levee which joins Lafayette and West Lafayette.

This levee carries most of the traffic between the two places. It is new, as the disastrous flood of 1913 destroyed the old one. The paving is wooden block.

According to the 1910 census the population of Lafayette was about 20,000 and that of West Lafayette, 3800. These figures do not include the 2000 students of Purdue University, most of whom reside in West Lafayette during the time the University is in session.

The car traffic observations were made on the Purdue Line of the Lafayette street railway system. This line runs west from the courthouse square in Lafayette, across the Main Street bridge over the Wabash River and the levee above mentioned, along State Street, West Lafayette, to Waldron Street, north on Waldron Street to Seventh Street, east on Seventh and Thornell Streets to Salisbury Street, thence south to State Street again, thus forming a loop which incloses the main campus of Purdue University and a portion of the residence and business sections of West Lafayette. The route, with the main stops properly located as far as scale of distance is concerned, is used as the abscissas of the graphs in Figs. 1 and 2. The route length is 3.04 miles.

Some data on the headway of cars and weather conditions which existed during the time of the autumn observations are given in Table I. The so-called "regular" cars are operated around the loop in both directions, that is, when they arrive at the State Street end of Salisbury Street, instead of going on into Lafayette, the passengers are transferred and the cars turned back around the loop in the opposite direction. As operated the Purdue line is really part of what the street railway company calls its "Purdue-Oakland line." The outbound traffic over the Purdue line, therefore, does not all originate at the courthouse square but some comes from points farther east of the Oakland line. Also as the courthouse square is a transfer point, some passengers are transferred to the Purdue line from other lines. Likewise, the in-bound passengers do not all stop at the courthouse square. The tripper cars start at the courthouse square. They do not run around the loop, however, but are turned back at the Ladies' Hall entrances to the University campus because the traffic beyond this point is light. The tripper car route length is 1.22 miles.



LAFAYETTE TRAFFIC—FIG. 1—MAXIMUM LOAD "OUT" AND "IN," SATURDAY, OCT. 30, 1915; FIG. 2—DISTRIBUTION GRAPH, AVERAGE FOR SATURDAY, OCT. 30, 1915

The jitneys usually operate between the courthouse square and Southworth's (see Fig. 1), although occasionally some of them go as far west as do the tripper cars. The jitneys are, therefore, operating in direct competition with the tripper cars, except that some of the tripper car passengers are carried on transfers from other lines, or are transferred to other lines at the courthouse square. Jitney operation is not regulated, although special licenses are required. Most of the jitney cars are Fords. The jitney operators may be divided into three classes: (1) Those who make a regular business out of the work; (2) workmen or others who hang out a "taxi" sign while on their way to or from their regular work, or who operate only during the evening rush-hour periods; (3) farmers who come into town and run their automobiles in jitney service during Saturday afternoons and evenings. By reason of the good paving and the large amount of short-haul traffic, conditions are very favorable for jitney service between Lafayette and West Lafayette.

TABLE I—GENERAL DATA

Headway between cars:	
Regular cars	15 min.
Tripper cars	5 min. (7 a. m., 1 p. m., 4 p. m., 10 p. m.) 7½ min. (remainder operating day)
Seating capacity of cars	28
Seating capacity of jitneys	4
Length of car route	3.04 miles
Length of jitney route	0.85 miles
Time and weather conditions:	
Saturday, Oct. 30, 1915, warm and clear.	
Sunday, Oct. 31, 1915, cool, clear and windy.	
Wednesday, Nov. 10, 1915, cool and clear.	

Various data regarding the street car traffic are given in Tables II and III. The average number of passengers per trip was low, varying between 19.6 and 25.4 per cent of the seating capacity of the cars. The tripper car traffic was much lighter than that carried by the regular cars. On Saturday, the day of heaviest street car traffic, the average number of in-bound passengers per tripper car was only 3.5. The corresponding number for the regular cars was 10.5. It appears, therefore, that the greater part of the street car traffic is long-haul traffic.

As shown in Table III, the percentage of overloads

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*Abstract of a paper presented at the annual convention of the Indiana Engineering Society, held in Indianapolis, Feb. 3 to 5.

TABLE II—STREET CAR TRAFFIC DATA

Day	Saturday	Sunday	Wednesday
Number of trips, regular car, out.....	71	64	68
Number of trips, regular car, in.......	70	62	67
Number of trips, tripper car, out......	124	98	99
Number of trips, tripper car, in.......	126	98	101
Total trips, all cars, out.............	195	162	167
Total trips, all cars, in..............	196	160	168
Total trips, all cars, both ways.......	391	322	335
Total passengers, regular cars, out....	968	905	695
Total passengers, regular cars, in......	734	769	538
Total passengers, tripper cars, out.....	371	255	239
Total passengers, tripper cars, in.....	439	361	349
Total passengers, all cars, out........	1,339	1,160	934
Total passengers, all cars, in........	1,173	1,130	887
Total passengers, all cars, both ways..	2,512	2,290	1,821
Average load per car, both ways......	6.4	7.1	5.5
Average load, per cent seating capacity	22.8	25.4	19.6

TABLE III—STREET CAR OVERLOAD TRAFFIC DATA

Day	Saturday	Sunday	Wednesday
No. of overloads, regular cars, out.	5	6	1
No. of overloads, regular cars, in..	3	4	1
No. of overloads, tripper cars, out.	1	1	0
No. of overloads, tripper cars, in..	0	0	0
Number of overloads, both ways.	9	11	2
Overloads, per cent total trips....	2.3	3.4	0.56
Time, maximum load, out........	7.45 a. m.	5.00 p. m.	7.45 a. m
Time, maximum load, in.........	2.45 p. m.	9.15 a. m.	7.15 p. m.

was extremely low, for the different days varying between 0.56 and 3.4 per cent. As here used an overload is defined as a load in excess of the seating capacity of the car, no account being taken of the passengers "standing by preference." On days when the University is in session the maximum load "out" is usually carried by the car which leaves the courthouse square at 7.45 a. m. and is due to students living in Lafayette who are on their way to 8 o'clock classes. This overload is not usually excessive and, as shown in Fig. 1, the next "in" trip is light.

The lower graph, Fig. 1, is plotted with passengers in the car as ordinates, and main stopping points, spaced to scale, as abscissas. The number of passengers leaving the car at a given point is indicated by the height of the offset in the graph at that point. The shaded area indicates load in excess of seating capacity. Beyond the point marked "switch" the traffic is very light and the observer changed at this point to an in-bound car. The upper graph shows the load conditions for this "in" trip.

Graphs representing the averages of all "in" and "out" trips for Saturday are shown in Fig. 2. Sloping lines indicate a change of load between main stopping points. In connection with these graphs the various areas are of interest. The area between the seating capacity line and the axis of abscissas is a measure of the total seat mileage per trip. Similarly, the shaded and unshaded areas are, respectively, measures of the empty seat mileage and passenger mileage. The ratio of passenger-miles to total seat-miles for the average "in" trip is only 0.173 and for the average "out" trip, 0.186. The passenger-miles per trip divided by the number of passengers per trip gives the average length of ride, which in this case for the in-bound trip is about 1.6 miles, transfer passengers neglected.

The graphs of Fig. 3 indicate the number of passengers carried by the cars for the various hour periods of the operating day. It will be noted that the "in" peaks and "out" peaks do not come simultaneously.

A careful study of the car traffic data leads to the conclusion that from the standpoint of car seating capacity and schedule, the service is better than the traffic demands justify.

In Table IV are summarized the jitney traffic data. It will be noted that, while the number of passengers per trip only averaged 1.5, the total number of passengers carried by the jitneys is comparable with the number carried by the street cars. In fact, the data show that the jitneys carried about two and one-half times as many passengers as the tripper cars. Apparently the short-haul passengers preferred the jitney as a conveyance. Bad weather conditions would undoubtedly affect this preference. In the present case the preference seemed to be at least partly due to the fact that the

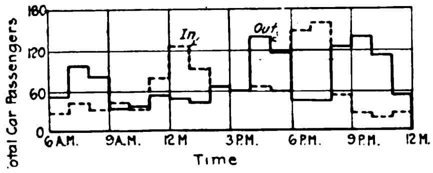

Fig. 3—Total Car Passenger Loads, Saturday, Oct. 30, 1915

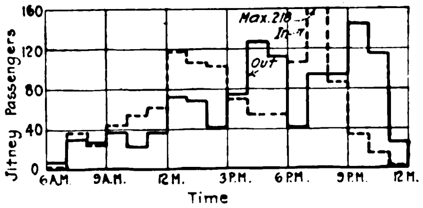

Fig. 4—Jitney Passenger Loads, Saturday, Oct. 30, 1915

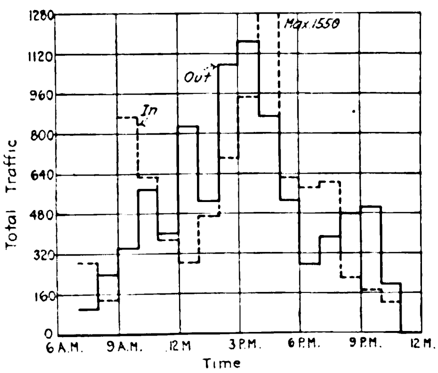

Fig. 7—Total Traffic, Sunday, Oct. 31, 1915

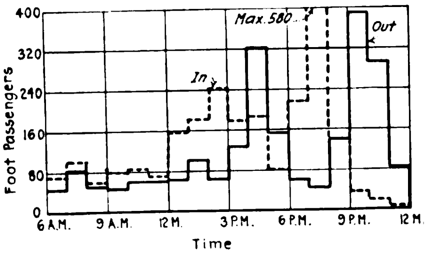

Fig. 5—Pedestrian Traffic, Saturday, Oct. 30, 1915

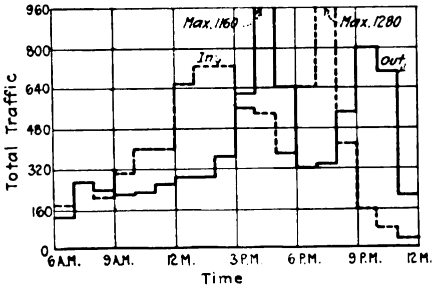

Fig. 6—Total Traffic, Saturday, Oct. 30, 1915

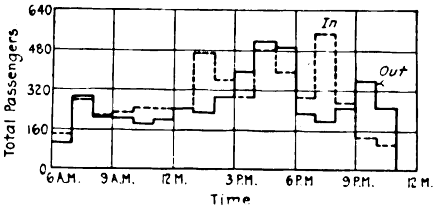

Fig. 8—Total Traffic, Wednesday, Nov. 10, 1915

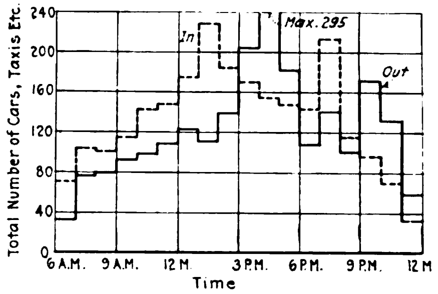

Fig. 9—Cars, Autos, Jitneys and Other Vehicles, In and Out, Saturday, Oct. 30, 1915

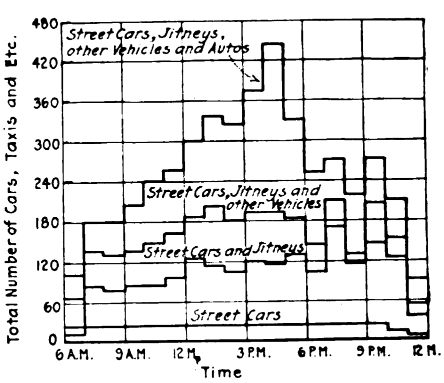

Fig. 10—Cars, Autos, Jitneys and Other Vehicles, Both Ways, Saturday, Oct. 30, 1915

Diagrams Accompanying Traffic Studies in Lafayette, Ind.

TABLE IV—JITNEY TRAFFIC DATA

Day	Saturday	Sunday	Wednesday
No. of jitneys operating (approximate)	23	12	19
Total jitney trips, out	709	380	446
Total jitney trips, in	772	371	453
Total jitney trips, both ways	1,481	751	899
Total jitney passengers, out	1,194	632	697
Total jitney passengers, in	1,180	506	623
Total jitney passengers, both ways	2,374	1,138	1,320
Ave. passengers per jitney, both ways	1.60	1.52	1.47

TABLE V—JITNEY EARNINGS

Day	Saturday	Sunday	Wednesday
Total jitney earnings	$118.70	$56.90	$66.00
Average earnings per jitney per day	$5.15	$4.83	$3.47
Average number trips per jitney	64.4	62.6	47.3
Average earnings per trip, cents	8.0	7.6	7.3
Ave. earnings per jitney-mile, cents	9.4	8.9	8.8

TABLE VI—OTHER TRAFFIC DATA

Day	Sat.	Sun.	Wed.
Number of private autos, out	901	1,165	661
Number of private autos, in	940	1,123	708
Number of private autos, both ways	1,841	2,288	1,369
Number of passengers, private autos, out	2,268	3,801	1,453
Number of passengers, private autos, in	2,433	3,614	1,564
Number of passengers, private autos, both ways	4,701	7,415	3,017
Number of other vehicles, out	451	312	324
Number of other vehicles, in	618	329	376
Number of other vehicles, both ways	1,069	641	700
Number of passengers in other vehicles, out	758	556	621
Number of passengers in other vehicles, in	812	599	489
Number of passengers in other vehicles, both ways	1,570	1,155	1,110
Number of pedestrians, out	2,094	2,474	1,177
Number of pedestrians, in	2,489	2,641	1,370
Number of pedestrians, both ways	4,583	5,115	2,547

TABLE VII—PASSENGER TRAFFIC SUMMARY (BOTH WAYS)

Time	Saturday	Sunday	Wednesday	One Week
Street car passengers	2,512	2,290	1,821	13,900
Jitney passengers	2,374	1,138	1,320	10,100
Private auto passengers	4,701	7,415	3,017	27,200
Other vehicle pasengers	1,570	1,155	1,110	8,275
Pedestrians	4,583	5,115	2,547	22,425
Grand total	15,740	17,113	9,815	31,900
Per cent total:				
Carried by street cars	15.9	13.4	18.6	17.0
Carried by jitneys	15.1	6.7	13.5	12.8
Carried by private auto	29.9	43.3	30.6	33.2
Carried by other vehicles	10.0	6.7	11.8	10.1
Pedestrians	29.1	29.9	26.0	27.4

TABLE VIII—VEHICLE TRAFFIC SUMMARY

Time	Saturday	Sunday	Wednesday	Week
Total trips, cars	391	322	335	2,390
Total trips, jitneys	1,481	751	899	6,780
Total trips, private auto	1,841	2,288	1,369	10,970
Total trips, other vehicles	1,069	641	700	5,310
Grand total	4,782	4,002	3,303	25,300
Per cent total:				
Cars	8.2	8.0	10.1	9.4
Jitneys	31.0	18.7	27.2	26.6
Private auto	38.5	57.3	41.5	48.4
Other vehicles	22.3	16.0	21.2	20.6

time necessary to make the trip was far less with the jitney than with the street cars. This difference of time in favor of the jitney would partly disappear if the speed limit ordinances were rigidly enforced, although by reason of its fewer stops, the jitney, if operated at the same maximum speed as the cars, could be expected to maintain a higher schedule speed.

The financial data of Table V have been computed from data given in Tables I and IV. On account of the fact that the number of jitneys operating varied throughout the day, too much stress should not be placed on the average earnings per jitney per day. The jitney owner working from twelve hours to eighteen hours per day would be likely to earn considerable more than the average. The short-haul makes the jitney earnings per mile rather high even if the average load is small.

The graphs in Fig. 4 show the number of passengers hauled by the jitneys on Saturday during the various hour periods between 6 a. m. and midnight. The graphs in Figs. 5 and 6 give similar data for the foot traffic and total traffic respectively. It will be noted that these graphs are similar in general shape.

In Table VI is given a summary of all traffic other than that previously discussed. "Other vehicles" include all those not specifically classified.

Total traffic graphs giving the number of people passing "in" and "out" during the various hour periods of the other two days are given in Figs. 7 and 8.

Figs. 6, 7 and 8 may be compared for the purpose of studying daily total traffic variations. The graphs show clearly the special traffic conditions encountered on Saturdays and Sundays as compared with those encountered on week days. It may be noted here that the days on which observations were made were average autumn days and the graphs do not contain abnormal peaks. The peaks indicated were, depending on the hour and day, caused by shoppers, amusement seekers, clerks, workmen, churchgoers or other similar waves of traffic.

In Table VII is summarized the total passenger traffic for the three days and for a week, the latter being estimated on the basis that the Wednesday traffic was a fair average for the five week days. The crews of the street cars and jitneys are not included in these figures. Considering the population from which the traffic is derived the magnitude of the grand totals is surprising. A study of the data indicates that on the week basis, about 30 per cent of the traffic was "fare" traffic, and that the street cars carried about 60 per cent of it. One-third of the total passenger traffic was carried by private automobiles.

Studies have been made of the car traffic in previous years, but not for the same time of year. While data from these studies are not directly comparable with the data here presented, the indications are that with the advent of the jitneys and numerous private automobiles the street car traffic decreased about 25 per cent. It is probable that the major part of this loss is due to the loss in the short-haul traffic which the jitneys now carry, but since the jitneys at the time of the observations carried 40 per cent of the "fare" traffic, it is evident that they are traffic makers themselves. By increasing the riding habit of the people they may actually be of some assistance to the street railways in the matter of long-haul traffic.

A study of Figs. 3, 4 and 6 leads to the suggestion that the jitneys may be of still further service to the street railways by acting as "peak absorbers." The lure of possible fares "automatically" increases the number of jitneys operating during the rush-hour periods and thus lowers the demands on the street railway, provided that the increase in jitneys does not too seriously affect car operation by increasing the street traffic congestion. This "automatic peak absorbing" action is of value to the street railways if the peak is of such a nature as to demand the use of extra equipment for a short time, otherwise, instead of being of assistance to the railways the jitneys are the cause of a direct loss in net income. The fact that unregulated jitneys do act as peak absorbers may well be made the basis of objection by the street railway company against increasing rush-hour service, is an important point.

The total Saturday vehicle traffic, "in" and "out," during the various hour periods is plotted against the corresponding periods in Fig. 9. Fig. 10 is a summation of the graphs of Fig. 9, the summation being divided in such a manner as to indicate the distribution of traffic among the various classes. For example, the intercept between the "Street Cars" graph and the "Street Cars + Taxis" graph for a given hour is the number of jitneys passing the observation point during the hour. The total vehicle traffic is summarized in Table VIII.

The percentages are interesting. On the week basis, approximately 70 per cent of the traffic is automobile, 10 per cent street car and 20 per cent horse-drawn vehicles. By comparing the average loads in Tables II and IV it will be seen that for the same passenger traffic handled four jitneys were required to carry the traffic carried by one car. On the week basis, a little more than one-fourth of the vehicle traffic was due to jitney operation. From the standpoint of paving wear, these figures might well interest the taxpayer, since the street railway pays directly for a strip of the paving, and in proportion to the assessed value of its property helps to pay for the remainder, while jitney owners in communities where there is no jitney regulation pay little or no tax on their equipment and only nominal license fees. As traffic congestion affects the safety and welfare of the public the figures should be of interest to municipal authorities as well as the public at large.

A brief summary follows of some of the more important points brought out by the study, the figures given being approximate:

1. From the standpoints of seating capacity and schedule the street car service was better than the autumn traffic demands justified.
2. The jitneys carried more of the short-haul traffic than did the street cars.
3. The average earnings per jitney-mile were 8.9 cents.
4. One-third of the people going from one town to the other rode in private automobiles and 30 per cent paid fares.
5. Seventy per cent of the vehicle traffic was due to automobiles, 10 per cent to street cars and 20 per cent to horse-drawn vehicles.
6. On the basis of the same number of people carried the jitney vehicle traffic was four times the car vehicle traffic.

The writer desires to express his indebtedness to M. Q. Allen, L. A. Hurley, H. H. Fisher, K. Kline and C. G. Bach, seniors in the School of Electrical Engineering, Purdue University, who collected the original data and plotted the traffic graphs, and to Jack Abbott, superintendent Fort Wayne & Northern Indiana Traction Company.

Safety-First Exhibit in New Haven

The New Haven Public Library Arranges Material Donated or Loaned by Manufacturers and Railways Into an Attractive Safety Exhibit

BY KENNETH C. WALKER

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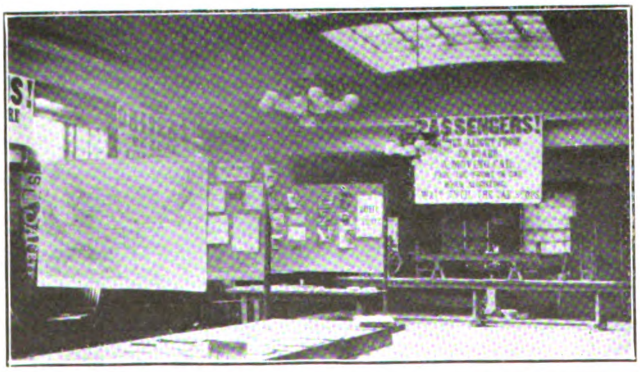
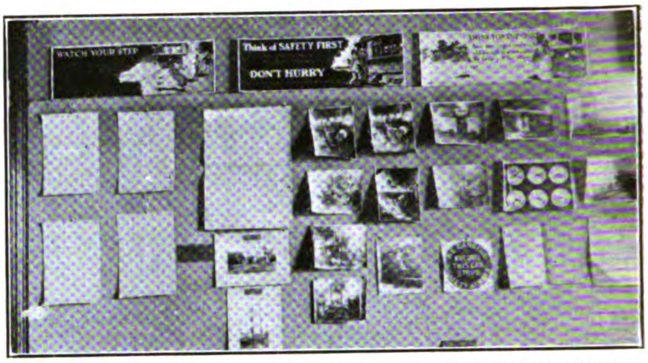
EARLY in the month of November the New Haven Public Library had an offer from the industrial department of the New Haven Y. M. C. A. of the loan of the United States Steel Corporation's safety exhibit. From this offer plans were laid at once, with the co-operation of A. B. Dickson, industrial secretary of the Y. M. C. A., for an enlarged exhibit. Inasmuch as the safety-first movement largely relates to industries the planning and general direction of the enlarged exhibit was logically undertaken by the technology department of the library.



GENERAL VIEW OF NEW HAVEN LIBRARY SAFETY EXHIBIT



SAFETY-FIRST POSTERS AND PHOTOGRAPHS SHOWN IN EXHIBIT

As a result of a careful survey of the field and well-directed inquiries, more than forty firms sent material, either as gifts or loans. Among the railway operating and manufacturing companies which exhibited were the following: American Mason Safety Tread Company; Boston Elevated Railway; Brooklyn Rapid Transit Company; Connecticut Company; General Electric Company; Nachod Signal Company; National Safety Council, Chicago, Ill.; New York, New Haven & Hartford Railroad, and Public Service Corporation of New Jersey.

The accompanying illustrations give a general idea of the exhibit. Although much of the material was in the form of photographs and posters, there were many pieces of apparatus. A special demonstration of the pulmotor was one of the features. Already requests for this exhibit have come from different sources, one request suggesting that we make a suitable exhibit to send around to other cities in this State. It is quite likely that such an exhibit will be sent to libraries interested.

To obtain the necessary publicity, the industrial department of the Y. M. C. A. had several hundred invitations printed and mailed to people of importance and distributed freely among the shops and carhouses. The vice-president of the street railway company very kindly consented to our request to have signs placed in vestibule windows worded, "Be Careful, Safety Always, Wait Until This Car Stops," and dashboards bearing the notice, "Look Both Ways Before Crossing the Street, Safety Always."

New Gasoline Line to Operate in the Southwest

A new 43-mile line, known as the California Southern Railroad, is now under construction in the Palo Verde Valley of California from Blythe Junction on the Santa Fé Railroad to Blythe. The line is standard gage and at first will be operated by gasoline, but later will probably be operated by steam. Eighteen miles of the line have already been completed and the company expects to complete 25 miles within the next thirty days and the 43 miles to Blythe by this spring. The line will traverse a rich mining district. The officers of the company are: President, J. M. Neeland, who built the Pan-American Railroad in Mexico and various other lines; vice-president and general manager, C. H. Beggs, formerly vice-president and manager of the Frisco System; secretary and treasurer, J. R. Grant; vice-president, J. H. Borders; general freight and passenger agent and auditor, W. F. Burnett. The general offices of the company are in the Investment Building, Los Angeles, Cal.

Railway Operation in Cleveland*

Efforts Made in Cleveland to Reduce Cost of Operation in Order to Permit Low Fares Under Tayler Ordinance—Details of the Service Rendered and the Actual Cost of Operation Under This Ordinance

By F. W. DOOLITTLE

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IN 1903 Tom L. Johnson was re-elected Mayor of Cleveland upon a platform pledging the establishment of competing 3-cent fare railways, together with possible municipal ownership, etc. For several years after this date the street railway situation at Cleveland was in a very unsettled condition. Various proposals were made by the company but rejected by the city; others were made by the city and rejected by the company. Franchises were given to newly-organized companies to operate in limited districts at a 3-cent fare; but no real progress was made.

TAYLER ORDINANCE

Finally, however, a settlement was reached through the referendum approval on Feb. 17, 1910, of the Tayler ordinance, granting a renewal of the street railway franchises to the Cleveland Railway and fixing the rates experimentally at 3 cents cash fare and 1 cent for transfer with no rebate.

The features of the plan, as later amended, were briefly these:

1. The city of Cleveland, through its Council and its street railroad commissioner, was to prescribe the service.
2. The revenues were to be credited to an "interest fund" established at $500,000 by an initial payment of that amount by the company.
3. To cover costs of operation, the company was to be allowed: (a) For maintenance, depreciation and renewals 4 cents per car-mile during January, February, March, April, May and December; 5 cents per car-mile during November, and 6 cents per car-mile during June, July, August, September and October; (b) for operation 11.5 cents per car-mile, these allowances being computed on the basis of total car mileage less all yard and house mileages, all mileages made by service equipment and 40 per cent of the trailer car mileage.
4. Interest at 6 per cent was to be calculated on the agreed valuation at the date of the taking effect of the ordinance, plus the value of such additions and betterments as should be agreed upon by the city and the company, less the bonded indebtedness of the company. On the funded debt interest was to be allowed as disbursed. This is and has been 5 per cent.
5. If at any time after a trial period of eight months the interest fund should amount to more than $700,000, the company was forthwith to put into effect the next lower rate of fare, and if the fund should fall below $300,000, the next higher rate of fare. Ten rates were provided for, varying from 4 cents plus 1 cent for transfer to 2 cents with free transfers.

EXPERIENCE UNDER ORDINANCE

The trial period of eight months provided by the ordinance for the operation of a 3-cent fare plus 1 cent for a transfer was completed on Nov. 30, 1910. As the interest fund was approximately $550,000, this rate of fare was continued. In May, 1911, the city asserted that the interest fund exceeded $700,000, and on June 1, 1911, the charge for transfer was discontinued. The straight 3-cent fare continued in effect until Sept. 1, 1914.

During all this period there was a gradual accumulation of deficits in the operating and maintenance funds. At a conference of city and railway officials on Feb. 5, 1913, President Stanley advocated an increase in fare, while the city officials demanded the transfer of the injuries and damage fund and the insurance fund accumulations to the interest fund, thus obviating the necessity for any increase in fare. Subsequent requests for increased allowances for maintenance and operation were refused and a decrease in fare ordered, beginning with May 1, 1913, to 3 cents cash, two tickets for 5 cents and 1-cent charge for transfer. The company thereupon demanded arbitration in accordance with the terms of the ordinance.

ARBITRATION OF 1913

As a result of their investigations the arbitrators found that the allowances for maintenance, depreciation and renewals were inadequate. The overdraft of $323,597 in the fund they decreed should be liquidated in such amounts from time to time as could be transferred from the interest fund without reducing the interest fund below $400,000. They were unable from the evidence, however, to determine satisfactorily whether the prevailing allowances should be increased, and decided that the company should again start with the presumption that the average allowance would provide an adequate maintenance, renewal and depreciation fund, because officers of the company, having long experience, accepted this appropriation in the framing of the measure. The allowances for operation were deemed insufficient. The over-expenditure on Feb. 28, 1913, of $259,592 was taken care of by the transfer on July 31, 1913, of the whole amount from the interest fund, and the board unanimously determined that there should be an increase of 0.6 of a cent per car-mile, making an operating allowance of 12.1 cents per car-mile, effective March 1, 1913.

The accumulated amount of $216,002 in the reserves for injuries and damages and for insurance was credited to interest fund on July 1, 1913, under the finding of the arbitrators, that the practice of the company of maintaining an accident fund, to which was credited currently 0.8 of 1 cent per car-mile and to which were charged all expenditures under this account, could not be justified under the ordinance. A similar finding was made with regard to the insurance fund, so that since that date, March 1, 1913, the company has not maintained any reserve for insurance or accidents.

At the time of the arbitration there had been retired from service certain physical property which it was no longer possible to operate. The value of this property had been credited to the proper account and charged to the maintenance, renewal and depreciation reserve. Subsequently, when an arrangement was made with the city to spread the value over a period of years, a suspense account was opened at the suggestion and request of the street railroad commissioner. The amount finally agreed upon between the commissioner and the company for the value of the equipment retired was $705,347.

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*Abstract of address delivered before Engineers' Club of St. Louis, Mo., on Feb. 9, 1916. The data upon which this address was based were gathered in connection with the studies of the Bureau of Fare Research of the American Electric Railway Association.

From a practical standpoint, the operating results disclosed at the time of the arbitration indicated that while the plan of regulation had many admirable features, it was nevertheless economically unsound, inasmuch as it did not permit revenues sufficient to cover the costs of operation, to maintain the property and to permit such a return upon the investment as would enable the company to compete in an open market for additional funds.

EFFORTS TO REDUCE COST OF OPERATION

The partial recognition by the board of arbitration of actual costs of operation in lieu of "allowances" as set forth in the ordinance, brought the Cleveland city officials face to face with the problem of continuing low fares by unusual economies in operation. There has resulted, largely during the administration of Commissioner Peter Witt, a degree of co-operation between the City Council, the public and the railway which is unique in American cities and goes far to explain the unusually low costs in the conduct of the traction business in Cleveland.

Termination of Lines in Center of City: The principal avenues of travel in Cleveland radiate from the business center of the city, which is located on the lake front. There are eleven radial lines leading in a general easterly direction and five leading to the west. Under the present arrangement each of these lines terminates in the center of the city. A large percentage of all the cars pass around one of the five loops installed in the Public Square under the direction of Mayor Johnson. A very large proportion of all the traffic in and out of town originates or terminates in this square. The effect that this plan of stopping all cars in the center of town has on the revenues is probably not as great as the effect upon operating cost, although it is now necessary in some cases for the rider to pay 7 cents to get across town. The total amount of revenue from such fares, however, is not great, and the inconvenience of transfer at the center of the city is the chief disadvantage with which the public is willing to contend in order to promote the economies of operation incident to the short routeing of all cars in the downtown district.

Designated Stops and Effects Thereof: Altogether about 45 per cent of the stops in the city have been eliminated, but there has been pressure brought by various interests affected resulting in the restoring of certain of the eliminated stops until the percentage of designated stops at present has increased from 53 to 64. One very important effect of the elimination of stops is shown in the increased speed of cars, which has risen from 9.5 m.p.h. in 1913 to an average of 10.73 m.p.h. in 1915. Comparative figures for this and other properties are published in the accompanying Table I. The elimination of stops has tended to decrease injuries and damages arising out of boarding and alighting accidents. Moreover, it has not brought about an increase in the number of collisions, owing probably to closer attention on the part of motormen and a knowledge on the part of drivers and pedestrians that at many street intersections cars do not stop. Special attention has been given by the traffic police to the prevention of accidents, and this efficient effort has doubtless been reflected in the decreased accident hazard.

Trail-Car Operation: There has been a steady increase in the use of trail cars in Cleveland, the percentage of mileage made by trail cars increasing from less than 1 in 1911 to about 15 per cent at the present time. As a result there is a saving in time resulting from the decreased time of loading and an increase in the track capacity due to the fact that there is no headway between the motor and the trail car. There appears to be little objection on the part of the patrons to a schedule whereby two cars are operated together on a headway twice as great as would be the case in single-car operation. The acquiescence of the traveling public in this economy was a considerable factor in the continuance of the 3-cent fare until Sept. 1, 1914.

TABLE I—SHOWING COMPARATIVE SPEEDS FOR CLEVELAND AND OTHER CITY RAILWAYS

Company	Miles Per Hr.
Cleveland Railway:	
Municipal Traction Company—1908	9.45
Receivers —1910	9.50
Cleveland Railway —1912	9.50
Cleveland Railway —1915—Base	10.76
Rush	10.08
Night	11.27
All	10.73
Denver Tramway	9.74
United Railroads of San Francisco	8.57
Washington Railway & Electric Company	8.65
Chicago Surface Lines	9.04
Twin City Rapid Transit Company	9.55
Springfield (Mo.) Traction Company	7.57
United Railways Company of St. Louis	9.57
Bronx Surface Roads	8.36
Manhattan Surface Roads	6.75
Queens Surface Roads	9.60
Cincinnati Traction Company	8.70
Toledo Railways & Light Company	8.15
Milwaukee Electric Railway & Light Company	8.59

Extension of Lines: During the life of the ordinace there has been a relatively small amount of track constructed. Such track as has been built, however, has been so placed as to permit passengers to move from one point of the city to another without passing through the region of greatest traffic density. There is at the present time a well-defined need for certain extensions. Recently a delegation of property owners requested a 3-mile extension of one of the suburban lines. The street railroad commissioner agreed to the extension provided the property owners contributed to the cost of construction 75 cents per foot of abutting land, or $1.50 per foot of track. At the present time more than $22,500 has been pledged and construction will be begun in the near future. The fare from the city to the point where the extension will be begun will be 3 cents. For each 1½ miles of the extension an additional fare of 3 cents will be charged. It is particularly of interest that the building in Cleveland during the last two years has been with slight regard to the location of the single-fare district. Some localities within the 3-cent area, particularly those along the recently constructed crosstown lines, have shown a considerable activity, but no more so than other districts to which the fare is 5 cents. There are a number of lines extending beyond the old city limits and on these lines a fare of 5 cents or more is charged. It appears that in these districts a 5-cent fare is not regarded as a particular disadvantage.

Paving Obligations: It is a rather difficult matter to measure the expenditures of the Cleveland Railway for paving by a comparison with expenditures of other companies, owing to differences in practice in distribution of paving costs as between operating expenses and charges to capital account, and the variety of franchise requirements under which various companies operate. Moreover, paving costs show a very large fluctuation from year to year. A tabulation recently prepared, however, discloses that about 17 per cent of the charges to way and structures of the Cleveland Railway for the last three years went for paving, while the average for sixteen other companies was 23.5 per cent.

Co-operation of Traffic Police: The track "hog" does not exist in Cleveland. The traffic ordinances of the city provide that vehicular traffic shall move as close to the right-hand curb of each street as possible, and the utmost vigilance is exercised to arrest and convict teamsters and autoists who appear to be encroaching upon the company's tracks. This matter is handled directly by the police prosecutor, and it is possible for teamsters to be arrested, convicted and fined for interference with street cars without the matter coming to the attention of the railway company. So careful apparently is the police department to co-operate with the street railroad commissioner in the promotion of high schedule speeds that during two weeks of rather frequent riding in Cleveland but one instance was observed in which the motorman rang his gong to warn a driver off the track.

SERVICE RENDERED UNDER TAYLER ORDINANCE

Rather extensive tests were made last summer in Cleveland with a view of determining as definitely as possible the quality of the service furnished. The general conclusion reached was that with an unusually favorable distribution of residence and business districts, with a type of equipment more quickly loaded than is the case generally, with unusual co-operation on the part of the patrons in the matter of the method of fare collection, in the matter of passing quickly into and out of cars, and in the matter of the use of trailers and of designed stops, there is still, during both rush and non-rush periods on many lines, a degree of crowding and a percentage of standing passengers which places the standard of service in Cleveland below that specified by the Wisconsin Railroad Commission in its widely quoted service order in connection with the Milwaukee Electric Railway & Light Company, and in certain instances below that recommended in Chicago by the Board of Supervising Engineers.

Density of Traffic: The passengers and car-miles on each of the several lines were examined and the data summarized. From an examination of figures covering the operation of electric railways in thirteen cities, ranging in population from 260,000 to 1,900,000, comparative data have been prepared, on which Table II is based. The relatively high density of traffic in Cleveland is due to the cumulative effect of conditions of operation later enumerated. This high density summarizes some of the prevailing reasons for low operating cost.

District Served: An examination was made of the traffic movement throughout the city by studying the receiving and discharging areas and the neutral zone for each line.

It is of interest to note that in many portions of the city the neutral zone is rather wide. This, no doubt, is one reason for the lack of jitney competition in Cleveland. Contributing causes are low minimum fares and the evident unfriendliness with which the city officials interested in the success of the ordinance view such competition.

Rolling Stock: The street railroad commissioner and the company have co-operated to produce several novel types of cars from the standpoint of carrying capacity. In the latter designs the area available for passengers constitutes a somewhat larger percentage of the total capacity of the car than that obtaining in former Cleveland cars and in the cars of many other cities. This tendency is best illustrated by the front-entrance, center-exit type described in the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1915, page 364. The speed of loading is facilitated in very many of the cars by the use of wide doors, the absence of steps and the collection practice.

The company has maintained an equipment register on a strictly comparable basis for many years, and this register indicates that on March 1, 1910, the average seating and standing capacity of all revenue cars owned was 113.5 passengers, and on March 1, 1915, 129.3 passengers. This is an increase of 14 per cent. The revenue car-miles during the year ended March 1, 1910, were 24,500,000, and during the year ended March 1, 1915, were 33,800,000, an increase of 37 per cent. The product of car-miles and car capacity was therefore 57 per cent greater in 1915 than in 1910. During this period the number of rides per year had increased from 195,000,000 to 324,000,000, or 66 per cent. On the basis of seating capacity only, there were furnished in 1910 accommodations for 1,100,000,000 passenger-miles and in 1915 for 1,700,000,000 passenger-miles, an increase of 52 per cent, as contrasted with an increase in passengers of 66 per cent and a probable greater increase in passenger-miles owing to the building up of outlying parts of the city, with a consequent increase in the average length of ride. It would appear from this comparison that the efforts made, which have been successful in increasing the speed of operation, have failed to keep the equipment as nearly that required by the traffic as was the case five years ago, service having increased 57 per cent while traffic increased 66 per cent.

TABLE II—SHOWING RELATIVE TRAFFIC DENSITY AS DETERMINED FOR THIRTEEN CITIES

Item	Cash and Ticket Passengers (per Car-Mile)	Total Passengers Including Transfer (per Car-Mile)	Cash and Ticket Passengers (per Capita)	Total Passengers Including Transfer (per Capita)
Average	6.00	8.41	267	376
Maximum	6.83	10.58	337	541
Minimum	4.66	6.35	223	255
Cleveland	6.83	9.54	330	461
St. Louis	5.54	8.50	302	466

Loading and Collection Practice: The present practices of loading and discharging passengers and collection of fares are designed to promote speed and reduce expense in the matter of economies in fare collection. A variety of methods are in use at the present time on different lines, the method used being apparently that best fitted to the type of traffic and car in use. The practice also varies on the same line at different times of the day and even between motor and trail car on the same trip. The various practices are best illustrated by the following examples:

1. The ordinary car with front and rear doors will be operated in-bound as a pay-as-you-enter car, the passenger entering by the rear door where the conductor is stationed and leaving by either door. On the out-bound trip this car will be operated as a pay-as-you-leave car, passengers entering at either door and leaving by the rear door.

2. The center-entrance cars are operated in-bound as pay-as-you-enter cars. The rear half of the car is regarded and treated as a platform and passengers may occupy that part of the car without paying fare until they leave. If, after entering the rear part of the car, a passenger desires to go forward, he is required to pay his fare when he passes the conductor. These cars are operated out-bound as pay-as-you-leave cars. The result is that the passengers who leave the car at the Public Square and those who get on at that place are enabled to move through the doors with no delay, those alighting having paid their fare upon entering the car and those boarding paying as they leave. At the Public Square observations taken with a stop watch indicate that 100 people frequently pass through the doors of a center-entrance car in three-quarters of a minute. The movement of passengers boarding other types of cars in Cleveland is less rapid than that for center-entrance

cars, and the rate of adoption of the latter type of car during the past few years is of interest. On Jan. 1, 1913, 1914 and 1915, the percentages of center-entrance cars in service were respectively 10, 29 and 39 per cent.

Car Movement: The average speed of cars in Cleveland as computed from the current schedules is about 11 m.p.h. The speed is at present a trifle less than it was a few months ago and it is probable that this has resulted partly from the resuming of certain stops which were originally eliminated and partly from the well-known tendency of individuals and machines to slow up. An examination of the reports of sixty-five urban companies operating in other American cities, shows that the average speed, as obtained by dividing revenue car-miles by revenue car-hours, is 8.59 m.p.h. Values for the various companies range from 6.85 to 9.60 m.p.h.

The effect of skip stops on car movement has already been pointed out and is again referred to as being one of the major factors contributing to rapid movement of cars. The use of trail cars, with the increased headway thus possible, is another factor which facilitates car movement. It is obvious that when cars are running within a few feet of each other, a delay to one will occasion a delay to a considerable number of cars, while if the cars are run on a greater headway, the delay to the first car is not transmitted to those following it and the first car alone suffers.

Short routeing of cars has been practised in Cleveland to an extent considerably greater than is general. The saving in car-miles thereby effected is large and while there is some inconvenience to those passengers who are obliged to take the car following to complete their journey, the plan is in the interest of economy. A provision of the franchise minimizes "car to car" transferring by requiring passengers to board a car running to destination wherever possible.

Near-side stops are employed in the downtown business district in Cleveland and elsewhere in the city at intersecting lines. Throughout the remainder of the city the stops are not determined by the position of the intersecting streets, but are so placed as to equalize the distance walked by patrons under the designated stop scheme.

As has been previously mentioned, the traffic detail of the Cleveland police force is particularly efficient in avoiding delays to the street cars. Traffic police are stationed at seventy-two points throughout the city, from 8 a. m. to 7 p. m. Owing to the peculiar conditions in Cleveland, the area of congestion is relatively small and this factor doubtless contributes to the possibility of the maintenance of high-speed operation.

Number of Transfer Points: The number of transfer points on the Cleveland lines is relatively small. On 295 miles of track they number but eighty-eight in addition to the general transfer points at the Public Square. Compared with a number of other American cities, the transfer points per mile of track indicate that the layout of lines and general movements of traffic in Cleveland permit the serving of the public with a minimum of special work and with a minimum of delay and confusion at transfer points. An examination of twenty-two companies operating approximately 5000 miles of track, available for comparison with Cleveland, disclosed a number of transfer points varying from 0.94 down to 0.18 per mile of track, as compared with 0.30 in Cleveland and with 0.715 in St. Louis.

Car Loading: To determine the car loading, a study was made of traffic conditions on lines carrying about 80 per cent of the total traffic in Cleveland for a continuous period of eighteen hours on a typical week day. This study involved the observing of all radial lines at the point of maximum loading and the determination by actual count of the number of seats and passengers in each direction, from 6 a. m. to midnight.

The results of this study of loading indicate that at the point of maximum loading during the maximum fifteen minutes, the ratio of seats to passengers varied from 55 to 96 with an average for all lines observed of 72.1. For the maximum hour, the ratio of seats to passengers varied from 52 to 99 with an average for all lines observed of 78.9. These conclusions are corroborated by a previous check made in October, 1914. It was then found that during one hour from 4.50 p. m. to 5.50 p. m. for three consecutive days, the standing passengers were 27.9 per cent during the maximum fifteen minutes and 21.1 per cent during the maximum hour.

The situation during non-rush hours, as is indicated by the eighteen-hour check, is not greatly different from that during rush hours. The operation of 3.7 times as many cars during the evening rush as during the middle of the day, shows a concentration of service probably greater than that of any other urban system in this country, except certain rapid transit lines in New York and Chicago. From two to two and a half times as many cars are ordinarily run during the evening rush as during the middle of the day, and when this ratio is increased to exceed three, it indicates either that exceptional service is furnished during the rush hours, or that service during the middle of the day is considerably less than would be furnished by the average company, the latter being the case in Cleveland.

An examination of the service on the individual lines shows that the uniformly heavy lines, such as St. Clair, Euclid, Broadway and Lorain, are generally deficient during the non-rush hours on the basis of the standard of car loading prescribed by the Wisconsin Railroad Commission, but that this standard is met during the rush hours. On such lines as Fulton, Dennison, Detroit, Clifton, West Twenty-fifth, Scranton, Woodland and West Fourteenth, the service is generally bad during the evening rush and shows a degree of overcrowding not permitted under the Wisconsin requirements, or by generally accepted good practice.

To sum up the situation, additional service for the entire system is required as follows: 598 additional car-hours per day by cars already in service, and fifty-one additional car-hours during the maximum period and requiring therefor additional facilities. Although a certain amount of excess service is being rendered, it is evident that this excess service could not, in general, be used to supplement the insufficient service elsewhere, both on account of the difficulty of running the same car on various lines at various times of the day and also because of the fact that excess service in one direction is usually necessary in order to provide the required service in the opposite direction on the return trip. It should also be borne in mind that more than one-third of the "excess" shown occurs after 8.30 p. m. when headway requirements rather than loading requirements govern.

In general for the twenty-two lines studied, it appears that the particular departure from the Wisconsin standard is during the transition period and during the middle of the day. In each of these places it is, of course, possible to furnish the required service with equipment which is at the present time available, inasmuch as the total number of cars in service during these periods is less than the number in service during the rush hour. With this in mind, it appears that in order to meet the Wisconsin standard, it would be necessary to increase the off-peak car-hours by 5.5 per cent. During the evening peak there would also be required about 4.3 per cent more cars than are now operated. These would presumably represent an increase in investment in cars, car-housing facilities, power plant and other parts of the street railway plant which must be provided in proportion to the maximum car demand.

The cost of providing 5.5 per cent more car-hours has been computed on the basis of the average cost per car-hour, exclusive of those operating expenses which would presumably not be increased and exclusive of any and all charges for taxes and interest. The cost of furnishing 4.3 per cent additional service during the evening peak has been computed by including in addition to the costs enumerated above those costs which vary with traffic demand, including, of course, interest and taxes. The total costs thus obtained and necessary to meet the service standard promulgated by the Wisconsin Railroad Commission amount to more than $300,000. It may be possible, of course, in certain instances, to meet the Wisconsin standard by shifting of cars from one line to another throughout the day. The very great practical difficulties of schedule making which arise when such an attempt is made, appear to indicate, however, that no very great part of this $300,000 could be saved. Hence, it is evident that since the measure of the necessity of an increased rate is but $200,000, the present service standards in Cleveland are the means of economy equal to at least one step in the rates of fare.

Riding Habit: The growth of population and industrial activity in Cleveland has been accompanied by a steady increase in the number of rides per capita. This growth in social and industrial importance has been such as to increase materially the extent of the floating population, which is reflected in the apparent riding habit. In spite of the fact, however, that the extent of riding in Cleveland is above the average, it is not obvious that the various changes in fare are reflected to any considerable extent in the amount of riding. During the past years there have been various changes of rate of fare in Cleveland, and a study of these data does not indicate any marked degree of correlation between the rate of fare and the number of rides per capita.

Psychological Factors in Measuring Service: After examining all the physical factors, it is obvious that there is at work in Cleveland in addition to these a factor which is of considerable moment but which it is difficult to reduce to accurate measurement. The people of Cleveland have been told and generally believe that they have the best street railway system in the country, and, as the writer knows from experience, the most casual acquaintance both on the cars and in the streets in Cleveland is quick to boast of the excellence of the service and the satisfactory results of the Cleveland experiment.

There are no standards of service which the average person is able to estimate or define accurately because satisfaction is psychological and largely independent of those elements of service which can be measured in accurate terms. Inasmuch as a preconceived idea as to the quality of service frequently determines opinion, the general reputation of a company is of great importance. The people of Cleveland have had pointed out to them for five years that low fares can continue only if accompanied by economies in operation, and the political capital of the party in power has been based upon the belief of the people that "Cleveland service" is "good service."

How great a factor this is may best be appreciated by those who have experienced a situation in which efforts have been directed toward emphasizing the idea that whatever service the local street railway company rendered was poor service. A headway of six minutes in a community where the company is popular is satisfactory, but a headway of three minutes when the company is under attack is considered poor service. The same observation applies to standards of loading and other criteria of service. In a word, the co-operation of the patrons, fostered by the city government, is a material factor in the Cleveland situation, and much that may be complained of elsewhere is not there regarded as poor service.

ACTUAL COST OF SERVICE UNDER TAYLER ORDINANCE

The interest fund and the true corporate surplus have not been at all similar during the operation of the Tayler ordinance. Indeed, the true corporate surplus was late in 1914 more than $1,000,000 less than the interest fund.

During the five years of operation of the ordinance, it has been possible to write off only $180,000 out of $700,000 of abandoned equipment, all of which went out of service during the first three years, and as the present value of that portion of the Cleveland Railway's plant in existence on March 1, 1910, is obviously less than it was five years ago by a very considerable amount, the discrepancy between the actual expenditures for maintenance, renewals and depreciation and the allowance for these expenses fails very materially to indicate the amount by which the ordinance allowance has proved to be insufficient.

Aside from the wasting of physical property, the operation of the Cleveland Railway has failed to yield 6 per cent on about 70 per cent of the investment, and while under the provisions of accounting necessitated by the ordinance there has been a decrease in the interest fund of $219,012 during the last two years, there has actually been a deficit of $379,778. Since Sept. 1, 1914, when under the terms of the ordinance it became necessary, due to the status of the interest fund, to increase rates, there has been an increase in the interest fund of $92,146, but with labor conditions unsettled (an increase of wages was granted to trainmen, effective May 1, 1915, of 2 cents an hour, amounting to about $140,000 per year), with financial and industrial conditions not of the best, and with constantly increasing costs of operation, it will probably be some time before it is possible to reduce fares in Cleveland again, if in fact such a time ever comes.

On March 1, 1915, the operating fund showed an overdraft for two years of $916; the maintenance, depreciation and renewal fund an overdraft for the same period of $478,109, and there was a deficit of $145,444 remaining from the total deficit converted into a suspense account at the time of the arbitration. The sum of the first two items, $479,025, indicates the amount by which the allowances during the last two years have been insufficient to meet the expenses which they were designed to meet, and this total, together with the amount now remaining in the maintenance suspense fund ($145,444), indicates the contribution of over $620,000 by the company to continuity and quality of service since March 1, 1910, in addition to the amount by which its property has depreciated and against which no adequate reserve has been built up. It is of particular interest to note that under the present system no reserves, such as those for injuries and damages, insurance and other provident funds, can be built up. It is obvious that this is in violation of well established principles of sound accounting and business prudence.

With respect to depreciation, it appears that the ordinance contemplates that the maintenance of all physical property, as well as its depreciation, shall be met from an allowance of approximately 5 cents per ordinance car-mile. During 1914, the allowance per actual car-mile—that is, per car-mile in which the mileage of trail cars is given full weight—was 4.75 cents.

Depreciation alone on a well-operated plant will not be less than 3.75 per cent of the cost new of the physical property. The 1909 valuation of the property operated by the Cleveland Railway was $27,596,366, and since that time there has been invested in additional property $6,747,555, making the cost new of the present plant $34,343,921. Of this amount 3.75 per cent is $1,287,900. This is 3.8 cents per actual car-mile for the year ended Dec. 31, 1914. This leaves of the allowance of 4.75 cents but 0.95 cents per car-mile for maintenance of all physical property. The average expenditure in 1912 of nearly 1000 electric railways in the United States for maintenance (not including depreciation) was 5.75 cents per car-mile.

While the allowance under the Cleveland ordinance might cover either depreciation or maintenance, it is obvious without a more extended analysis that any company attempting to meet both maintenance and depreciation charges out of this allowance of 4.75 cents per car-mile is attempting the impossible. It was to have been expected that the Cleveland company would necessarily over-expend this allowance for maintenance, depreciation and renewals. This over-expenditure has already amounted to $623,000, and it is certain that the item "deferred maintenance" will be one of increasing importance. Attention should again be called to the $700,000 of property which was retired about three years ago and which still appears in the balance sheet to the amount of $553,002, as "road and equipment suspense." The necessity of meeting the cost of property retired is inevitable, whether the loss is insured by a proper reserve or amortized after the property is retired. The difference is that car riders in the future will pay for losses incurred for the benefit of car riders in the past.

In the matter of taxes, the Cleveland Railway is in a unique position. It is to the evident interest of the city to keep expenditures of every kind at a minimum, and there is pending at the present time an action to have the assessment of the company reduced for the last two years. This action was brought following the adoption by the City Council of a resolution requesting the street railroad commissioner to direct the company to ask for a rehearing before the Tax Commission on the question of valuation and to refuse to pay taxes on an amount in excess of $19,000,000. In the meantime charges are made monthly on the basis of the assessment now under dispute, and the amounts thus accumulated are included in the interest fund. In case the city is successful in its fight to have the assessment lowered, there will be, after the payment of taxes for the last two years, a balance in this tax reserve fund which will be credited to the interest fund. It is impossible to state at this time how much this will amount to, but it will probably, even in the event of a particularly favorable decision, not be large enough to change materially the status of the interest fund.* The company is not required to pay any car license fee, and it is freed from certain obligations in connection with paving.

With regard to the charges made for interest, interest on funded debt and bills payable is charged to the interest fund as payments are made. When securities are sold at a premium, the amount of this premium is credited directly to the interest fund, and when securities are sold below par, the discount is amortized through monthly charges to the interest fund. Interest is allowed on outstanding stock at 6 per cent per annum, but since the outstanding stock is materially less in amount than the actual capital investment prior to the adoption of the present working agreement, the fixed rate of return guaranteed by the city is more nearly 4 per cent per annum on the cost of the property than 6 per cent, as would appear from a casual reading of the ordinance.

The balance sheet indicates that in addition to the depreciation of the physical plant for which no reserve has been maintained, and which has amounted to no inconsiderable figure during the last five years, there has been an operating loss of $1,465,026. Had interest been paid during this period on the $10,000,000 of stock which was surrendered in 1908, this operating deficit would at the present time have amounted to approximately $1,750,000.

CONCLUSIONS

From the study of costs in Cleveland and the survey of operating and traffic conditions peculiar to Cleveland, the following conclusions may be drawn:

1. While the regulating ordinance contemplates fixing the rates of fare to conform with costs, the actual costs of service have considerably exceeded those recognized by the ordinance, owing to the inadequacy of allowances for operation and maintenance, the failure to provide reserves for injuries and damages and insurance, and the failure to make due provision for depreciation.

2. The actual value of property used for the transportation business exceeded that recognized by the ordinance, owing to the arbitrary reduction of the cost new of physical property to approximately 70 per cent of such value. To reproduce identical facilities for rendering transportation service would require an investment in excess of that assumed in the ordinance.

3. The rate of return provided in the ordinance, or 6 per cent, is not comparable with the rate of return necessary to attract money into the urban transportation business under conditions where, unlike Cleveland, such return is not guaranteed.

4. The actual costs of operation per passenger are considerably less than those of urban transportation systems in other American cities, owing to the co-operation of the public and the City of Cleveland. The skip stop, headway as high as five minutes on heavy lines, the use of trailers and short routeing, the loading and collection practice and the regulation of vehicular traffic are evidences of this co-operation. These innovations have had a substantial effect on costs.

5. The scheme of ordinance regulation as provided in Cleveland retards the extensions of existing lines and will in time no doubt materially affect the distribution of population.

6. The service rendered is found to result in a degree of crowding and a proportion of standing passengers which discloses a standard of service below that prescribed as adequate in other American cities.

7. While the average rate of fare per revenue passenger is now generally 3 cents with 1 cent for transfers in conformity with ordinance costs, the increase of actual costs of operation reflected in the deficiencies of operating allowances leads to the conclusion that the car-riding public of Cleveland may expect to face the alternative of higher fares or poorer service.

8. In view of the property abandoned, which is only now partially written off, it would appear that the present generation of car riders is receiving transportation costing in excess of fares paid, leaving future generations to pay for equipment worn out from past service. In effect, such a process of paying for the depreciation of the property results in converting physical property values into service rendered, and if continued would affect the security of the property which the ordinance is pledged to safeguard.

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*Since this was written the suits have been decided by Judge Vickery of the Common Pleas Court adversely to the company, but it is understood that an appeal will be taken.

American Association News

At a Meeting on Feb. 5 President Henry Addressed the Milwaukee Company Section, His Subject Being "The Relation Between the Public and the Electric Railway Companies—Meetings at Denver and Washington Were Also Addressed by Prominent Speakers

DENVER TRAMWAY SECTION

The thirty-second monthly meeting of the section was held on Jan. 27, with 100 persons in attendance.

The program was opened with a paper on "Efficiency Engineering," by Edward A. West, efficiency engineer of the Portland Railway, Light & Power Company. He was followed by H. N. Wheeler, the United States forest supervisor, with headquarters at Fort Collins, Col., who displayed a number of lantern slides and described the work of the forestry department. After the lectures the speakers were bombarded with questions by the members, and many interesting details of their subjects were thus brought out.

MILWAUKEE SECTION

At the meeting of the section held on Feb. 5, the guest of honor was Charles L. Henry, president of the association, who spoke on "The Relation Between the Public and the Electric Railway Companies." Five hundred persons attended.

Following President Henry's address brief reports were made as follows:

Results of the medical benefits and the reduction of illness due to the Employees' Mutual Benefit Association medical work, by Dr. C. H. Lemon, chief surgeon.

Results to date of the operation of the bonus plan in the transportation department, by G. Kuemmerlein, superintendent of transportation.

Results of the operation of the premium system in the rolling stock department, by W. C. Bolt, shop accountant.

Brief description of the profit-sharing plan installed in the rolling-stock department, effective Jan. 1, 1916, by H. A. Mullett, superintendent of rolling stock.

The social philosophy of the company in developing its various profit-sharing plans, by S. B. Way, vice-president.

After the more serious part of the exercises had been concluded an original one-act musical comedy, entitled "Brewster's Hennery," was presented by the educational and social auxiliary of the Benefit Association, all of those participating being employees of the company.

The accompanying halftone shows the gathering, with Mr. Henry on the platform.

CAPITAL TRACTION SECTION

This section, which was organized a month ago with eighty-nine charter members, has now 117 enrolled, and is growing rapidly. At the meeting held on Feb. 10, the speakers were Frank J. Hogan, attorney of the company, and R. G. Simms, treasurer. During the evening Division Superintendent E. L. Grayson, on behalf of the motormen and conductors, presented former Manager D. S. Carll with a gold watch as a token of esteem.

Mr. Simms outlined the history of the Capital Traction Company and its predecessors, and explained in detail the handling of fares. He stated that the present company came into existence in 1895, its predecessors being the Rock Creek Railway, incorporated in 1888, and the Washington & Georgetown Railroad, incorporated in 1862. The latter operated the first car line in the city, the fare being 5 cents. This company was the successor of the Vanderwerken Bus Company, which had two lines, on each of which 6 cents was the fare. A bus ride from Thirty-second and M Streets to the Navy Yard, 4¾ miles, cost 12 cents. To-day it is possible to ride more than 10 miles for 4 1/6 cents.

Mr. Hogan spoke of the great opportunities in the railway field for the young men to-day, and cited as an example the life of the late Henry Hurt. Mr. Hurt started his career in the lowly position of water-carrier in the Washington & Georgetown Railroad stables, and advanced step by step until he became president. Mr. Hogan claimed that similar achievements are

MEMBERS AND GUESTS IN ATTENDANCE AT THE FEBRUARY MEETING OF MILWAUKEE COMPANY SECTION; PRESIDENT HENRY IS SHOWN ON THE PLATFORM possible to-day as "the golden age of opportunity is not behind but ahead of us."

Musical numbers by local talent formed part of the program, as did the announcement by the membership committee of the reception of twenty-eight new members, the majority of whom were motormen and conductors.

WASHINGTON RAILWAY AND ELECTRIC SECTION

The February meeting of the section was held on Wednesday of this week, with the members of the commercial section of the Potomac Electric Power Company as the guests of the railway section. After opening the meeting, C. S. Kimball, president of the section, turned the meeting over to John C. McLaughlin, of the power corporation, who called upon Colonel Truesdell, former commissioner of the District. The colonel described what engineers have done to make the city beautiful. Then Col. W. W. Harts, U. S. A. engineering corps, officer in charge of public buildings and grounds in Washington, gave an illustrated lecture on the development of the city, and outlined plans which will soon be submitted to Congress for the further improvement of the city.

In taking the chair to introduce Colonel Harts, Colonel Truesdell stated that he personally had asked for the first charter for an electric railway in Washington, the Eckington & Soldiers' Home line, later the City & Suburban Railway, and now a part of the Washington Railway & Electric Company.

COMMUNICATIONS

The Amendments to the Constitution

WASHINGTON RAILWAY & ELECTRIC COMPANY
WASHINGTON, D. C., Feb. 15, 1916.

To the Editors:

I am in receipt of your invitation to express my views concerning the amendments adopted at the recent conference of the association at Chicago. Under ordinary circumstances I would not care to discuss the matter further, for the reason that my views, as expressed at the conference, were so distinctly at variance with those of others in attendance. Yet, I would rather like to say a word in order that my position may not be misunderstood.

I am keenly interested in the welfare and success of the association, and believe that the maximum amount of co-operation and assistance should be extended by the manufacturers both as individual companies and as an organization. There appeared, however, to be a lack of understanding as to what would be accomplished by the adoption of these amendments and, furthermore, as to what the final effect would be upon the status of the Manufacturers' Association. For these reasons it seemed to me the matter might be left in abeyance until the manufacturers themselves could have a clearer knowledge of the purposes sought to be attained, and I urged that the matter go over until the fall convention.

It developed that in holding this view I was in a hopeless minority, but being a good soldier and willing to abide by the judgment of the majority, I sincerely hope that the amendments adopted will bring about all the good results hoped for, and believe that the manufacturers should generally accept the invitation which has been extended to them to join the American Association, in the belief that in so doing they will strengthen the electric railway industry as a whole and in that way work for their own interests. It is apparent that we all have a common purpose, and no mere matter of administrative detail should be allowed to interfere with the accomplishment of what we are all working for.

W. F. HAM.

President Henry's Letter

DREW ELECTRIC & MANUFACTURING COMPANY
INDIANAPOLIS, IND., Feb. 15, 1916.

To the Editors:

I have noted in your issue of the 12th inst. President Henry's open letter respecting the recent amendments to the constitution and by-laws of the American Association, permitting manufacturers, dealers and the technical publishers to become members of the association. Past-President Allen, President Henry, Mr. Brady and the others who conceived and presented this measure have to some extent "pioneered" but have undoubtedly established a wise precedent that will be followed by other associations. I am informed that some associations extend the privilege of the floor to its allied appliance manufacturers, and in some few cases the right of vote is extended. It is certainly a mark of confidence and a compliment to the manufacturers that they should be called into the councils of the parent association.

That the move is not wholly unselfish is suggested by President Henry's letter. He believes that the association needs the manufacturers. If we can be of service we should answer the call, as it is impossible to conceive a constructive act of the American Electric Railway Association that will not bring its proportionate return to the manufacturer. No manufacturer should overlook the fact that the electric railway is the medium through which he extracts his little share of the fractional "nickel" from the public's spending money. If we are then, as manufacturers, only once removed from the source of our revenues, it seems logical that we should move up to the front with our associates and give them our heartiest assistance and best advice when requested. We must stand ready to shoulder any duty that will tend to improve, stabilize or increase their business, because on their success the manufacturer stands or falls.

In his reference to the work of the future, Mr. Henry refers to the attitude of our opponents. Personally I am not disposed to consider the general public, or any considerable portion thereof, as extremely hostile to the electric railway industry at this time. Whatever small unfairness may exist is due to lack of understanding. The public generally is coming to regard the electric railway now as a business, fundamentally the same as any other business. It permits its state, municipal and civic representatives to come with words of assurance and to take part in our meetings frequently. The people do not antagonize factories, stores, shops, newspapers and other commercial servants. It encourages and patronizes them. It would seem that the street railways and interurbans should soon enjoy this same treatment.

I believe it should be emphasized, publicly and otherwise, that the electric railway business is basically the same as any other legitimate business. Its patrons, both present and prospective, should be courted and considered as its friends and not its opponents. We as manufacturers have a golden opportunity to increase good-will and light in our respective communities. As members of the American Electric Railway Association we can present our own ideas for consideration at its meetings, and at the same time learn of the ways in which we can be of use to the association.

I believe the manufacturers can do valuable service in every department and in every activity of the association if permitted to become an integral part, and our efforts be better directed and of greater effect. It is obvious that there is a community of interests which calls for unity of action. J. H. DREW, President.

Energy-Input Method of Determining Motormen's Efficiencies

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILL., Feb. 14, 1916.

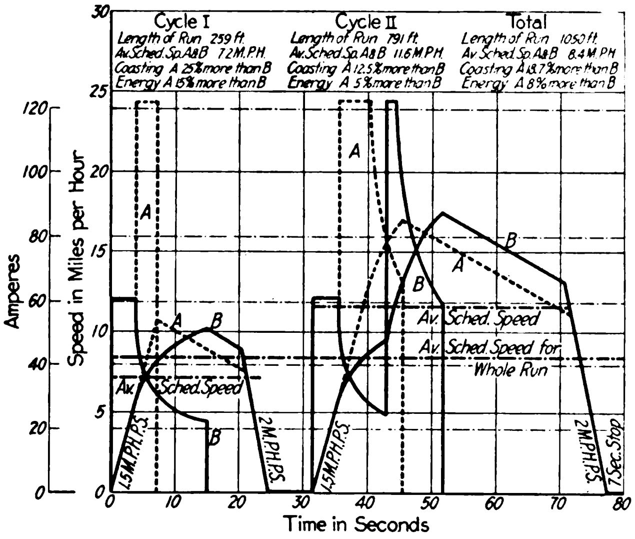
To the Editors:

Believing that in Mr. Chappelle's article entitled "Fundamental Principles of Car Operation Efficiency" in the Jan. 15 issue of the ELECTRIC RAILWAY JOURNAL there are several misleading comparisons made of the two devices now on the market for determining motormen's efficiencies, comparisons that might easily be wrongly construed and give rise to prejudice in favor of the coasting method of determining efficiency, the writer takes occasion to defend the energy-input method on the points on which it is assailed, and to question the soundness of some of Mr. Chappelle's deductions.

Mr. Chappelle, at great length, and by the aid of a series of speed-time curves dealing exhaustively with the subject, arrives at the apparently logical conclusions that the "best efficiency occurs with the highest rates of acceleration and braking," and that the "increased coasting percentage is practically proportional to the decrease in energy." Based on the premises which Mr. Chappelle has chosen to assume, these conclusions are no doubt correct, but it is the writer's opinion that there are many more factors affecting efficient car operation than the ones the author considered in attempting to solve this very complex problem. "The proof of the pudding is in the eating," and if Mr. Chappelle's conclusions will not hold in examples other than those used to prove his case, then the conclusions must have been based on unsound premises. Had Mr. Chappelle qualified his conclusions, and limited them within the bounds of the conditions he cited, there could be no disputing his contentions, but his sweeping statements must be challenged.

One important factor of operation that vitally affects energy input and coasting is the relative locations of different stops and the effectiveness of their anticipation by the motorman. In actual city operation, the average motorman has no idea whatsoever of the particular blocks at which he will be compelled to make his average number of stops per mile. These stops may be "bunched" considerably at certain parts of the run, and may be spread out considerably over other sections of the run. Under such conditions it is possible for a good motorman to effect great economies in energy consumption if he anticipates probable stops. The accompanying graph illustrates a typical run of four city blocks made by two motormen equally proficient in rapid acceleration and braking. It also shows an instance where the "best efficiency does [*not*] occur with the highest rates of acceleration and braking," and where the increased coasting percentage does *not* vary even "practically with the decrease in energy." For this diagram, there has been assumed a 23-ton car, 93-A Westinghouse motors, a low gear ratio of 3.58, all of which are data that Mr. Chappelle has used in preparing his diagrams. A normal acceleration of 1.5 m.p.h.p.s. and a braking rate of 2 m.p.h.p.s. have been assumed. It is also to be noted that a retarding force 20 lb. per ton for coasting has been used, it being believed that this figure more nearly represents actual operating conditions than Mr. Chappelle's figure of 10 lb. The mean schedule speed for the whole run, including stops, is 8.4 m.p.h., and there are assumed ten stops per mile of seven seconds' duration each. This graph differs from any of Mr. Chappelle's diagrams, in that the stops are not spaced at regular intervals over the distance, and in that the probability of a stop at any block is given consideration.

The sequence of operations of Motormen A and B, through the two cycles shown in the diagram, is as follows: Both motormen start with the same acceleration rate of 1.5 m.p.h.p.s. At the end of 7.2 seconds they both "get the bell" to stop at the next short block. A immediately cuts off power and uses all of his available time in coasting. B, however, has anticipated a stop at this block and has accelerated with his motors in series. When he gets the signal to stop, he does not cut off power immediately, as he has not yet used sufficient energy to carry him at approximate schedule speed to the next stop. Instead, he still runs in series until he reaches a speed of about 10 m.p.h., when he cuts off power and coasts five seconds, then brakes down to the stop. At the end of this cycle of operations A has used 15 per cent more energy than B even though he has coasted 25 per cent more, and both have made the run in the same time. Each now has a seven second stop. On starting again both use the same accelerating rate. A is after a coasting record, so he again accelerates through series into the full parallel position. B is again not sure whether or not he will have to stop at the next short block, so he accelerates again with the motors in series until he finds that he will "get no bell," then feeds through the parallel resistance points into full parallel. Both motormen now run three blocks, then get the signal to stop. Both stop at the same time. At the end of this second cycle of operations, A has used 5 per cent more energy than B, even though he has coasted 12.5 per cent more, and both have made the run in the same time. At the end of the whole four-block run A has used 8 per cent more energy than B, though he has coasted 18.7 per cent more than B. Both have made the run in exactly the same time.



EXAMPLE OF INCREASED ENERGY CONSUMPTION ACCOMPANYING INCREASED COASTING

In this approximately 0.2-mile run by both men, two stops of seven seconds duration each, were made, or an average of ten stops per mile. A and B have both made the same schedule speed for the run, including stops. A solely utilized the time-element factors in this operation, and made the better coasting record. B used these same time-element factors within reasonable limits, and by taking cognizance of probable stops, made a lower coasting record than A, but used approximately 8 per cent less energy than A. This diagram, representing as it does actual practical conditions of every-day operation, refutes pretty effectively the assertion that the duration of the time elements of acceleration, braking and stop period are the sole factors involved in the solution of this complex problem.

LAW OF AVERAGES ALWAYS APPLIES

It might be well to consider here the assumption in Mr. Chappelle's article that the law of averages does not apply to the operating conditions experienced by different motormen on a given route, although he has actually invoked this same law indirectly in support of his own contentions.

In the paragraph headed "Energy Input a Misleading Measure of Efficiency," Mr. Chappelle states that in his Fig. 13, with three different schedule speeds and stops per mile, the energy per car-mile is respectively 2.4, 2.65, and 3.21 kw.-hr., though the coasting in the three instances remains the same, or 40 per cent. Therefore, he argues that since the men are operating their cars in the best and most efficient manner in the three different service conditions, the coasting method, by its resultant similar figures of 40 per cent, shows that they have all operated at "equal efficiencies even though the conditions of operation vary widely, as enumerated." Mr. Chappelle indirectly hints that a comparison of the three energy-input figures tells nothing whatsoever of the relative efficiencies of the three motormen, but he probably does not know that energy-input figures are compared in a far different and more ingenious manner. First, it is to be premised that more than one man will work on each of the three schedules, and actual practice has proved that over a period of one or two weeks quite a number of men will have encountered an equal amount of the same conditions, and therefore they can be fairly compared with the men who have worked in the same class of service. In other words, a regular motorman who does a whole day's work will have periods of light traffic that will counterbalance his periods of rush-hour traffic, and over a period of time the average severity of the conditions he has encountered will be about the same as those of his fellow workers in that class of service. It is on this basis that the efficiencies of motormen are obtained by the energy input method. It is true that this necessitates the classifying of cars into sub-classes, depending on weight, horsepower rating, etc., and the classifying of the service conditions on the basis of their average severity. Such subdivisions, however, are neither difficult nor laborious, and are essential for the success of either system. It is possible to combine the results of any man, no matter in how many classes he has worked, and represent his system average efficiency in car operation by one number.

Very evidently it was Mr. Chappelle's intention to convey the idea that since the three motormen in his example worked under varying conditions but at equal actual efficiencies, and all made 40 per cent coasting, that in all cases the coasting percentage was the true measure of the men's actual operating efficiency. In other words, he endeavors to show that the coasting time recorder automatically handicaps the men for the more or less severe conditions under which they work. Suppose one would try Mr. Chappelle's formula in the case of Motormen A and B in his Fig. 16. He would discover that although A and B operated at equal actual efficiencies with the three men who made the 40 per cent coasting, yet A made 64.3 per cent and B made 54.9 per cent coasting. "The coasting record of the motorman, therefore, is [*not*] the correct relative measure of his actual efficiency for variations in the number of stops per mile or in the schedule speed that must necessarily arise in practical operation," at least not in this case, nor in many others that anyone interested may care to work out.

On the same page, in endeavoring to prove the fallacy of depending upon meters, Mr. Chappelle shows that a good man uses 2.1 kw.-hr. per car-mile, and coasts 42 per cent against only 21.5 per cent coasting and the same power, 2.1 kw.-hr. per car-mile, used by a poor operator under far easier conditions. Therefore, a good motorman, according to Mr. Chappelle's theory, if his record was taken with meters, would become discouraged at failing to see that he had used less power even though he had done better work. Suppose, however, that each man had a period of heavy traffic and a period of light traffic every day, and suppose that over a period of a week or more they both had encountered an equal number of the same kinds of conditions. Then the relation of their average energy per car-mile over this period would be indicative of their actual operating efficiencies, because all unequal conditions would have been eliminated by the law of averages.

It is gratifying to note an occurrence very similar to the one just mentioned to the coasting percentage figures in one of Mr. Chappelle's own diagrams. In Fig. 17 Motorman C used a more efficient accelerating rate, and made more stops than did Motorman D, and undoubtedly was disgusted on finding that his 100-per-cent-efficient work gave him only the same coasting as his inefficient fellow-worker. It would be interesting to know if Mr. Chappelle considers this "differentiation" desirable in the case of the coasting time recorder! And what would the psychological effect be on Motorman C when he discovers that it is an impossibility and a miscarriage of "automatic handicapping" for him ever to top D in the records?

In the end, however, the gist of the whole matter is that, because of the innumerable variables that are ever present, comparisons of individual records of individual runs are unreliable unless these variables are eliminated, or unless all factors affecting operation are considered. In the past, both the coasting time recorder and the meter have produced successful results, but these results are due to the fact that both devices rate the men on the basis of the average of all the conditions encountered over a period of time. Of course, coasting is an important indication of efficient car operation. But to hold that it is therefor the "time element" factor solely affecting such efficiency, under any and all conditions of car operations, is unfair to say the least.

C. H. KOEHLER.

The New Zealand Government Railway Department has recently had built by the Thomas Transmission Company, England, a 200-hp. locomotive-coach of gasoline mechanical drive, which has been designed to meet operating conditions of exceptional severity varying from a speed of 40 m.p.h. on the level with a gross load of 85 tons to a speed of 10 m.p.h. up a grade of 1 in 40 with the same load, the coach alone to be capable of taking the specified grades at a speed of 28 m.p.h. Tests conducted in England before shipment to New Zealand showed excellent evidence of its hauling power and quick acceleration under exceptionally heavy loads.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Twin Jacks for Removing Wood Poles

BY S. L. FOSTER

Chief Electrician United Railroads of San Francisco

In taking out wood poles the work and time spent can be much reduced and the appearance of the poles greatly preserved over the old method of prying them out with steel bars by using two ordinary 10-ton ratchet jacks borrowed from the track gang. This method, shown in the cut, has been used for many years on the United Railroads of San Francisco.

The earth is removed around the pole about the top of the ground, a wrapping of heavy chain is put on for the jacks to push against, planks are provided to distribute the pressure of the bases of the jacks and the pole is quickly hoisted up to a point from which it can be easily pulled over by a rope previously attached to its top, the time of pulling having been selected so that the leverage of the pole is so nearly counterbalanced by the resistance of the earth that the pole comes down gradually and escapes the danger of being broken by the fall.

This two-jack method was found more satisfactory than the use of a single jack which acts more to push the pole against the side of the hole opposite to the jack than to raise it vertically.

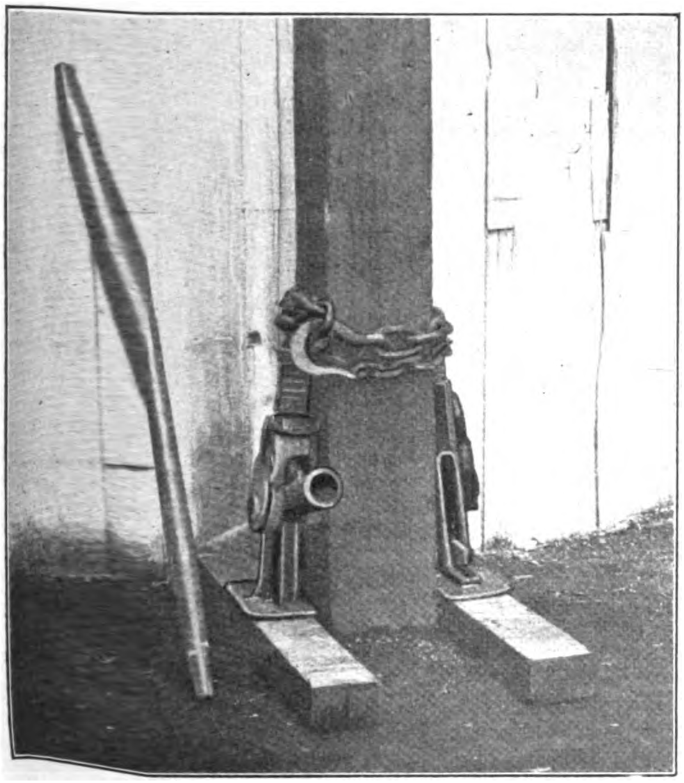
The chain bites into the soft wood of the pole and mars it a little but its use is far preferable, as to resulting appearance of the pole, to the old way of lifting the pole out by jabbing digging bars into the pole for use as pries. This jacking-out way is also more rapid than the digging bar method and can be more closely regulated.

For pushing wood poles along a trench the single jack standing across the trench at the ground level and acting more or less vertically serves the horizontal progress purpose excellently.

For moving extra heavy box-girder poles the jacks are laid flat in the bottom of the trench and act against the block of concrete horizontally.

In electric light and power and in telephone and telegraph work where the poles are set in the excavated material and merely to sustain a vertical load, and where no side stresses other than wind pressures are anticipated, a single jack may suffice for taking out wood poles, but in electric railway work where the poles are set to sustain not only vertical pressures but large and very "live" horizontal stresses and are often set in broken rock, etc., two jacks are found necessary. Sometimes extensive excavation is necessary before even two jacks can budge them.

The jacks are seen in the cut to face opposite ways. They are thus placed so that the ratchet releases may be on the outside and accessible for repeated use as the chain is lowered in the progress of the pole raising.



TWIN JACKS IN PLACE FOR POLE REMOVAL—PREFERABLE TO THE USE OF ONE JACK OR DIGGING BARS

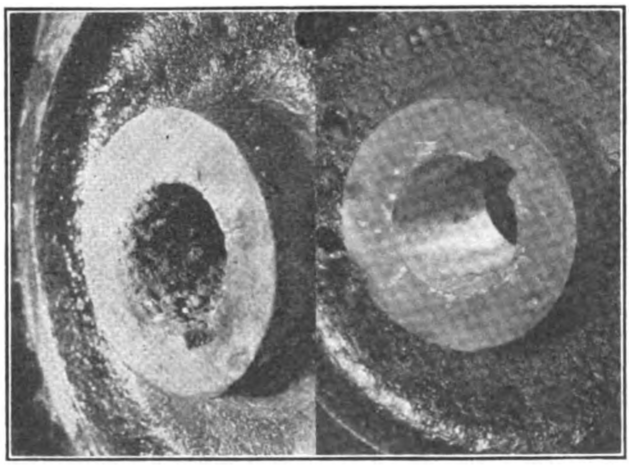
Reducing the Bore of a Gear by Means of the Electric Arc

BY JOHN B. BLACKLOCK

Master Mechanic Atlantic City & Shore Railroad, Atlantic City, N. J.

The accompanying illustrations show a job performed in the shops of the Atlantic City & Shore Railroad in which the bore of a large wormwheel was reduced about 1/16 in. This reduction was considered too small to permit the satisfactory use of a bushing, so we resorted to welding, with the result as shown. The original bore was 3½ in. and the hub 8 in. long. After boring the gear was pressed on the shaft with a force of 15 tons.

In this and other welding jobs performed in the company's shops a water rheostat is used to control the cur-



WORMWHEEL WITH NEW METAL WELDED IN BORE, BEFORE AND AFTER RE-BORING rent and trolley voltage is used. The water rheostat was mentioned in the issue of the ELECTRIC RAILWAY JOURNAL for July 3, 1915, page 24. In the testing corner of the shops is the switchboard illustrated in connection with the article and directly below it is a barrel filled with brackish water. An iron plate suspended in the water, forming one terminal of the rheostat, is controlled in position by a handwheel on the switchboard. The other terminal is a ground plate in the barrel bottom.

The welding current flows through a circuit breaker, an ammeter and a knife switch to the welding handle, and the suspended plate is electrically connected to the article to be welded. For all ordinary work the rheostat gives no trouble, although on a heavy job taking, say, thirty minutes, the water becomes quite hot.

Simple Method of Graphically Determining Air-Brake Leverages

BY H. M. LLOYD
Equipment Engineer British Columbia Electric Railway, Vancouver, B. C.

With the almost universal use of air brakes on both city and interurban equipments has come the necessity of paying more attention to the proportions of the levers in the truck and foundation rigging, so as to make as nearly as practicable a uniform braking percentage on all cars of the same type.

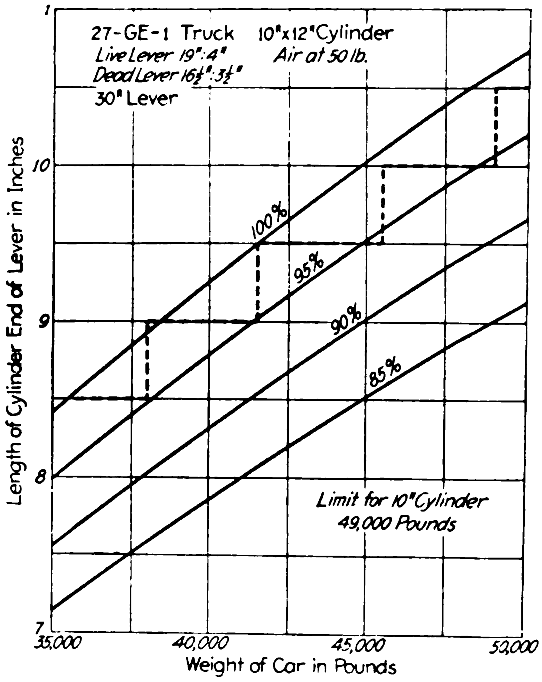
In single-car operation, such as that of the usual city service, suppose that a motorman on one shift has a car with a high braking percentage, and has become accustomed to the "feel" of his car when making the quick stops usual in such service, and on the next shift receives a car with a low percentage. I think that he would have some excuse for failing to stop his car on the crossing, or even for failing to avoid a collision, owing to the lower percentage requiring a much quicker application of air than the last car he was handling. Or vice versa, would he not have some excuse for piling his passengers into the front end of the car, or skidding wheels, if the car he has just taken over has a higher percentage than the one he had before? Then in train operation an unequal percentage is liable to cause a surging between cars, to the discomfort of passengers, and causing unnecessary strains upon the draft gear, which has not the assistance of spring vestibule buffers to steady it, as in steam road equipment.

Therefore, with a standard type of air equipment and trucks, by adjusting the distance between the push-rod holes and tie-bar holes in the cylinder levers, the total leverage ratio can be adjusted to give a standard percentage of the light weight of the car, at least within reasonable limits. For all equipments having the same design of trucks, and assuming a certain maximum application of air pressure, a curve graph, such as shown in the accompanying figure, can be readily plotted, from which, as soon as any car has been weighed, the position of the tie-bar holes in the cylinder levers can be at once determined for any desired leverage ratio. In the chart herewith shown, which is for a city equipment, the dotted line gives the locations of the hole at ½-in. intervals. For instance, with the hole at 9½ in., the total percentage would be between 95 and 100 (theoretically) on all cars weighing between 45,500 lb. and 41,500 lb., if the truck levers are correctly proportioned.

Similar graphs can be easily prepared for other equipments, so that whenever a car has been light-weighed its leverage can be at once checked.

On city equipments adjustments within ½-in. limits are sufficient, as there are two or three causes which contribute to variations in the total percentage, and make closer adjustments impracticable. In the first place, the "straight air" equipment general on city cars gives maximum cylinder pressure varying with the pressure in the main reservoir, between the limits of cutting in and out the air compressor, which is usually about 30 per cent of the lower limit. Again the proportion of loading to light weight is greater on city than on interurban cars. Another cause which may appreciably offset the total light weight is found when steel wheels or tires are used in the variation in weight due to turning them. The principal cause, due to variation of air pressure, could be minimized by raising the reservoir pressure, and supplying the air through a pressure reducing valve and a small equalizing reservoir, but the necessity for this additional equipment hardly warrants the added expense.

On interurban cars where automatic air-brake equipment is generally used, with the addition of automatic slack adjusters, the application pressure in the brake cylinders is practically constant. Variations due to loading are usually less, excepting perhaps on express or baggage cars, because of the greater weight per passenger of interurban equipments; and the proportion of wheel weights to the whole is less. It is, therefore, practicable to make a much closer adjustment of leverage, to within the limits of ¼ in., or even ⅛ in. if heavy equipments are in use, and in charts for such cases the dotted line may not be quite so useful.



GRAPH FOR DETERMINING AIR BRAKE LEVERAGES

The use of such charts as these assumes, of course, that care is taken to keep all the truck levers standard as to their proportions, and to some extent their angular relations to each other when shoes are on the wheels. On some types of trucks, the short end of the lever, particularly the "dead" levers is such that wear of 1/16 in. in the pin holes may seriously unbalance the shoe pressures on the opposite pairs of wheels, disturbing the total leverage ratio, and increasing the tendency of certain pairs of wheels to lock and skid. This can be largely avoided by the use of case-hardened bushings in the pin holes.

In this connection, some well-known designs of trucks are faulty, in the writer's opinion, in that the "dead" levers are allowed to rest against stops which move with the compression of the truck springs so that the length of that arm of the lever is constantly changing. The result is that the shoe pressures are unbalanced, frequently enough to cause locking of the wheels. Of course, theoretically, even this may be of advantage on one truck, depending upon the direction in which the car is moving, but in practice the results are more often troublesome than otherwise.

Electric Railway Track Construction in Paved Streets

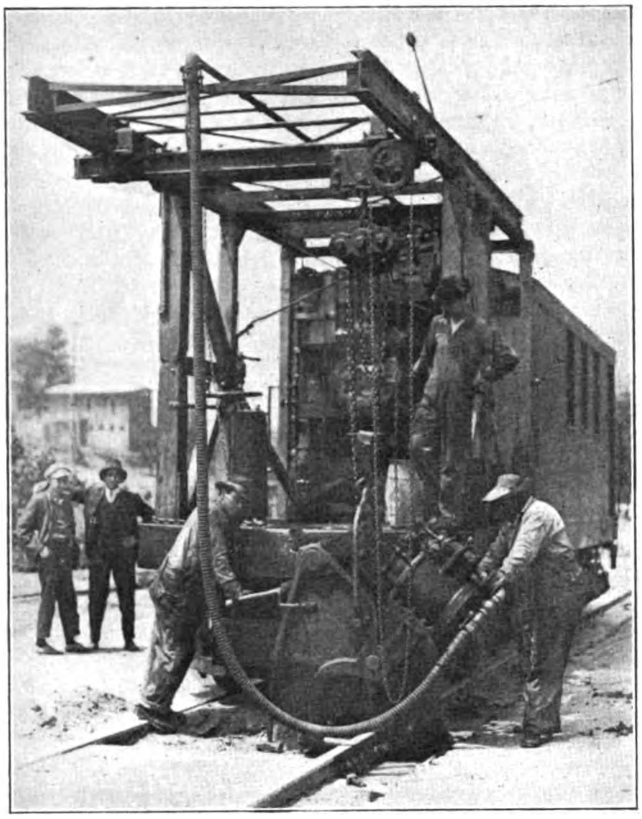
BY THOMAS W. BLINN

Formerly Assistant Engineer Maintenance of Way Northern Ohio Traction & Light Company, Akron, Ohio, Now With Solvay Process Company, Syracuse, N. Y.

It has been the experience of the Northern Ohio Traction & Light Company, in track construction laid in paved city streets, that the most approved types of rail section, track fastenings and steel ties, with concrete base, are necessary to withstand the extra heavy loads resulting from increased traffic, owing to heavy modern types of cars as well as of motor vehicles.

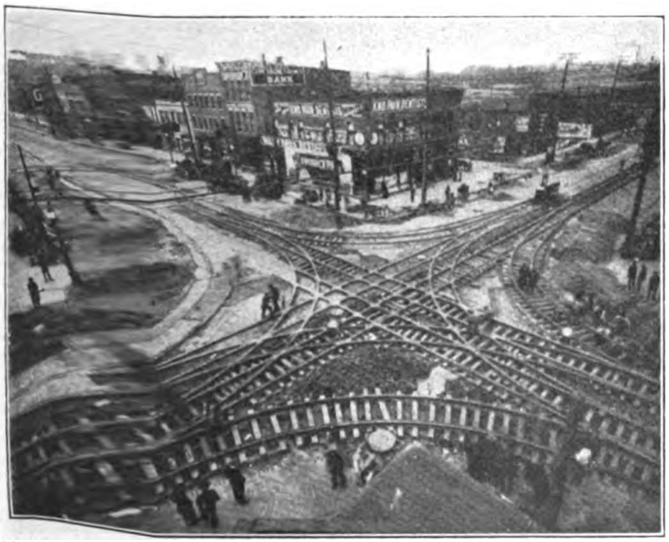
The standard roadbed installed on this company's new track extensions and renewals in the cities of Akron and Canton, Ohio, calls for 7-in. 95-lb. high T-rail, Lorain Steel Company's section No. 400, 60 ft. long, with Carnegie steel ties, section M-25, 7 ft. long, 4¼ in. high. This high T-rail, the company claims, is a vast improvement over the girder rail, such as the 73-291 section. The T-rail, when taken from the mill, is rolled with the proper distribution of metal, whereas the girder rail breaks more easily and the fracture shows improper metal distribution, which is possibly due to improper rolling. As to wear, the ball of the girder rail is worn away by the flange of the car wheels and finally allows the car wheels to strike the tread, causing the rail to bend inwardly, throwing the track out of gage and necessitating the spacing of the tie rods closer together. The T-rail does away with this improper wear and depreciation, and allows the flange of the wheel to wear away the head without necessarily affecting the gage of the track.

The only argument in favor of the girder rail is its possible use for vehicular traffic. Teamsters and drivers claim that this treadway provides a smooth means of travel for the wagon wheels and affords easier access to and egress from tracks on paved city streets. This argument is uncalled for because, in the first place, the tracks are not for vehicular traffic, and should not afford encouragement in that line; secondly, by the use of proper nose-block and good grouting the same condition can be obtained with the T-rail.

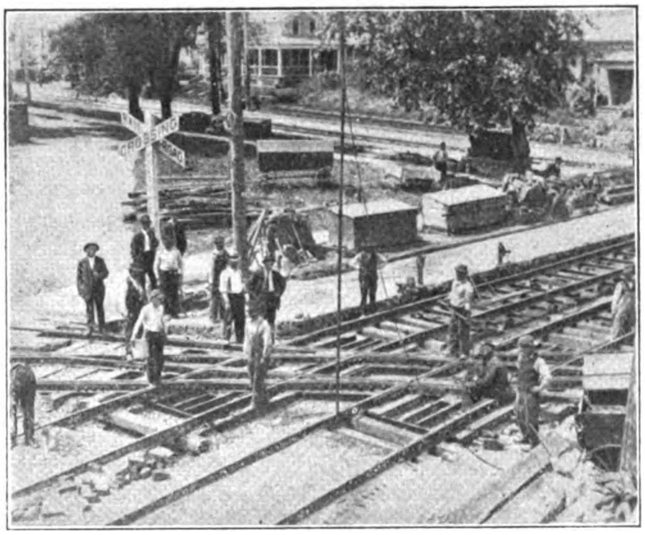


RIVETING RAIL JOINTS BY COMPRESSED AIR AT 115 TONS PRESSURE

In the new work in Akron and Canton provision is made for joint expansion or contraction, each rail being butted in close, forming a unit construction. The rail joints are riveted with 1 3/16-in. x 5¼-in. cone-shaped rivets, by means of an electrically-driven compressed air machine, at 115 tons pressure, as shown in an accompanying illustration. Under favorable conditions a joint of six holes can be riveted in about six minutes, averaging one rivet per minute. The company's standard calls for staggered joints in all track work. Instead of using the Carnegie steel ties at the

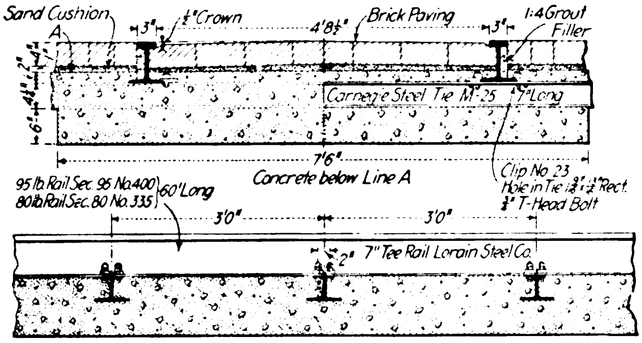


COMPLICATED SPECIAL-WORK LAYOUT AT BUSY STREET INTERSECTION IN AKRON



SPECIAL WORK AT INTERSECTION OF DOUBLE TRACK ELECTRIC LINE WITH CROSSING POINTS OF TWO STEAM RAILROAD LINES joints, a steel twin tie manufactured by the International Steel Tie Company, Cleveland, Ohio, is used. The company places 6 in. of concrete under ties, concreting from within 5 in. from the top of the rail, and allowing 1-in. sand cushion, ½-in. crown and 4-in. Metropolitan paving block, with nose brick at the inside of the rail, and 1 to 4 cement grouting next to the rail. The joint grilling is 2½-in. x 5-in. x 5-in. standard with 1¼-in. holes. Track centers for double track are 10 ft. apart. Paving is laid in the devil strip between rails and 18 in. outside of tracks.

The view on page 371 of a seven-eighth grand union gives a comprehensive idea of the magnitude and extent of trackage, and general layout required at this busy street intersection, where two main trunk lines meet. This installation is at South Main and Exchange Streets, Akron, Ohio. The special work was built by the Cleveland Frog & Crossing Company, Cleveland, Ohio, and 7-in. 140-lb. guard rail is used. The layout has a hard center solid manganese center construction. Switches and mates are the standard length, 13 ft. 6 in. In order to get proper car clearances here, the track centers were built 11 ft. apart at each end of the special work, not affecting materially the general layout of the tracks. The spacing of the 1¼-in. holes in the joint drillings was 2½ in., 4 in., 4 in. For bonds, one ⅞-in. hole was drilled 4½ in. from the end of rail, in line with the splice drilling, but soldered terminal bonds were actually used throughout the track work. The flat terminals were soldered to the rail after the contact area was prepared by grinding. Heat was applied by a blow torch. The 7-in. high T-rail had sufficient area on the top of the rail base for bonding, and this afforded easy access for the grinding machine. Bonds were 24 in., 30 in. or 36 in. long, depending upon the weight of rail and the drillings in the joints. The company used 30-in. bonds for 80-lb. rails and 36-in. bonds for 95-lb. rails. On this piece of special work the bonding was installed through as well as around the layout, connecting each piece of special work to the copper cable which links around the special work and linking each joint in the special work, as in straightaway track construction.



LONGITUDINAL AND CROSS-SECTIONS OF TYPICAL TRACK CONSTRUCTION IN AKRON, SECTIONS TAKEN BETWEEN JOINTS

Under railroad crossings a light 56-lb. or 50-lb. scrap rail was connected to each track, thus forming a good, permanent bond.

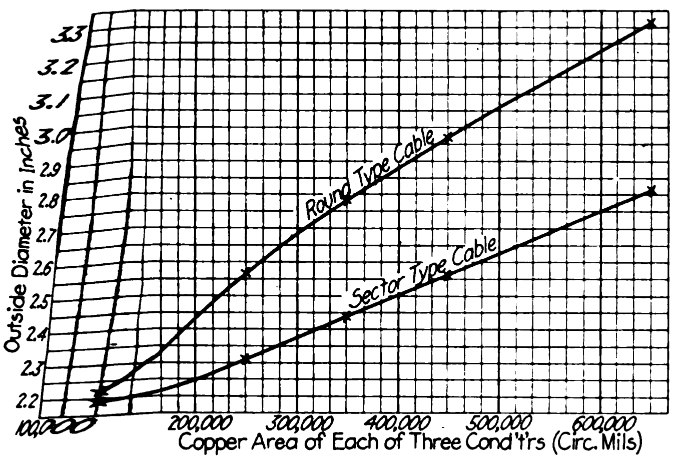
The special work described above was installed in eleven working days under traffic in both directions. The entire work, including paving, bonding and overhead work, was completed in eighteen days. A Kent Machine Company's continuous concrete mixer was used, as shown on the tracks in the upper right-hand corner. The average was 60 ft. per hour per single track. A 1:3:5 mixture of Universal Portland cement, washed sand and gravel was used. Wood ties were placed under the special work, the total depth to the subgrade being 19 in. The base was a 6-in. layer of concrete, a 1-in. sand cushion was placed upon it, and the paving was of 4-in. Metropolitan brick. Other materials used at this intersection alone included more than 77,000 paving bricks, 896 No. 1 white oak ties (128 used for sleepers), nine kegs of track spikes, 422 tons of gravel, 287 tons of sand, 1958 bags of cement for the base, and 218 bags of cement for pavers.

Owing to the crossing of two steam tracks over the double-track electric line, a complicated system of frogs was necessitated, as shown in a second view on page 371. Here the intersection of the Baltimore & Ohio Railroad with the Akron-Barberton & Belt Line Railway comes in the devil strip of the double-track electric line on East Exchange Street, Akron. The rail section here is 100-lb. A. S. C. E., with 2½-in.-5-in.-5-in. joint drilling. This special work of hard center solid manganese construction was built on a heavy steel underframe, furnished by the International Steel Tie Company, Cleveland, Ohio. About 10 in. of crushed No. 3 limestone was tamped under the frame. The frame was concreted in three parts before placing it in position. The whole was concreted up to the top of the rail and welded with strips of soft metal to the special work with a welding machine manufactured by the Indianapolis Switch & Frog Company, shown to the right in the crossing illustration. The use of a heavy steel underframe welded to the special work is more or less a matter of experiment with this company, but it is expected to stand up against the heavy traffic and peculiar special work layout which is necessary at this locality.

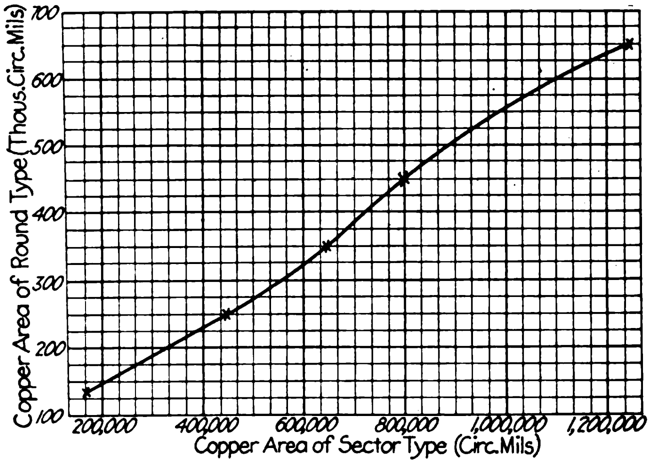
Electric Interurbans in Spain

According to the *Elektrische Kraft und Betriebe*, fifteen of the interurban electric railways in Spain, which include the greater part of the lines of this description and which aggregate a single-track mileage of 183 miles, are of 1 meter gage. One of these railways, running from Pampeluna to Sanguesa, 11 miles, is operated by single-phase current at 6000 volts and 25 cycles; all the others use continuous current at 500-600 volts, with the exception of the 26-mile Viga-Mondariz line, which is still under construction and which will use direct current at 1200 volts. Another line under construction which will use direct current at the same pressure is the Barcelona-Sabadel-Tarasa line. Three lines running out of Bilbma, totaling 50 miles, will use the d.c. 500-600-volt system. Of ordinary electric railways the Gergal-Santa Fé-Mondigur ore-hauling line near Almeria is the only one in use. This three-phase regenerative system was described in the ELECTRIC RAILWAY JOURNAL of Aug. 15, 1914. A more important long distance line, whose electrification was under consideration just before the outbreak of the war, is that which connects Huelva with the famous Rio Tinto copper mines; this line, devoted almost exclusively to the transportation of ore, is 50 miles long and has a gage of 1.30 meters (4 ft. 3 in.). For its operation it is intended to use three-phase current at 3000 volts and 50 cycles; the locomotives are fitted with two motors of 600 hp. each.

A commission nominated by the Spanish government is at present occupied with a scheme for a steam and express electric line from Madrid to the French frontier, the termination of which will probably be at the new Somport tunnel which passes through the Pyrenee Mountains.



SECTOR CABLE—RELATION BETWEEN DIAMETERS OF ROUND-TYPE AND SECTOR CABLES, OF SAME AREA AND EQUIVALENT INSULATION THICKNESS

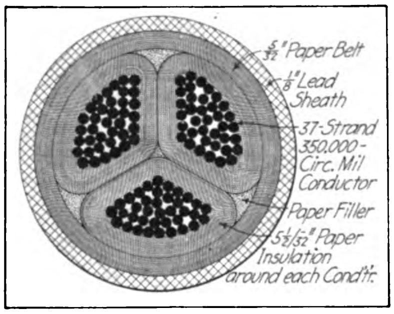


SECTOR CABLE—RELATION OF CONDUCTOR AREAS OF ROUND-TYPE AND SECTOR CABLES, OF SAME DIAMETER AND INSULATION THICKNESS

Sector or "Clover Leaf" Cable

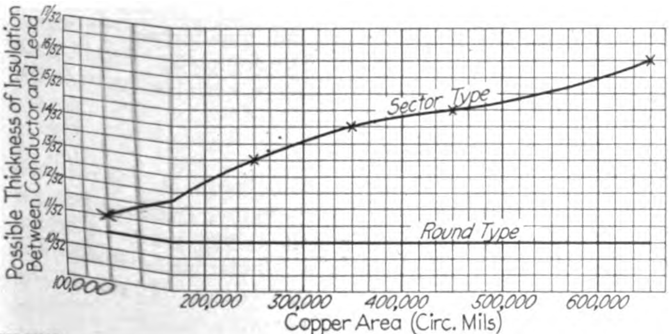
Sector cable is rapidly coming into use partly to increase duct capacity. For equal copper temperatures and conductor cross-sections a sector cable will carry greater loads than one of the round conductor type because it affords better transmission of heat from conductors to sheath.

Based on equal rises in copper temperature and equal diameters, the currents which sector cable and round-conductor type can carry are approximately in the ratio of the corresponding cross-sections. For instance, a 2.5-in. round-conductor cable having a conductor cross-section of 250,000 circ. mils has about five-ninths the current-carrying capacity of a 2.5-in. sector cable which has a cross-section of 450,000 circ. mils.


5/32" Paper Belt
1/8" Lead Sheath
37-Strand 350,000-Circ. Mil Conductor
Paper Filler
5 1/2/32" Paper Insulation around each Cond'tr.

SECTOR CABLE—SECTION SHOWING RELATION OF INSULATION, CONDUCTORS AND SHEATH

As to cost, sector cable is slightly less expensive than round-conductor in sizes from No. 000 B. & S. gage up, owing to the small quantities of material required. The difference in price becomes more marked with the larger sizes, but is not in direct proportion to the difference in amounts of materials used, as the fabrication of sector cable is much more difficult than that of the round-conductor type. However, for the same carrying capacity sector cable is considerably cheaper. When armored cable must be employed, the sector-conductor type has the additional advantages of requiring less armoring material and possessing a larger percentage of conductor cross-section than unarmored cable.



SECTOR CABLE—RELATION OF INSULATION THICKNESS, CONDUCTOR TO SHEATH, IN ROUND-TYPE AND SECTOR CABLES, OF SAME DIAMETER AND CONDUCTOR AREA

Other comparisons are shown by the accompanying curves. One indicates the relative outside diameters of round-conductor and sector cables having the same copper areas and thickness of insulation. Another shows the increased copper area which can be made available in a given diameter and with a definite insulation thickness by substituting sector cable for the round-conductor type. A third diagram indicates the amount by which the insulation thickness may be increased without altering the conductor cross-section or increasing the outside diameter by using sector cable instead of round-conductor cable.

All of the comparisons are based on round-conductor cable insulated for 6600 volts, that probably being the type most commonly required by central station companies. For lighter insulation walls the advantages of sector cable become more marked, while for heavier walls the reverse is true. With ordinary wall thickness sector cable possesses no practical advantages for sizes smaller than No. 000, because the theoretical gain which can be shown for cable as small as No. 00 is offset by the practical difficulties which are met in attempting to maintain the sector shape of the conductors when the cable is being formed.

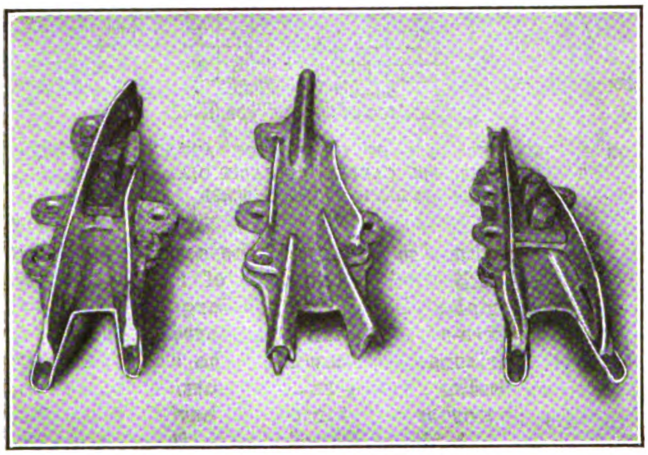
Proposed Tramway Extensions for Rome, Italy

The administration of the Municipal Tramways, Rome, Italy, is drafting a broad scheme of tramway extensions and street improvements conjointly, which is to be undertaken when the whole of the city's network is under municipal control. Ten new lines are to be built, and the administration plans to construct underground tramway lines of moderate depth which will represent an intermediary stage between the existing surface systems and the deep tube line of the future, which must be constructed when the population of the city amounts to 1,000,000. The provisional moderate depth underground lines are, it is stated, an actual necessity, owing to the daily growing congestion of the traffic in the streets of the city. The ten new lines projected are to be constructed gradually, preference being given to radial trunk lines and the most active traffic routes. The total length of the new lines projected is about 1300 miles.

Trolley Frog with Renewable Switch Pan

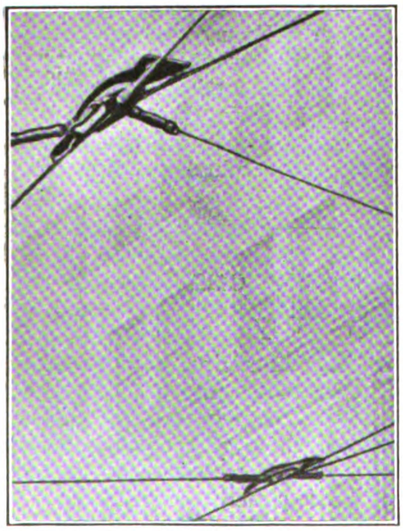
James C. Barr, Boston, Mass., states that the Elwell Q-17 frog, shown in the accompanying illustrations, is now used exclusively by the Bay State Street Railway as far as new purchases are concerned. The company has had the frogs in use about two years.

The frog consists essentially of a permanent frog bridge to which a renewable switch pan is bolted. Both main parts are ordinarily of malleable iron, but can be made of bronze if desired. The weight, complete with nuts, bolts and washers, is about 9½ lb. The frog is 18½ in. long over all, either right-hand or left-hand style.



LEFT-HAND, RIGHT-HAND (INVERTED) AND "V" FROGS

The frog bridge is installed with permanent guy wires, and it is designed strong enough to bear all line tension without buckling. The switch pan can be replaced in sixty seconds, as the removal and replacement of only three bolts is involved in renewing the pan. This operation takes the place of the older one, involving disturbance of guy wires and trolley wires and frog alignment, which required from thirty minutes to three hours.



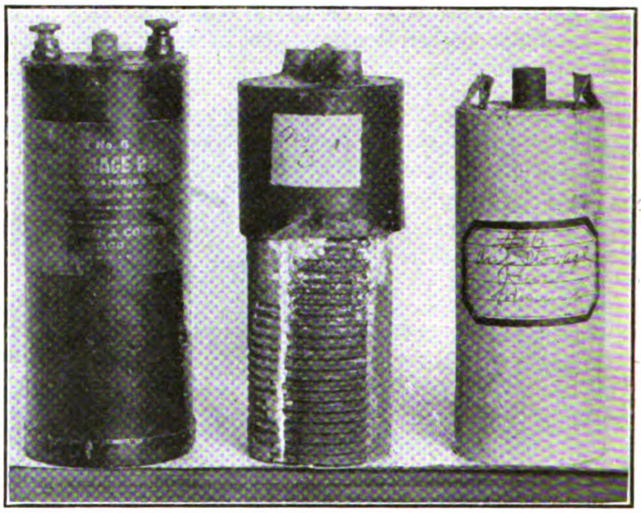
FROGS INSTALLED IN LYNN, MASS.

Among other advantages claimed for this frog are the following: The cost of renewal is low, less than one-half that of a new frog, as the renewable pan performs all switching duty, while the total saving in maintenance cost is said to be 75 per cent. No clamping devices are required to hold the trolley wires in the grooves in the pan, as they are snapped under strong jaws and remain in permanent tension and alignment.

The illustrations give details of construction of the frog. One shows, from left to right, the left-hand frog, the right-hand frog (inverted) and the V frog. The other is taken from a photograph of two left-hand frogs installed at Central Square, Lynn, Mass., near the Boston & Maine viaduct. On account of the location near the viaduct the height above the rail is but from 15 ft. to 16 ft., imposing hard service on the frog. The nearer frog in the picture passes about 500 cars in twenty-four hours and its switch-pan life is about eight months. Cars pass this frog with controllers on the first few notches and with consequent heavy draft of current.

Storage Battery Substitute for Dry Cell

A dry storage battery of practically the same size as the standard No. 6 dry cell has recently been put on the market by S. S. Stolp, Chicago, sole sales agent for J. P. Mentzer & Company, also of Chicago. Unlike the ordinary storage battery, this one contains a non-flowing electrolyte in a cylindrical cell made of a paper fiber which is proof against water, acids and electrolysis, and is unbreakable. In the center of the cell is a tube to supply water to prevent drying out. This tube also serves as a gas vent and as a means of taking up the changes in volume of the electrolyte during charge and discharge. The positive and negative elements are made from rolled strips of corrugated lead, and the electrolyte is an amorphous, non-crystallizing, white substance which is said to possess exceptionally high absorbing power. Tests have shown that the battery can be recharged an indefinite number of times at a lower price per charge than the original cost of the ordinary dry cell. The rating of the battery is ½ amp. for forty hours, 1 amp. for eighteen hours, 2 amp. for eight hours, or 3 amp. for five hours, and the average discharge potential is 2 volts. The manufacturers recommend this dry storage battery as a substitute for the dry cell in the bell and buzzer signal systems for street railway cars. The complete cell, plate construction and partly formed element are shown in the accompanying illustration.



VIEW OF DRY STORAGE BATTERY COMPLETE, PLATE CONSTRUCTION AND PARTLY FORMED ELEMENT

As a precaution against fire the Louisville & Southern Indiana Traction Company, New Albany, Ind., has installed a 10-hp. d.c. motor, which drives the various wood shop tools, in a glass case. This inclosure not only accomplishes its purpose but protects the motor from accumulations of dust and permits visual inspections to be made while the motor is in service. The glass case is inexpensive, yet at the same time meets the requirements of insurance inspectors.

NEWS OF ELECTRIC RAILWAYS

NEW YORK TESTIMONY PILING UP

Committee Delves Into Finances of a Decade Ago—Statement by President Williams of the B. R. T.

The record of testimony in the Thompson investigation is appalling. The committee has dragged its weary way lately through the maze of the negotiations attending the planning and execution of the contracts for the subways now under construction. Even now there exist in some quarters the same wide differences of opinion in regard to the contracts that voiced themselves during the negotiations. In consequence of some of the testimony offered before the committee, Comptroller Prendergast, the only member of the Board of Estimate of New York now in office who voted for the contracts, issued a statement on Feb. 12 in which he said that he felt it his duty to raise his voice against the storm of misconception, and in some cases malicious representation. In this connection he said:

"With a single notorious exception, there has not been a single statement made during the last week regarding these contracts which was not a matter of public discussion and record months before the contracts were signed and the subject of the most active contention during the six weeks immediately preceding the signing of these contracts. The objections made then are exactly the same things that have now been 'discovered' by the Thompson committee. If the record shows anything at all, it shows conclusively that every one of those objections to the contracts was beaten down in argument. The almost general public approbation with which the signing of the contracts was received is all the evidence that is required in substantiation of this statement.

"I now want to refer to one notorious matter which has been brought out by Mr. Colby; that is, the alleged collusive arrangement said to be a part of the contract for third-tracking the elevated railroads. It has been maintained that the percentage of profit to be allowed the contractor would represent something near $2,000,000. It has been testified before the committee that Mr. Shonts, president of the Interborough Rapid Transit Company, told a former director of the railroad that it was necessary to make this arrangement in order that certain commitments and obligations might be taken care of. A story of this kind naturally arouses curiosity of a serious character regarding the nature of these commitments and obligations.

"It is to be regretted that upon the publication of this charge Mr. Shonts did not immediately demand a hearing before the committee for the purpose of meeting the charge and explaining it thoroughly. Personally, and as an official, I hope the committee will sift this transaction to the very bottom. It will deserve commendation for disclosing the real truth.

"This much must be understood now, however. The city had nothing to do with making that contract for the third-tracking. The work was to be done by the railroad with its own money, the city not contributing a dollar."

On Feb. 10 the New York *Times* published a story to the effect that the directors of the Brooklyn Rapid Transit Company had voted a honorarium of $100,000 to President T. S. Williams of the company in appreciation of his work in connection with the subway contracts. Mr. Williams promptly issued a statement in which he said:

"While it is of no public concern, the Brooklyn Rapid Transit Company (not the New York Municipal Railway Corporation) did show its acknowledgment of my services by paying me the sum of $100,000, given, as the report of a committee of the directors states, 'in recognition of his unusual services and time spent in negotiations with the city relative to the subway contracts.' This payment was not solicited or suggested by me. It was the voluntary and appreciative act of the directors.

"I suppose the Thompson committee will in due time take up the matter of all our expenditures under the city contracts and also the city's expenditures, and we shall be glad to give them full information. Our record is as clean as a hound's tooth. There has not been a dollar of graft. Supervision of our plans, contracts and accounts by the city has cost the joint enterprise probably not less than $1,000,000 extra money, and when our part of the total cost is compared with the city's we are the ones who have the greatest cause for complaint."

On Feb. 10 H. M. Fisher, secretary of the Interborough Rapid Transit Company, was questioned in regard to the history of the company. He was taken very briefly over much of the ground covered by the Public Service Commission in its investigation of traction finances in New York made almost a decade ago. He was also questioned in regard to the Interborough-Metropolitan Company and its successor, the Interborough Consolidated Corporation. Mr. Fisher said that the Interborough-Metropolitan Company had paid dividends at the rate of 5 per cent per annum for about a year and a half, the last payment being made in July, 1907. The Interborough Consolidated Corporation had been organized to conform the nominal capital of the Interborough-Metropolitan Company "to the present condition of its assets and thus enable the stockholders of the Interborough-Metropolitan Company to participate justly in its recurring annual surplus profits, which previously were not divisible."

On Feb. 11 Senator Thompson read a letter from John C. Wilson, who wrote that for fifteen years he had held 2700 of the 11,872 shares of stock of the Interborough Company not owned by the Interborough Consolidated Corporation. Mr. Fisher regarded Mr. Wilson as a chronic kicker. In his letter Mr. Wilson said:

"I have long believed that the directors have taken advantage of their position to make personal profits for themselves and their friends through the payment of unnecessary and excessive salaries, bonuses, commissions, etc., and I have endeavored to the best of my ability to expose and thwart them."

On the same day Chairman Straus of the Public Service Commission said:

"The public may rest assured that the present Public Service Commission will see that the cost of construction of the dual system will not be padded by improper or extravagant items of any character. Under the contracts no items can be capitalized until they have been formally acted on here. If any payments have been made not warranted by the findings of the commission no part of them will be charged up against the city.

Mayor Mitchel had this to say on the bonus subject:

"In so far as the bonuses, if paid, as alleged, either now or an attempt be made to add them to the construction cost of the subways, the city should and will oppose by whatever means it has. Beyond that I cannot say what the city will do, because I do not know anything about it personally."

Regarding Senator Thompson's effort to reach J. P. Morgan by cable in Europe, members of Morgan & Company were quoted as saying:

"Senator Thompson's message is surprising in view of the fact that upon Mr. Morgan's departure, a member of the firm, in reply to the chairman's inquiry, explained fully to him that the exact date of Mr. Morgan's return was indefinite, owing to the extent of business matters that he was obliged to cover. Mr. Morgan, it will be remembered, appeared as a witness before the committee several weeks ago, and at that time he expressed a desire to serve the committee in any way that he could. His trip to Europe was planned as long ago as last November."

Recapitulation of the testimony before the committee shows that in the five years since the subway negotiations became acute, and largely on account of these negotiations and the resulting contracts, the Interborough Rapid Transit Company and the New York Railways spent nearly $3,500,-

000 on counsel. Special payments in this time totaled $316,032. In addition the Interborough Company paid to its legal staff at $300,000 a year $1,500,000, the New York Railways paid its staff $260,000 a year or $1,300,000. The New York & Queens County Railway paid its staff $25,272 a year or $126,360. Richard Reid Rogers was paid $30,000 a year or $150,000 for the five years, with a bonus of $50,000, making the total payment to him $200,000 and the grand total of payments $3,442,392.

Theodore P. Shonts, president of the Interborough Rapid Transit Company, was the witness on Feb. 17. He was questioned at length in regard to his previous railroad connections, his remuneration in his various positions and the bonus of $150,000 voted to him by the directors and recorded in the minutes as "for services of an extraordinary character and of great value to the company." Mr. Shonts explained that this was "for duties outside of those for which I was originally employed to perform, $125,000 at one time and $25,000 at another." Most of Mr. Shonts' investments were in Interborough-Metropolitan stock, of which he said that "I bought more than I had a right to." Mr. Shonts also told about the conference on subway matters that he had with the late Mayor Gaynor at the latter's farm at St. James, Long Island. As a result the Mayor had two engineers go over the subway data and report to him, after which the Mayor's attitude changed and the company had a fair hearing. It was explained that the retainer of $17,500 paid to ex-Comptroller Grout of New York was in connection with expert information supplied in regard to the finances of the city, its debt limit and its ability to meet the obligations which the rapid transit contracts would impose.

PACIFIC ELECTRIC IMPROVEMENTS PROPOSED

Work to Commence Soon on Improvements Which Are to Cost Several Millions

The Pacific Electric Railway, Los Angeles, Cal., will begin construction work this spring on improvements that will cost several million dollars, chief among which are car shops to be erected at the new industrial townsite of Torrance, about 10 miles south of the city, for the joint use of the company and the Southern Pacific Railroad. The plant will cover a site of 125 acres. The buildings will be mostly of steel frame construction and will be so designed as to provide for the construction of all future cars for the electric line. It is rumored that with the completion of the plant the Southern Pacific will abandon its shops at other places and will confine its field of manufacturing activities to Torrance.

The Pacific Electric Railway's present shops on East Seventh Street, Los Angeles, handle repair work only and provide storage facilities. They are to be vacated to make way for a new $10,000,000 market terminal. Here new switches and spurs of a total length of about 2 miles are to be constructed to serve the many warehouses of the terminal company and freight depots for incoming and outgoing produce.

The abandonment of these structures will necessitate the construction of new carhouses and storage tracks, and instead of having one large central station for the housing of nearly all cars from all divisions, as at present, arrangements have been made to provide separate stations for each division. They will be located at Covina Junction for the eastern division, which includes lines to San Bernardino, Pasadena, Alhambra, Sierra Madre and Covina; at Vineyard Station for the western division, including lines to Venice, Santa Monica, Sawtelle, Beverly and Redondo Beach, and at Sixth and Alameda Streets, Los Angeles, for the southern division, including lines to Long Beach, Whittier, Santa Ana, Balboa Beach and San Pedro. The total capacity of these will be several thousand cars.

In addition to these improvements the company has recently contracted with the city to construct tracks to serve municipal docks and warehouses at San Pedro harbor. It is also preparing to reconstruct a number of bridges, repair track damaged by the recent floods, eliminate grade crossings at Rose Hill, and, as previously reported in the ELECTRIC RAILWAY JOURNAL, build an elevated line along Sixth Street, to cost $166,000, and rearrange tracks and build umbrella sheds at its Hill Street station.

$375,000 IN EQUIPMENT ORDERED

Lehigh Valley Transit Company Orders Fifteen Cars, Signals and Generating Equipment

Orders for new equipment to cost $375,000 have been placed within the past few days by the Lehigh Valley Transit Company, Allentown, Pa. Following the installation of this material, a number of changes will be made which include the possibility of the operation of three-car trains on the Philadelphia Division and the guarding of every mile of track operated by the company with the automatic signals.

Included in the equipment order are twelve 52-ft., all-steel, center-entrance limited cars for use on the Philadelphia Division, to be made by the Southern Car Company, High Point, N. C. This will provide a total of twenty-four limited cars for travel on the Liberty Bell Route. An order has also been placed for three additional all-steel cars for use in the Easton-Bethlehem-Allentown limited service.

To provide sufficient generating capacity in the Allentown power station for the rapidly growing railway and commercial load, an order has been placed with the Westinghouse Electric & Manufacturing Company for a 10,000-kva. turbine, the largest yet installed on the property. This will give a total available rating of about 30,000 kva. The same company will also supply about six 60-cycle rotary converters to enable the standardization at 60 cycles of all substations except those on the Philadelphia Division. Two new 25-cycle substations will be erected on the latter division, on the Lehigh Mountain, near Allentown, and at Quakertown.

Orders have also been placed with the Nachod Signal Company, Louisville, Ky., for complete automatic signal equipment covering every line of the company not heretofore equipped with the automatic devices. These include the local lines in Allentown, Bethlehem, Macungie line, the Nazareth, Easton and Egypt lines.

For some time past surveys have been in progress looking toward the double-tracking of the line between Bethlehem and Easton, and when this work is completed practically the entire system between Allentown and Easton will be double track. As soon as permission has been granted by the Public Service Commission, work will also be started on the change of location of the tracks just west of Easton, where at present the line crosses the railroad tracks on a trestle. It is planned to have the tracks pass under the railroad, thus eliminating a dangerous curve and an 8 per cent grade.

IMPROVEMENTS TO GALESBURG PLANT DECIDED

The Galesburg Railway, Lighting & Power Company, Galesburg, Ill., proposes completely to rebuild the boiler room end of its plant, and will install a row of boilers facing the present boilers. This will mean widening the boiler room about 24 ft. This year the company will install two 500-hp. Stirling type boilers with stokers, and put in coal and ash handling apparatus with coal bunkers to take care of approximately 1000 tons of coal, a 250-ft. concrete stack 14 ft. at the top, and two 2500-hp. feedwater heaters, and other auxiliary equipment. This will give the company a most modern boiler plant. In the engine room the company will install an 800-kw. direct-current, engine-driven railway unit. The engine will be of the Corliss type, non-condensing, to be used for steam heat load in the winter.

CONSTRUCTION MATERIAL WANTED

The L. A. Wells Construction Company, 34 Wade Building, Cleveland, Ohio, is in the market for 2300 tons of steel rails and connections, soft-wood ties, 35-ft. poles, trolley and high-tension wire, special work for overhead construction, copper bonds, six 50-ft. cars and electrical apparatus for power house and substation. The company is also prepared to receive figures on grading, approximately 250,000 yd. The material mentioned is to be used in constructing and equipping 23 miles of electric railway to be built from Fort Scott, Kan., to Mulberry, Kan. Work is to start as soon as the weather will permit.

The road will be known as the Fort Scott & Pittsburg Railway. It was first projected in 1912. The company is represented in Fort Scott by H. A. Cooper, with offices in the Redfield Building.

STATUS OF WILKES-BARRE INJUNCTION

The Wilkes-Barre (Pa.) Railway has issued the following statement in regard to the injunction in the strike case pending there:

"In view of the confusion that seems to have arisen as to the statement that the case of the Wilkes-Barre Railway against the Amalgamated Association of Street Railway Employees, Local No. 164, et al., has been continued until March 10, it is announced that this date refers solely to the equity division of the action, or that section of the prayer that asks for damages. The court procedure allows the defendants thirty days in which to file an answer to a complaint, with such extension of time as may be agreed on by counsel or directed by court. It is this procedure that leads to the consideration of the question of damages being postponed until March 10.

"In the matter of the continuation of the injunction itself the only postponement is that necessary for the proper transcription of the record. This, it is assumed, will be a matter of two or three weeks, after which, upon argument, the question at issue will go to the court.

"Inasmuch as a number of inquiries were made of the officials of the Wilkes-Barre Railway as to their opinion of the failure of the defendants to offer evidence, the company states that in view of the fact that the matter is now before the court any comment would be improper and in bad taste."

SENATE VOTES FOR OWNERSHIP INQUIRY

Joint Investigation of Government Ownership and Operation of Public Utilities Proposed

The Senate on Feb. 15, by a vote of thirty-nine to twenty-two, adopted an amendment directing a joint committee of the House and Senate to investigate government ownership and operation of all public utilities engaged in interstate commerce. The amendment was added to the joint resolution presented by Mr. Newlands of Nevada, chairman of the committee on interstate commerce, providing for a joint committee of five members from each house to make a sweeping investigation of traffic conditions along the lines suggested in President Wilson's address convening Congress. The resolution itself, to which the amendment was added, did not reach a vote. The amendment adopted reads, as an addition to the instructions of the proposed joint committee:

"Also the subject of government ownership of all public utilities, such as telegraph, telephone, express companies, and railroads engaged in interstate and foreign commerce, and report as to the wisdom or feasibility of government ownership of such utilities and as to the comparative worth and efficiency of government regulation and control as compared with government ownership and operation."

Senator Borah of Idaho earnestly advocated the amendment providing for an investigation of government ownership of railroads. He said that in the event that government regulation and control are found to be breaking down, government ownership was bound to be one of the great questions before the country. Senator Borah said the war in Europe had done more to emphasize the question of government ownership than could have been accomplished in a normal way in fifty years. He referred to Germany as the greatest example of efficiency and organization, where public utilities are largely government-owned, and pointed out that England and France have been compelled to take gigantic strides in the same direction as a measure of safety in this war. He expressed the opinion that after the war neither country will move back to its original status. Senator Borah said the proposal to investigate the subject was wholly educational in intent, and he believed the American people, as well as the Congress, would be better equipped to meet the question if all the facts were gathered.

The resolution and the amendment have since been passed. In an interview which he gave last October Senator Borah expressed the opinion that regulation was not satisfactory to the public or to the owners of the properties. A summary of his remarks made at that time was published in the issue of the ELECTRIC RAILWAY JOURNAL of Oct. 30, 1915, page 923.

NEW MOVE IN TOLEDO INVENTORY CASE

Attorneys for the Toledo Railways & Light Company, Toledo, Ohio, have notified the Ohio Public Utilities Commission that no inventory and appraisal of its property will be filed with that body, because the law does not give it authority to issue a blanket order that all public utility corporations shall furnish this information. The order, known as No. 176, was issued about two years ago by former members of the commission who claimed to have the authority under the public utility law.

Representatives of the city of Toledo have been protesting against the action of the commission in allowing the company an extension of time in which to file its inventory and appraisal. The city never made a formal complaint with the commission, but has been depending upon this blanket order. The company does not deny that the commission has authority to make a specific order, after the city has filed a complaint and indicated the lines along which it desires the valuation, together with its purpose in making the complaint, but attorneys for the city indicated to the commission that there is no intention of filing such a complaint. The matter has been referred to Attorney General E. C. Turner for an opinion.

GEARY STREET CASE DECIDED

A decision of the Supreme Court at San Francisco, handed down on Feb. 9, upholds the contention of the United Railroads that the city of San Francisco, Cal., in refusing to stop the operation of certain Geary Street cars on lower Market Street and the ferry loop is acting illegally. The court granted the appeal of the United Railroads for a writ of mandate to compel the lower court to cite Mayor Rolph, the members of the Board of Works, and Thomas A. Cashin, superintendent of the municipal lines.

The city based its contention on the claim that the injunction granted the United Railroads, ordering the city to stop operation of its cars, was "mandatory" instead of prohibitive, and inasmuch as an appeal automatically holds up the operation of a mandatory injunction, the city's attorneys contended that the Mayor and other officials were not guilty of contempt in the continuance of the car service.

The decision of the Supreme Court was written by Justice Henshaw and concurred in by four other judges. The effect of the decision, it is affirmed, will be to put the Mayor and other city officials in contempt of court if they continue to operate the cars, and the United Railroads' attorneys will be enabled to demand a contempt citation for the city officials if the operation of the cars in question is not discontinued.

DECISION FAVORABLE TO COMPANY IN BALTIMORE PAVING CASE

In the case brought against the United Railways & Electric Company, Baltimore, Md., in regard to the paving obligations of the company, the Court of Appeals of Maryland on Feb. 10 held that the company is not required to do any paving, but merely to keep its tracks in repair once the paving is done. The decision was rendered in a suit of the city to collect $22,450 for a special section of paving. In the decision the court says that the company received no special benefits from the paving improvements, and that it would be just as reasonable to assess owners of automobiles or other vehicles using the streets for paving costs as to make the street railway pay for them.

On Feb. 11 City Solicitor Field of Baltimore announced that he would advise Mayor Preston to take the paving case to the Supreme Court of the United States. He is quoted in part as follows:

"If we should not succeed there (in the Supreme Court) then, it seems to me, if there is no other way in which we can compel the company to make its proper contribution to the public burdens, that the city should get ready to exercise its option to take over the lines of the old Baltimore City Passenger Railway, which are the cream of the system. The city has the right to take this property over at recurring periods of fifteen years. The next opportunity will be in 1919."

PRESIDENT PELLISSIER TESTIFIES

Hearings in the arbitration case of the Holyoke (Mass.) Street Railway were continued during the week ended Feb. 19. President L. D. Pellissier presented financial data pertaining to the company's operations. The witness said that for several years prior to 1912, surpluses amounting to about $10,000 had been earned, but that of late money has had to be taken from the surplus to pay the 8 per cent dividends until recently declared. The company's stock had declined in value and had recently been offered for sale at less than par. There were 371 stockholders, of whom 192 were women. The average increase in wages of regular employees since 1907 had been 30.5 per cent, whereas the increased cost of this labor to the company, owing to a shorter working day, had been 37 per cent. Since 1912 the increased cost to the company had been 18 per cent, and in the last three years the hours of labor had been reduced at least thirty minutes a day. More open cars with glass fronts had been put on to protect the motormen, and the accommodations for the men at the carhouses had been improved with recreation and locker rooms. About $15,000 had been paid by the company in the last three years for accident insurance for the men. The increase in work had been small. The average daily collection per conductor in 1915 was $20.70 against $19.60 in 1912, a gain of twenty-two fares and an average of 0.6 more transfers. For every dollar of added revenue obtained by the company the motormen and conductors received 32 cents.

Carhouse and Fifteen Cars Destroyed.—The carhouse of the Chambersburg, Greencastle & Waynesboro Street Railway at Waynesboro, Pa., together with fifteen of the company's cars, was burned in a spectacular blaze on Feb. 15. The loss is placed at $50,000, and only four cars remain.

New Offices Occupied in Washington.—The general offices of the Washington Railway & Electric Company, Washington, D. C., for many years located at Fourteenth and East Capitol Streets, have been moved to its new building adjoining the Potomac Electric Company Building, Fourteenth and C Streets, Northwest.

Chicago Traction Commissioners Sign Contract.—William Barclay Parsons, Robert Ridgway and Bion J. Arnold, the engineers selected to investigate and recommend a solution of Chicago's local transportation problem, signed contracts with the city on Feb. 14, 1916. Immediately following this official act, the commission organized with Mr. Parsons as chairman, and decided to call itself the "Chicago Traction & Subway Commission." Chairman Parsons announced that the first public hearing would be held on Feb. 16.

Commissioner Sanders Favors New Construction.—Street Railway Commissioner Fielder Sanders told the street railway committee of the City Council of Cleveland on Feb. 14 that the ordinance, authorizing the Cleveland Railway to relay 25 miles of track this year should be passed. Councilmen Stolte and Meyers opposed the company's plan of relaying 10 miles of track on Broadway and Cedar Avenue. Commissioner Sanders said that track improvement should receive attention to the exclusion of the construction of new division houses and shops.

Montgomery Traction Must Pay.—The United States Circuit Court of Appeals has affirmed the decision of the District Court that the contract of the Montgomery Light & Traction Company with the Montgomery Light & Water Power Company, operated by Henry L. Doherty & Company, is valid. This constitutes a precedent in establishing the validity of a continuing contract when damages cannot be definitely ascertained. This contract called for the Doherty Company to furnish current to the Montgomery Light & Traction Company, and for four years prior to the suit this has been done. Nearly $100,000 was involved in addition to the validity of the contract, and since the time the suit was filed another $100,000 has accrued.

New York Commission to Move to Equitable Building.—The Public Service Commission of the First District of New York has decided to rent the twenty-fourth and twenty-fifth floors in the Equitable Building, New York City, and the seventeenth floor of the City Investing Building for $110,000 a year, giving up quarters in the Tribune Building, the Woolworth Building and the Immigrant Bank Building, which quarters now cost the commission $122,000 a year. The working staff of the commission is now housed in three buildings. The commission is to get 2000 sq. ft. more office space than it is renting now, with more light and better service. The commission will begin moving from its present quarters on April 1.

Friendly Suit to Enjoin Subway Work in Cleveland.—A friendly suit was filed in the Common Pleas Court of Cuyahoga County, Ohio, on Feb. 11 to enjoin the County Commissioners from selling bonds to secure funds to build subway approaches to the new Superior-Detroit bridge across the Cuyahoga River in Cleveland. The prosecuting attorney filed the suit. The petition charges that the vote of the people on building a county bridge did not authorize the commissioners to issue bonds for building a subway; that the commissioners are without power to modify the plans for approaches; that they have no authority to spend money for subways in Superior Avenue, a city street, and that the proposed subway approaches cannot legally be considered as approaches.

Writ of Review Asked in Seattle Case.—Ralph S. Pierce, assistant corporation counsel of the city of Seattle, Wash., has petitioned the Thurston County Superior Court at Olympia for a writ of review of the order recently made by the Public Service Commission denying the appeal of the city of Seattle for the dismissal of the petition of the Puget Sound Traction, Light & Power Company to be relieved of certain of its franchise obligations. Mr. Pierce argues that the power of the Public Service Commission with respect to relieving the company of any of its franchise obligations is limited to the fixing of rates on a proper showing that the company is not making a sufficient return on its investment. If the writ of review is granted, the case of the company in which it sought relief from paving obligations will be transferred to Thurston County for argument.

Tacoma Falls Back on Privately-Owned Power Company.—The municipally-owned hydro-electric plant of Tacoma, Wash., has finally had to rely upon a private power company for protection against emergencies and periods of low water. The city has made a contract with the Tacoma Railway & Power Company providing for the interchange of electric energy, the company agreeing to furnish as much as 10,000 hp. when required to supplement the output of the municipal plant. In addition to this contract the company has been granted a franchise permitting it to serve power business in Tacoma direct from its lines, and also receives certain concessions in its street railway franchises. Following the failure of a proposed company to build a steam heating plant and provide a steam auxiliary for the city's water power, the city officials adopted a program of co-operation with the Railway & Power interests.

Acting on the Hydro-Radial Railway By-Laws.—Two municipalities, Waterloo and St. Mary's, have failed so far to pass the third readings by the Council of the hydro-radial by-laws passed by the people. At a prolonged session of the Waterloo Town Council on Feb. 8 the motion to give the third reading to the by-laws was defeated by a vote of five to four. The majority of the councilors were not satisfied with the assurances received from Sir Adam Beck that the route to be selected through Berlin and Waterloo would be satisfactory to both municipalities. It is quite likely a conference will be held with regard to St. Mary's, as the town solicitor fears the hydro-radial debentures will exceed the borrowing power set forth in the municipal act. The Hydro-Electric Power Commission of Ontario has hitherto regarded hydro debentures exempt, and still thinks so. Should it be necessary, special legislation will be asked, amending the hydro-radial act. Blanchard Township, which defeated the by-law last January, has decided to resubmit it to the vote of the electorate on March 13. The City Council of Toronto has passed the recommendation of the Board of Control, requesting Sir Adam Beck to seek an amendment of the hydro-electric railway act, 1914, to make it clear that the city has complete control of all its streets excepting such as were given for the right-of-way for the proposed hydro-radial line.

Financial and Corporate

SECURITIES HELD BY U. S. BANKS

Public Utility Bond Holdings Increase 13.7 per Cent and Railroad Bond Holdings 1.74 per Cent for Year Ended June 30, 1915

The report of the Comptroller of the Currency for the year ended June 30, 1915, shows that the amount of public utility bonds held by banks in the United States increased 13.7 per cent, while the holdings in railroad bonds increased only 1.74 per cent. This showing compares with a 19.0 decrease in public utility bonds and a 9.4 increase in railroad bonds in 1914, and a 19.5 increase in public utility bonds and a 6.2 per cent decrease in railroad bonds in 1913. The net change in 1915 from the 1912 figures is an increase of 10.0 per cent for public utility bonds and an increase of 4.4 per cent for railroad bonds.

The various classes of securities held by the banks of the country and the changes for the last year are shown in the following table (in millions):

Class	June 23, 1915	June 30, 1914	Increase	Per Cent Increase
United States	$811.2	$823.5	*$12.3	*1.50
State, county and municipal	1,494.0	1,353.4	140.6	10.37
Railroad	1,704.6	1,675.3	29.3	1.74
Public utility	663.9	583.9	80.0	13.70
Unclassified bonds, stocks, etc.	1,208.2	1,148.8	59.4	5.17
Total	$5,881.9	$5,584.9	$297.0	5.32

*Decrease.

It will be observed that holdings of United States bonds decreased and that investments by the banks in state, county and municipal bonds showed the largest increase in amount and the second in percentage of gain, the first place in percentage of increase being held by public utility bonds, which were second in amount of increase.

The following table (in millions) shows the various classes of securities held by the several classes of reporting banks on June 23, 1915:

Classification	State Banks (14,598)	Mutual Savings Banks (630)	Stock Savings Banks (1,529)	Private Banks (1,036)	Loan and Trust Companies (1,664)	National Banks (7,605)
United States	$2.8	$17.0	$5.5	$0.3	$2.1	$783.5
State, county and municipal	101.7	848.6	54.3	3.7	241.2	244.5
Railroad	81.2	818.5	21.1	3.5	401.1	379.2
Public utility	66.7	109.2	34.1	1.2	232.4	220.3
Other bonds, stocks, warrants, etc.	168.0	76.5	43.3	6.6	472.8	440.9
Total	$420.4	$1,869.8	$158.3	$15.3	$1,349.6	$2,068.4

The most striking changes in holdings were made by savings banks and national banks. The savings banks, mutual and stock combined, showed the largest increase in holdings of public utility bonds, adding $54,800,000 of such securities during the year while at the same time reducing their railroad issues by $20,000,000. National banks, on the other hand, increased their railroad holdings by $37,500,000, but added only $2,100,000 of public utility bonds. This showing was quite the reverse of that made in the preceding year, when the savings banks decreased their public utility holdings by $46,800,000 but increased their railroad issues by $38,100,000, while the national banks added $20,800,000 of public utility bonds and dropped $3,500,000 of railroad bonds.

State banks showed an increase of $15,900,000 in public utility bonds and $4,600,000 in railroad bonds, as compared to a decrease of $2,100,000 and an increase of $11,100,000 respectively in the preceding year, while trust companies, which in 1914 cut off $109,600,000 of public utility bonds and bought $98,100,000 more railroad bonds, increased their holdings in both issues for 1915 by $7,700,000 and $5,800,000 respectively. All classes of banks showed increase in their holdings of state, county and municipal bonds, the approximate gains being $68,500,000 for national banks, $40,000,000 for trust companies, $31,000,000 for savings banks and $11,000,000 for state banks.

ANNUAL REPORTS

The J. G. Brill Company

The sales value of the combined output for the calendar year 1915 of all the plants owned and operated by The J. G. Brill Company, Philadelphia, Pa., amounted to $4,403,117, as compared to $9,154,434 in 1913 and $4,903,511 in 1914. In only two other years, 1908 and 1909, did the sales fall below the point reached this year. It is said that the general business of electric car and truck manufacturing reached a condition of depression during 1915 that was without parallel in the history of the industry. The company obtained at least its full share of all orders placed during the year, but the prices resulting from the competition brought about by such conditons were of necessity extremely low. The general conditions in the company's field began to improve during the latter part of the year, and the improvement is said to be continuing and increasing, so that 1916 is begun under much more hopeful conditions. On Feb. 5, 1916, the combined orders of the company and its subsidiaries amounted to $4,765,985, as compared to $1,147,100 of work on hand on Feb. 6, 1915.

The operation of the plants of the company for 1915 resulted in a combined profit of $280,299, after charging against earnings the sum of $174,897 for all maintenance and repairs to the property. From this amount of profit there was set aside into the reserves for depreciation an amount of $163,973, so that the net profit amounted to $116,326. After making certain adjustments in the surplus account and paying dividends of $183,200, the net surplus at the end of the year totaled $1,247,982.

The management was able during the year to obtain orders for the manufacture of material for export as a result of existing conditions in Europe, such exports including principally motor-transport bodies and shell forgings. Many delays, however, unavoidable as far as the company was concerned, prevented the completion of a large measure of the shell orders, with the result that much of the profit which it was hoped would be realized thereon in 1915 was not earned in that year. An extension of the time of delivery well into the present year has been granted.

Interborough Consolidated Corporation

The income statement of the Interborough Consolidated Corporation, New York City, for the seven months ended Dec. 31, 1915 (the portion of its fiscal year since its formation to readjust the Interborough-Metropolitan Company on June 1, 1915), follows:

Surplus, June 1, 1915, exclusive of dividend accruals on Interborough Rapid Transit Company stock	$2,084,474
Dividends on Interborough Rapid Transit Company stock	$4,239,100
Interest and dividends on securities owned	24,095
Interest on loans, bank balances, etc.	33,656
Profit realized on securities sold	147,977
Total income	$4,444,828
Total surplus and income	$6,529,302
Interest, taxes, administration and general expense, sinking fund, etc.	2,436,890
Surplus available for dividends	$4,092,412
Dividends on preferred stock	2,058,322
Net surplus	$2,034,090
Appropriation for retirement of $200,000 of Interborough-Metropolitan ten-year 6 per cent collateral gold notes	200,000
Surplus balance Dec. 31, 1915	$1,834,090

The statement of income and disbursements as shown above covers seven months' operation. During this period three quarterly dividends of 1½ per cent each were declared upon the preferred stock of the Interborough Consolidated Corporation, whereas the income account shows full dividends received upon the Interborough Rapid Transit Company capital stock for only six months. The income for the period is therefore $847,820 less than it would have been under regular conditions of accounting for a full nine months' period. The administration and general expenses for the seven months include costs and expenses incidental to the consolidation agreement of April 23, 1915, amounting to approximately $116,000, by which amount they are in excess of the ordinary expenses of administration.

In regard to the subsidiary companies it is said that the surplus from operations of the Interborough Rapid Transit Company for the six months ended Dec. 31, 1915, was $3,899,153, an increase of $209,198 over the same period last year. The increase in surplus for December was $179,276, and for October, November and December $380,141. The improvement in traffic began in October, and each subsequent month showed a substantial increase over the previous month, indicating a return to normal business conditions. The net corporate income of the New York Railways for the five months ended Nov. 30, 1915 (December not yet available) increased $141,788 over the same period last year. The revival of business was reflected in increased earnings beginning with September, and this improvement has continued without evidence of abatement. The earnings of the New York Transportation Company have increased at a substantial rate during the last year, justifying the expectation that at some no distant day a distribution of dividends can be made on these shares.

Prolonged negotiations are said to have resulted in the acquisition by the New York Railways of substantially all of the claims outstanding against the receivers of the New York City Railway and Metropolitan Street Railway. There remains unadjudicated the question of allowances to the various receivers, counsel and others who claim the right to be paid out of the funds in the hands of the court. In view of this situation an application has been made to the United States District Court for the discharge of the receivers and the release of funds now held by them, reserving therefrom an amount sufficient to cover outstanding claims until they can be purchased or adjudicated by the court.

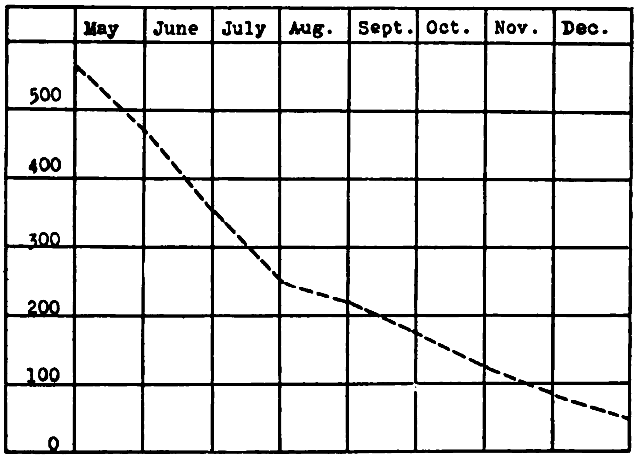
New York State Railways

The statement of income, profit and loss of the New York State Railways, Rochester, N. Y., for the year ended Dec. 31, 1915, combined with that previously published for the preceding fiscal year, follows:

	1915	1914
Earnings from operation	$7,264,674	$7,595,001
Expenses of operation (including depreciation)	4,487,270	4,600,572
Net earnings from railroad operation	$2,777,404	$2,994,429
Taxes	456,577	496,659
Net earnings	$2,320,827	$2,497,770
Net non-operating revenues	166,903	165,466
Gross income	$2,487,730	$2,663,236
Income deductions (interest and rentals)	1,389,119	1,355,466
Net income	$1,098,611	$1,307,770
Schenectady Railway Surplus—New York State Railways proportion 50 per cent	*15,162	18,992
Ontario Light & Traction Company surplus—New York State Railways proportion 100 per cent	7,090	2,453
Total income applicable to dividends	$1,090,539	$1,329,215
Dividends preferred stock, 5 per cent	193,125	193,125
	$897,414	$1,136,090
Dividends common stock	797,880	997,350
Balance	$99,534	$138,740

*Deficit.

The 1915 annual report of the company does not contain any comparative data for 1914, but a reference to the above figures inserted from the 1914 report will show the exact meaning of the statement in a sheet supplement of the 1915 report to the effect that the gross and net earnings for the last year were materially affected by jitney competition and by the general business depression. The earnings from operation decreased $330,327 or 4.3 per cent, while the expenses of operation (including depreciation) decreased $113,302 or 2.4 per cent, so that the net earnings from railway operation showed a loss of $217,025 or 7.2 per cent. Taxes, however, fell off $40,082 or 8.0 per cent, with a slight increase of $1,437 or 0.8 per cent in net non-operating revenues, so that the gross income showed a decline of $175,506 or 6.6 per cent. The income deductions (interest and rentals) increased $33,653 or 2.4 per cent, with the result that the net income of the company decreased $209,159 or 15.9 per cent. The New York State Railways 50 per cent proportion of the Schenectady Railway's surplus fell off from a surplus of $18,992 to a deficit of $15,162, but its 100 per cent proportion of the Ontario Light & Traction Company's surplus increased from a surplus of $2,453 to a surplus of $7,090, so that the total income applicable to dividends was diminished by $238,676 or 17.9 per cent. The 5 per cent preferred dividends were maintained, but the 1914 common stock dividend of 5 per cent was cut in 1915 to 4 per cent, and the surplus amounted to $99,534, as compared to $138,740 in 1914.



GRAPH SHOWING DECLINE OF JITNEYS IN ROCHESTER

In regard to jitney competition and the outlook for the future, the supplement to the report contains some explicit and interesting data. The jitneys operated in Rochester during May exceeded 550, but since that time the number has been continually decreasing, until during January, 1916, the number in operation varied from thirty to forty, or less than 8 per cent of the total number operated in May. The accompanying illustration shows very clearly the decline in the jitney movement during the year. During the last two months of 1915 the gross and net earnings of the company were greater than in any November and December in its history, this being the result of the decline in jitney competition and of the revival in general business. The following comparative summary of operations for the two months referred to shows clearly that much better conditions existed during these months than during the year as a whole and indicates more reasonably what is to be expected as the lines continue to operate under more normal business conditions and with freedom from unfair competition:

	Amount	Increase	Per Cent Increase
Earnings from operation	$1,332,222	$103,043	8.38
Expenses of operation	779,767	45,462	6.19
Net earnings from railroad operation	$552,455	$57,581	11.64
Taxes	75,399	*5,764	*7.10
Net earnings	$477,056	$63,345	15.31
Net non-operating revenues	33,039	*442	*1.32
Gross income	$510,095	$62,903	14.07
Income deductions	229,649	*1,724	0.75
Balance available for dividends	$280,446	$64,627	29.94

*Decrease.

The previously mentioned deficit on the part of the Schenectady Railway may be partly attributed to the decline in earnings from operation, which at $1,178,215 represented a decline of $126,088 or 9.6 per cent. The expenses of operation, however, totaled $762,211, a decrease of $71,161 or 8.5 per cent, and the net earnings of $416,003 from railway operation showed a loss of $54,928 or 11.7 per cent. The increase of $6,510 or 7.6 per cent in the total of $91,313 for taxes was heightened by the drop in net non-operating revenues from a surplus of $5,683 to a deficit of $51, and after a slight increase in income deductions, the net income at $215,674 showed a loss of $68,311 or 24.0 per cent, as compared to the preceding year. Dividends were maintained at the usual rate of 6 per cent, with the result that the year showed a deficit of $30,325, as compared to a surplus of $37,985 for the preceding year.

During 1915 the earnings from operation of the Ontario Light & Traction Company, Canandaigua, N. Y., totaled $59,825, a gain of $5,845 or 10.8 per cent, while the expenses of operation were $37,429, an increase of $829 or 2.2 per cent, leaving net earnings from operation of $22,396, an increase of $5,016 or 28.8 per cent. Taxes and uncollectible bills increased from $2,678 to $3,833, net non-operating revenues from $5,288 to $6,624, and income deductions from $17,472 to $18,096, so that the net income amounted to $7,090, as compared to $2,453 for 1914.

KANSAS CITY PROPERTIES SOLD

Judge Hook Confirms Sales and Kansas City Railways Holds First Meeting

Acting for the reorganization committee of the Kansas City Railway & Light Company, Clyde Taylor has purchased at receivers' sale the Metropolitan Street Railway properties for $3,600,000, the Kansas City Elevated Railway for $150,000, and the Kansas City & West Port Belt Railway for $100,000. Unspecified assets were also purchased for the sum of $10,000. Mr. Taylor also purchased the Kansas City Electric Light Company for $400,000, and this will be turned over to the Kansas City Electric Light & Power Company, the newly organized operating company for the electric light properties.

The first meeting of the Kansas City Railways was held on Feb. 15. Philip J. Kealy was elected director and president, succeeding John M. Egan. The meeting followed the confirmation, in the federal court, by Judge William C. Hook, of the sales of the various properties before noted. Mr. Kealy has also been made general manager of the light company, pending the election of a general manager, and he is to handle the details of separating this company from the street railway. He succeeds Louis H. Egan. There has been no meeting of the new light company.

The proceedings in the federal court were brief, and without objection, the form of decree and the forms of the various securities and conveyances being approved by the various interests and the city. A special order of court was made providing that securities which had not been formally presented under the "plan" may yet be filed and participate, it being understood that further orders will be made if necessary so that all owning securities may be protected. Another special order provided that either receiver may sign certificates and other documents in the absence of the other, the one signature to be valid for both.

The confirmation of the sales puts the Kansas City Railways in charge of the railway properties. The receivers will continue for ninety days to receive claims and finish details. One of the first acts of the new company was the appointment of Richard J. Higgins, city counselor of Kansas City, Kan., as counsel for the company on the Kansas side. O. L. Miller, who has been counsel, will continue as associate.

ADJUSTMENT OF OHIO LEASES

Ohio Electric Railway Is Arranging Lease Changes to Lighten Earnings Charges

Previous issues of the ELECTRIC RAILWAY JOURNAL have contained references to the Cincinnati, Dayton & Toledo Traction Company, which has been under lease to the Ohio Electric Railway for about ten years. The Ohio Electric Railway operates the property on the basis of a rental sufficient to pay interest on $5,000,000 of bonds and dividends at the rate of 5 per cent on $250,000 of preferred stock and $2,000,000 of common stock. While the road operates an exceedingly good territory and secures large gross earnings per mile, it has never paid in net earnings the amount that the Ohio Electric Railway has paid out in rentals. This company, therefore, has endeavored to make a readjustment of the lease so that it could continue to operate the road without such enormous losses as it has been compelled to sustain up to this time.

Negotiations with the Cincinnati, Dayton & Toledo Traction Company are not yet completed. It is said, however, that an arrangement has been about completed by which the Ohio Electric Railway will continue to operate the line for a period of six months and thereafter unless cancellation is desired, and pay to the lessor the entire net earnings, which will in turn be applied to the interest on the underlying bonds amounting to $2,300,000, and then to other obligations of the road. A bondholders' protective committee has been formed to conserve the interests of the holders of the consolidated 5 per cent mortgage bonds, amounting to $2,700,000, and the agreement between the Ohio Electric Railway and the lessor is also joined in by this committee.

Application for a receiver for the Cincinnati, Dayton & Toledo Traction Company has been made by the holder of a $1,000 bond, but it is not anticipated that this will interfere with the carrying out of the arrangement proposed, particularly as the bondholders' committee has more than 60 per cent of the consolidated mortgage bonds in hand.

The Ohio Electric Railway has also arranged to readjust some of the leases with other properties which it operates, as, for example, the Dayton & Western Traction Company extending from Dayton, Ohio, to Richmond, Ind. A readjustment of the lease of this property has been effected by which the lessee instead of paying 5 per cent on the preferred and 6 per cent on the common stock will in the future pay 5 per cent on the preferred and 3 per cent on the common stock until the road earns a net sufficient to allow the payment of the additional 3 per cent on the common.

American Railways, Philadelphia, Pa.—The $2,300,000 of three-year 5 per cent secured notes of the American Railways, dated Feb. 1, 1916, referred to in the issue of the ELECTRIC RAILWAY JOURNAL of Feb. 5, page 287, were disposed of to Newburger, Henderson & Loeb and Bioren & Company, Philadelphia, Pa.

Androscoggin Electric Company, Portland, Me.—Maynard S. Bird & Company, Portland, Me., recently offered $140,500 of first and refunding mortgage 5 per cent gold bonds of 1914 of the Androscoggin Electric Company due on Oct. 1, 1934, without call privilege. The interest on this issue is payable in April and October at the office of the Union Safe Deposit & Trust Company, Portland. The bonds are to be in the denomination of $500 and $1,000. The Androscoggin Electric Company was incorporated in Maine on Oct. 26, 1914, and purchased the properties of the Lewiston & Auburn Electric Light Company and the Portland-Lewiston Interurban Railroad.

Ardmore (Okla.) Electric Railway.—The property of the Ardmore Electric Railway has been sold under foreclosure to Warren A. Craven, Milton, Iowa.

Brooklyn (N. Y.) Rapid Transit Company.—Eleven of the subsidiary companies of the Brooklyn Rapid Transit System recently held annual meetings. In the board of the New York Consolidated Railroad, which operates the elevated and subway lines, J. J. Dempsey, superintendent of transportation of the company, was elected a director to succeed John W. Weber, and Walter St. John Benedict was elected a director to succeed John Englis, deceased. The other directors were re-elected. In the Coney Island & Brooklyn Railroad directorate L. Van Cott, purchasing agent of the Brooklyn Rapid Transit Company, was elected to succeed John Hill Morgan, resigned. In the South Brooklyn Railway, A. R. Piper, Walter St. John Benedict, J. J. Dempsey, O. J. Covill and William Siebert were elected directors to succeed T. S. Williams, C. D. Meneely, N. F. Brady and H. C. Du Val, who retired from the board, and John Englis, deceased.

Cleburne (Tex.) Street Railway.—The Cleburne Street Railway has been purchased by F. C. Cotton, Denver, Col., and associates, from John W. Floore, former owner. The line is being overhauled by Daniel DeWitt, former manager of the company, who stated that he expected to have cars operating by Feb. 15. Cars have not been run for more than a year.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The Ohio Public Utilities Commission on Feb. 9 authorized the Cleveland, Southwestern & Columbus Railway to purchase the Crestline plant of the Crawford County Gas & Electric Company for $16,920 and to issue $10,000 two-year and three-year notes as part payment.

Cleveland & Eastern Traction Company, Cleveland, Ohio.—The item published in the ELECTRIC RAILWAY JOURNAL of Jan. 29, page 233, in regard to the election of directors for the Cleveland & Eastern Traction Company was in error. The following are the directors: H. P. McIntosh, H. P. McIntosh, Jr., A. G. Tame, Horatio Ford, R. A. Harman, E. M.

Halle, E. W. Moore, A. M. Snyder and C. A. Brand. A. G. Tame, C. Brand, Horatio Ford and H. P. McIntosh, Jr., were not elected new members of the board. They have been directors for some time. The directors of the Cleveland & Chagrin Falls Railway are: H. P. McIntosh, H. P. McIntosh, Jr., Horatio Ford, R. A. Herman, E. W. Moore, W. H. Price and A. M. Snyder. Mr. Ford and Mr. McIntosh were not elected new members, as they have also been directors of the company for some time.

Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa.—A quarterly dividend of 1¾ per cent was paid on Feb. 10, by the Fort Dodge, Des Moines & Southern Railroad on its $1,500,000 of preferred stock.

Havana Electric Railway, Light & Power Company, Havana, Cuba.—The Havana Electric Railway, Light & Power Company has called for payment the $2,000,000 of outstanding 6 per cent two-year secured notes, dated Sept. 1, 1914. They are to be paid at 100½ and interest on March 1, 1916, at the office of the Guaranty Trust Company, New York, trustee. It is stated that a part of the $4,000,000 of general mortgage 5 per cent bonds due on Sept. 1, 1954, heretofore pledged as collateral for the notes, is being sold to provide funds to pay off the notes.

Long Island Railroad, New York City.—The Public Service Commission for the Second District of New York has authorized the Long Island Railroad to issue $13,000,000 of 4 per cent ten-year gold debenture bonds at par to repay the Pennsylvania Railroad for advances made for improvements since 1909. Dick Brothers & Company, New York City, asked an adjournment of the case before the commission pending the determination of an action brought by them in the Supreme Court to separate the Pennsylvania Railroad and the Long Island Railroad, to secure an accounting by the directors of the Long Island Railroad for all money spent for improvements since 1901 and to cancel certain indebtedness for advances from the Pennsylvania Railroad. The commission states, however, that if Dick Brothers were really concerned over the issue of the present securities as affecting their equity suit, they should and undoubtedly would have obtained a restraining order from the court, as they had been informed of the case before the commission for the last year.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Railroad Commission of California has authorized the Los Angeles & San Diego Beach Railway to pledge $30,000 face value of its first mortgage 5½ per cent sinking-fund gold bonds as collateral security for a note to the Merchants' National Bank, San Diego, dated Nov. 5, 1914, for $21,000.

Middle West Utilities Company, Chicago, Ill.—The Illinois Trust & Savings Bank, Russell, Brewster & Company, McCoy & Company and N. W. Halsey & Company, Chicago, Ill., and A. H. Bickmore & Company and the William P. Bonbright Company, New York, are placing at 96⅝ to yield 6½ per cent a block of $4,500,000 of ten-year 6 per cent collateral gold bonds of the Middle West Utilities Company of 1915. The bonds are being issued to reimburse the treasury for improvements, additions, etc., and will retire all the outstanding three-year 6 per cent notes due on June 1, 1916, thus making the $6,500,000 of collateral trust 6 per cent notes the company's only funded obligation.

New York (N. Y.) Railways.—It was agreed on Feb. 15 that the interest on the 5 per cent adjustment mortgage bonds of the New York Railways for the six months ended Dec. 31 should be 3.2 per cent, a larger percentage than had been allowed for any previous six months' period. The payment for the first half of 1915 was 1.37 per cent, so that the return for the year will be 4.57 per cent, compared with 3.05 per cent paid in 1914. The earnings of the New York Railways are said to be improving and counting $4,000,000 to come shortly from the assets of the Metropolitan Street Railway, and $7,000,000 in real estate not used in operation, the ready cash assets amount to about $15,000,000. The first mortgage bonds outstanding are only $17,000,000.

Pittsburgh (Pa.) Railways.—The Colonial Trust Company, Pittsburgh, Pa., trustee for the issue, is offering at par and interest $200,000 of 5 per cent car trust gold bonds of the Consolidated Traction Company, to be dated April 1, 1916, and due $20,000 annually on April 1, 1917 to 1926, inclusive. The bonds are in the denomination of $1,000 and the interest is payable in April and October. The bonds are a first lien on twenty-five double-truck steel motor cars and twenty-five double-truck steel trailers costing $221,000, of which $21,000 is to be paid in cash.

Norton & Taunton Street Railway, Norton, Mass.—The property of the Norton & Taunton Street Railway was sold under foreclosure on Feb. 7 at Norton for $250,000 to the representative of the bondholders.

Public Service Corporation of New Jersey, Newark, N. J.—The Public Service Corporation of New Jersey has sold to Drexel & Company, $7,500,000 of three-year 5 per cent notes. The proceeds of the sale will be used to retire a similar amount of notes maturing on March 1.

DIVIDENDS DECLARED

Central Arkansas Railway & Light Company, Hot Springs, Ark., quarterly, 1¾ per cent, preferred.

Central Mississippi Valley Electric Properties, Keokuk, Iowa, quarterly, 1½ per cent, preferred.

Terre Haute Traction & Light Company, Terre Haute, Ind., 3 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$18,056	*$8,354	$9,702	$3,175	$6,527
1 "	"	'14	17,128	*9,524	7,604	2,052	5,552
12 "	"	'15	190,852	*108,204	82,648	26,947	55,701
12 "	"	'14	178,825	*114,279	64,546	25,023	39,523

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$36,268	*$19,626	$16,642	$6,536	$10,106
1 "	"	'14	29,794	*18,778	11,016	6,694	4,322
12 "	"	'15	357,214	*206,428	150,786	79,172	71,614
12 "	"	'14	349,893	*211,119	138,774	77,579	61,195

COLUMBUS (GA.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$70,227	*$26,866	$43,361	$28,677	$14,682
1 "	"	'14	59,937	*27,603	32,334	28,791	3,543
12 "	"	'15	721,217	*322,040	399,177	344,544	54,633
12 "	"	'14	681,606	*298,334	383,272	324,637	58,635

DALLAS (TEX.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$168,163	*$101,577	$66,586	$35,861	‡$31,925
1 "	"	'14	186,415	*96,203	90,212	33,390	56,822
12 "	"	'15	1,828,488	*1,120,174	708,314	399,561	‡304,953
12 "	"	'14	2,208,879	*1,287,660	921,219	370,961	550,258

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$26,888	*$12,091	$14,797	$5,522	$9,275
1 "	"	'14	21,486	*13,823	7,663	5,605	2,058
12 "	"	'15	276,661	*157,537	119,124	66,517	52,607
12 "	"	'14	276,633	*178,857	97,776	67,063	30,713

JACKSONVILLE (FLA.) TRACTION COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$53,618	*$36,772	$16,846	$14,736	$2,110
1 "	"	'14	56,142	*38,473	17,669	13,188	4,481
12 "	"	'15	611,568	*428,839	182,729	177,898	4,831
12 "	"	'14	715,255	*468,055	247,200	152,642	94,558

KEY WEST (FLA.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$9,505	*$6,619	$2,886	$2,559	$327
1 "	"	'14	10,026	*7,324	2,702	2,636	66
12 "	"	'15	112,840	*82,040	30,800	30,595	205
12 "	"	'14	132,252	*86,654	45,598	30,666	14,932

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$28,944	*$15,691	$13,253	$7,438	$5,815
1 "	"	'14	29,461	*16,527	12,934	7,699	5,235
12 "	"	'15	289,155	*179,025	110,130	91,268	18,862
12 "	"	'14	303,515	*194,084	109,431	91,431	18,000

PENSACOLA (FLA.) ELECTRIC COMPANY

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$23,935	*$13,008	$10,927	$6,883	$4,044
1 "	"	'14	20,107	*12,608	7,499	7,251	248
12 "	"	'15	258,042	*146,820	111,222	85,704	25,518
12 "	"	'14	264,840	*169,792	95,048	86,727	8,321

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m.,	Dec.,	'15	$699,702	*$414,998	$284,704	$182,417	$102,287
1 "	"	'14	717,550	*415,774	301,776	177,741	124,035
12 "	"	'15	7,559,583	*4,754,763	2,804,820	2,179,985	624,835
12 "	"	'14	8,450,974	*5,007,008	3,443,966	2,118,856	1,325,110

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*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

PLAN TO ENCOURAGE THRIFT IN BROOKLYN

Scheme Under Consideration for Interest Payments on Savings and for Loans to the Needy

T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, announces in the *B. R. T. Monthly* for February that the company is studying plans for encouraging thrift among its employees. Mr. Williams has headed his statement "The Need for Thrift." He quotes at random statements of typical cases of need among employees taken from reports made to him by George W. Edwards, welfare administrator of the company, a man who himself rose from the ranks in Brooklyn and an unusually successful administrator, to whom the men turn instinctively for succor in their hour of trial. In concluding his statement Mr. Williams said in part:

"For the sake of our men and their families, as well as for the good of the railroad system, we want to assist all our workers to acquire the saving habit. Then when trouble comes, whether it be in the shape of serious accident, or prolonged illness, or loss, or financial sacrifice for others, the accumulated savings may at least tide us over the dark days and exempt us from that uncertain dependence upon charity against which every proud spirit rebels. And the consciousness of such a laid-by store is in itself a great factor in happiness and contentment—even though we never may be obliged to draw upon it.

"How practically and best to encourage thrift is a difficult problem, and before announcing our plan we are studying the question from every angle. Involving as such a plan does the principles of savings and loan associations the restrictions of law must be considered and observed. We hope before long to present the form of an organization which will broadly answer the purpose. But whatever plan is adopted will furnish principally a medium whereby savings may be deposited and invested, and whereby moderate loans in worthy cases can be facilitated at low rates of interest. The success of the undertaking, and the results which we wish it may produce, will depend upon the individual support which it gets from our men and the cultivation of the habit of thrift—whether through the use of such an agency or otherwise. And with, or without, a formal plan, the need for thrift is the impressive lesson of those pathetic paragraphs which I have quoted."

The welfare activities of the Brooklyn Rapid Transit Company have been referred to frequently in the past in the ELECTRIC RAILWAY JOURNAL. From small beginnings made many years ago the field of work along welfare lines has been extended from time to time until now it includes many different forms of activity, in some of which the company was a pioneer. These forms of activity are referred to by Mr. Williams in answering the question as to what the company is already doing to mitigate such cases of suffering as he quoted. In this connection he says:

"In the first place, and most important, we aim by good wages, reasonable hours and suitable depot and shop quarters to encourage comfortable and wholesome living. In the second place, we employ a staff of physicians, under direction of Dr. Gibson, to look after the health of employees. In the third place, we, through special committees and protective measures, seek to make conditions of employment reasonably safe against accident and to stimulate interest in avoidance of the physical risks which particularly attend our occupation. In the fourth place we assume a part of the burden of accident by making financial compensation for time lost, earning power diminished, and doctor's bills. In the fifth place we provide additionally, through the Benefit Association, for payments to members incapacitated by sickness or accident, and for moderate insurance to the family or next of kin in case of a member's death. In the sixth place we have established life insurance in the minimum amount of $1,000 for all our employees who wish to avail themselves of it—without medical examination and at probably the lowest premium rates for similar insurance afforded anywhere in the world. In the seventh place we have old age pensions for those who have worked long and faithfully, so that as they lay aside regular duty they continue to draw pay for past services."

THROUGH SERVICE PROVES PROFITABLE

Through high-speed service on the line of the Terre Haute, Indianapolis & Eastern Traction Company between Terre Haute and Indianapolis, Ind., has converted into highly profitable runs four of the poorest-paying limited runs operated between these points. Two regularly scheduled limited trains, one leaving Indianapolis at 9.30 a. m. and the other at 3.30 p. m., were selected for the west-bound trips, and one leaving Terre Haute at 10.30 a. m. and the other at 4.30 p. m. for the east-bound trips. It requires two hours and five minutes to make the 72-mile run between the two terminals, as compared with one hour and forty minutes, the best time made by the trains on the competitive steam road. The electric railway schedule includes three pasenger stops and eight service stops between the city limits of the two terminals, and street stops for passengers in both terminals. Taking everything into consideration this is considered about the fastest time made by an electric railway in Indiana.

Schedules were planned so that a business man could go to his office, open his mail, and later take a car to either Terre Haute or Indianapolis. At his destination he would have plenty of time to transact his business and return to Indianapolis or Terre Haute for dinner in the evening. Although these trains, as mentioned before, were unprofitable when run on a slower schedule and leaving the terminals during the light-traffic periods, they now earn 15 cents per car-mile more than the average of all the other limited runs. This service was begun on Nov. 7, 1915, and the average fare per passenger and per mile for these trains and the regular limited trains during the holidays are shown in the accompanying table. It must be borne in mind that these average fares are for four through trains as against eleven regular limited trains.

	Highlanders		Other Limiteds	
	Average Receipts per Car-mile, in Cents	Average Fare per Passenger, in Cents	Average Receipts per Car-mile, in Cents	Average Fare per Passenger, in Cents
Dec. 24	49	57	40	36
Dec. 25	74	72	73	43
Dec. 26	79	60	47	33
Dec. 27	78	59	64	42
Dec. 28	69	68	47	40
Dec. 29	49	64	39	44
Dec. 30	59	59	39	36
Dec. 31	62	69	53	35
Jan. 1	43	60	38	37
Jan. 2	72	64	50	39
Average of total	63.4	63.2	49.0	38.5

In connection with this service it is also interesting to note that the name selected was obtained in an advertised prize contest. The publicity gained through this medium has also proved of much value. More than 785 names were suggested. The name "Highlanders," which was selected, was considered appropriate because it is a translation to the English of Terre Haute, which means highland. The regular limited cars are used for this service. These cars seat fifty-six passengers and are provided with smoking and baggage compartments. The through service on this line has proved so profitable that the management contemplates extending the plan to several other lines. The installation of the service was referred to in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1915, page 1060.

COMMISSION FIXES CHICAGO & MILWAUKEE ELECTRIC RATES

The Railroad Commission of Wisconsin handed down a decision on Jan. 25 establishing a new basis of cash and ticket fares for the Chicago & Milwaukee Electric lines. These new rates, which will become effective on Feb. 25, provide for no change in the Milwaukee, Wis., city fare, which is 5 cents, but the rate charged for all tickets between the Milwaukee city limits and Wisconsin State line will be on a straight 2-cents-per-mile basis. Cash fares collected on the trains will also be based on 2 cents per mile, but collections will be made in the next higher multiple of 5 cents. The order also provides for a $1 book containing 100 coupons which may be purchased by mail. This was required for the convenience of passengers originating at points were no ticket agents are maintained. These coupons will be acceptable in connection with cash, and make it unnecessary for conductors to carry pennies in change. The minimum fare for any ride is 5 cents.

In April, 1915, the railway received permission from the Wisconsin Railroad Commission and the Interstate Commerce Commission to increase rates on tickets to approximately 2 cents per mile and, at the same time, maintained the 5-cent zone system for cash fares. Application was also made to the Public Utilities Commission of Illinois, but no decision has been rendered. The Illinois commission expressed a willingness to authorize the change in rates permitted by the Wisconsin and the Federal commissions. The railroad company, however, also asked for relief from a number of franchise fare requirements, and as yet the Illinois commission has not rendered a decision covering all the points involved.

Under the 5-cent zone system with a 2-cents-per-mile rate for tickets, the average fare was approximately 1.8 cents per mile. If the new rates established by the recent decision of the Railroad Commission of Wisconsin are made to apply in both Wisconsin and Illinois, the minimum fare will be 2 cents per mile. As the situation now stands different rates of fares are charged in Wisconsin and Illinois, and for interstate trips. When negotiations now under way for an entrance into Chicago over the Northwestern Elevated Railway have been closed application will be made to the regulative bodies to authorize a readjustment of rates on a common basis.

More One-Man Cars for Everett.—The Everett Railway, Light & Water Company, Everett, Wash., has asked the Council for permission to operate one-man cars on the Bay Side-River Side line. Four such cars are already in service.

Express Service Approved.—The Illinois Public Utilities Commission on Feb. 8 announced the issuance of an order granting a certificate of convenience and necessity to the Centralia & Central City Traction Company, Centralia, Ill., permitting the company to operate an express service between Centralia and Central City.

Jitney Referendum Petition Short.—Charles M. Bryan, city attorney of Memphis, Tenn., holds that the petition presented in behalf of the Memphis Street Railway asking a referendum vote on the jitney franchise ordinances was short thirteen names and that an election could not therefore be ordered. The attorney for the railway stated that the issue would probably be taken to the courts.

Catering to the Night Hawk.—The International Railway, Buffalo, N. Y., has created a night-car schedule information bureau at its offices so that passengers using cars between 1 o'clock and 5 o'clock a. m. can call the company on the telephone and learn the exact time a car may be expected to pass a given corner. Most of the lines are now operating a half-hour service during the night.

Excellent Operating Record of Indianapolis-Seymour Line.—The railroad department of the Interstate Public Service Company, which operates an interurban electric railway between Indianapolis and Seymour, and was among the first companies to take up safety-first work, reports through James Harmon, its safety agent, that accidents in 1915 show a decrease of 51 per cent over 1914. The company employs seventy-eight trainmen, and of that number thirty-nine had no accidents during the year 1915.

Hearing in Hoboken 3-Cent Fare Application.—The Board of Public Utility Commissioners of New Jersey has been holding hearings in Jersey City on the application of the representatives of the city of Hoboken to require the company to operate there for a 3-cent fare. E. C. M. Rand, New York City, testified on Feb. 10 as to the value of the property of the company in Hoboken for the city, but on Feb. 11 most of his testimony was stricken from the record at the request of the city attorney, because some of the estimates of property value were not based on first-hand information. The hearing is to be continued on March 1, 2 and 3.

Jitneys Form Pleasure Club in Oakland—To evade the ordinance recently passed in Oakland, Cal., prohibiting jitneys from operating in the downtown section of that city, the "Oakland Pleasure Club" has been formed and membership cards are issued to jitney passengers riding for the first time and must be shown thereafter when they pay the 5 cents "dues." The membership cards read as follows: "This is to certify that .... has signed the roll of the Oakland Pleasure Club and is a member thereof. J. R. Sorenson, secretary-treasurer." On the reverse side of the card is printed: "Any member of this club may make arrangements with the business manager for the free use of a car for Sunday pleasure trips and special occasions by providing for the chauffeur's wages and supplies to be used on the trip. W. J. Mitchell, business manager." It is not expected that any action will be taken by the city untii expert opinion is rendered by the city attorney.

Lockport to Reconsider One-Man Car Action.—Officers of the Buffalo local of the Amalgamated Association of Street & Electric Railway Employees appeared before the Lockport City Council and opposed any favorable action by the city on the one-man crew system on the Lockport local cars, in return for which the International Railway proposed to build a modern terminal station for the interurban lines. The proposition was recently lost in the Council by a vote of six to four, but the matter will be reconsidered. Two years ago the city adopted an ordinance requiring two men on every car, but the company secured an injunction, and the matter is pending in the courts. Officials of the company pointed to the fact that the members of the Lockport Board of Commerce say service in Lockport has never been more satisfactory than at present with the one-man system. New cars are being operated over all city lines on a frequent schedule and there is no cause for complaint.

East Boston Tunnel Tolls Abolished.—The 1-cent toll charge collected from each passenger in the East Boston tunnel of the Boston (Mass.) Elevated Railway was abolished on Feb. 7, following an appropriation by the City Council to meet in part the necessary interest and sinking fund charges from the tax levy, in accordance with an act of the Massachusetts Legislature of 1915. The act carried a referendum provision which resulted in an affirmative vote last fall, but owing to the failure of the Council to appropriate the necessary funds for the present year the abolition of the tolls was delayed. Minor disturbances arose at the beginning of the present year when the public found that the toll was still in effect, but the company's inability to abolish the tolls without the taking of the final step by the city was soon made clear to the patrons of the line, and little further trouble resulted. The elimination of the toll charge now places the East Boston district on a par with all other areas of Greater Boston enjoying the 5-cent fare and transfer priviliges furnished by the company.

Accidents in Rhode Island.—The report of the Public Utilities Commission of Rhode Island for the year ended Dec. 31 has been presented to the Legislature of that State. The total number of accidents reported to the commission was 1034, a decrease of 129 from the number reported the preceding year. In these accidents fifty-four persons were killed and 1084 were injured, a decrease of sixteen in the number killed and 231 in the number injured. Of the persons killed twenty-seven were reported by railroad companies, twenty-two by electric railway companies, four by electric lighting companies and one by a gas company. Of the persons injured 402 were reported by railroad companies, 563 by electric railway companies and 119 by various other utilities. The total number of passengers reported killed was three, two of whom were reported by electric railway companies and one by a railroad company. Seven employees were reported killed, none of whom was in the employ of an electric railway. The number of highway travelers killed was twenty-three, an increase of one over the preceding year, and the number of trespassers was nineteen, a decrease of nine. Of the highway travelers killed, three were by railroad companies, nineteen by electric railway companies, and one by an electric lighting company. With one exception, all trespassers killed were reported by railroad companies.

Personal Mention

Mr. A. A. Miller, who has been traffic manager of the Gary & Interurban Railway, Gary, Ind., since its organization, has resigned and will become associated with the Troy Trailer Company.

Mr. George W. Bacon of Ford, Bacon & Davis, New York City, has accepted an offer from J. P. Morgan & Company to give all of his time for the present to their export department in connection with their munitions work. This will not interfere with his interest in the Ford, Bacon & Davis firm, which he will retain.

Mr. Howard Walker, formerly district superintendent of the Ohio Service Company, has been appointed to the newly-created position of general superintendent of the company's properties in Ohio. Mr. Walker will have charge of operation of all the company's properties in the State of Ohio acting in a capacity as assistant to Mr. C. H. Howell, manager of the Ohio Service Company.

Mr. John I. Beggs has increased his interest in the Southern Wisconsin Power Company and the Wisconsin River Power Company, but his relations with the St. Louis Car Company, of which he is president and general manager, have not changed. Mr. Beggs is spending somewhat more time in Wisconsin than for a few years past, but continues to manage and closely to supervise the administration of the St. Louis Car Company.

Mr. W. W. Lowe, superintendent of transportation of the Cumberland & Westernport Electric Railway, Cumberland, Md., has been promoted to the construction department of the New York offices of the Doherty organization. His work will be particularly along traction lines and for the next six months his headquarters will be at Frostburg, Md., where he will be available for calls to other traction properties controlled by Doherty & Company. Mr. B. Waller Duncan, general manager, has taken over Mr. Lowe's duties as superintendent.

Mr. C. T. Chapman, for the last year traffic manager of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn., will on March 1, sever his connections with that company, which has reduced its trackage to about 45 miles through the termination of a lease with the Chicago Great Western Railroad. Mr. Chapman prior to becoming connected with the company at Minneapolis was traffic manager of the Inter-Urban Railway, at Des Moines, Iowa, for four years, and for a number of years prior to that held responsible positions with other electric and steam railroads.

Mr. J. H. Pardee, president of the J. G. White Management Corporation, which is managing the property of the Manila Electric Railroad & Light Corporation, is visiting Manila. On Dec. 23 Mr. Pardee was the principal guest at a dinner given in his honor by Mr. C. Nesbitt Duffy, vice-president and general manager of the lighting and railway company. About 140 residents of the city, prominent in its government and business affairs, were present, and addresses were made upon the Philippines from various standpoints. Mr. Pardee spoke upon "The Philippines from the Standpoint of the Investor." Later, during his visit in Manila, Mr. Pardee presented the American Electric Railway Association medal for the best paper before any company section to Mr. J. F. Bury, assistant superintendent of transportation, who won the medal in the 1915 competition.

Mr. D. P. Abercrombie, Jr., who has been elected vice-president and general manager of the Connecticut Valley Street Railway, the Northern Massachusetts Street Railway and the Concord, Maynard & Hudson Street Railway and is clerk and treasurer of the Massachusetts Consolidated Railways, Greenfield, Mass., completed his education at Phillips Exeter Academy, class of 1893, and at the Massachusetts Institute of Technology, class of 1897. He engaged in engineering and contracting from 1898 to 1901. From 1901 to 1905 he was clerk and treasurer of the Greenfield & Turners Falls Street Railway, Greenfield, Mass., and from 1903 to 1905 also was clerk and treasurer of the Greenfield, Deerfield & Northampton Street Railway. From 1905 to 1916 he was clerk of the Connecticut Valley Street Railway; from 1911 to 1916 clerk and treasurer of the Concord, Maynard & Hudson Street Railway, and from 1911 to 1916 clerk and treasurer of the Massachusetts Consolidated Railways.

Mr. A. D. McWhorter, whose appointment as superintendent of the overhead lines of the Memphis (Tenn.) Street Railway in addition to master mechanic was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 12, was born in Madison, S. C., in June, 1877. He attended the public schools at Atlanta, Ga., and began his street railway career as a conductor on the Atlanta Railway when he was seventeen years old. Later he left the transportation department to become night car inspector in the repair shop. At the end of two years he was appointed night foreman, in which position he served for four years. In 1890 the Atlanta Railway and the Consolidated Street Railway were merged and Mr. McWhorter was appointed general foreman of the repair shops. After about three years in this capacity he accepted a position with the Atlanta Rapid Transit as general foreman of the repair shop. Six months later the Atlanta Rapid Transit and the Consolidated Street Railway were merged as the Georgia Railway & Electric Company. Mr. McWhorter remained as general foreman until March, 1905, when he resigned to become master mechanic of the Memphis Street Railway.

OBITUARY

T. K. Irwin, a director of the Joplin & Pittsburg Railway, Joplin, Mo., and one of the promoters of the company, died at his home in Carthage, Mo., on Feb. 12. Mr. Irwin was sevenry-seven years old.

G. H. Whitcomb, capitalist, Worcester, Mass., president of the Worcester & Marlboro Street Railway before it was absorbed by the Worcester Consolidated Street Railway, died in Worcester on Feb. 13. He was born in Templeton, Mass., seventy-five years ago and was graduated from Amherst College.

Eugene D. Martinez, electrical engineer of the Memphis (Tenn.) Street Railway, whose death was announced in the ELECTRIC RAILWAY JOURNAL of Feb. 12, had been ill for a number of months. Mr. Martinez was a native of New Orleans, La., and was graduated from Tulane University. Following his graduation he was connected as a mechanical and electrical engineer with the early installation of the electric railways in New Orleans. Later he served with Ford, Bacon & Davis and Stone & Webster, being connected with the latter as electrical engineer of the Houston (Tex.) Electric Company. In July, 1906, Mr. Martinez accepted the position of electrical engineer of the Memphis Street Railway.

Louis Duncan, Ph.D., formerly a member of the famous consulting engineering firm of Sprague, Duncan & Hutchinson, New York, died at his home in Pelham Manor, near New York, on Feb. 13, at the age of fifty-four. Dr. Duncan was graduated from Annapolis in 1880, and in 1883 was sent by the government to Johns Hopkins University to take a graduate course in physics and electricity. In 1887 he received his degree of doctor of philosophy at Johns Hopkins and then became a professor there. During the Spanish-American War he was major of the first volunteer engineers, and from 1899 until 1904 was head of the electrical engineering department of the Massachusetts Institute of Technology. At the time of his death he was a member of the firm of Duncan, Young & Company, consulting engineers, New York. His first most important electric railway engineering work was as consulting engineer for the electrification of the Belt Line tunnel of the Baltimore & Ohio Railroad. He also had charge of the change from cable to electricity of the Third Avenue system in New York, and later he was consulting engineer for the New York City Rapid Transit Commission. He also served as president of the A. I. E. E. from 1895 to 1897. Dr. Duncan possessed a keen, active mind and remarkable powers of engineering and mathematical analysis. During the last few years he has acted as a consulting engineer for a number of large electrical and water-power corporations.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

Chillicothe, Ill.—The Peoria & Chillicothe Electric Railway has received a franchise from the Council to construct a line in Chillicothe.

Morganfield, Ky.—G. L. Drury, as representative of the interests promoting the electric railway line between Morganfield and Uniontown, Ky., is now petitioning the Councils of both towns for rights-of-way within their limits. The county has already granted the necessary permission to use the road between the two communities.

East Liverpool, Ohio.—The East Liverpool Traction & Light Company has received a franchise from the Council to construct an extension to Grandview and complete other contemplated improvements to the company's holdings in East Liverpool.

Buffalo, N. Y.—A bill has been introduced into the State Legislature extending until Dec. 31, 1919, the time within which the International Railway may complete and place in operation the East and West Delavan Avenue and the Bailey Avenue lines over which the Council recently granted the International Railway a fifty-year franchise. The bill amends the act of a few years ago by the terms of which the company was to have completed these two lines in 1916, so as to give the company three years in which to complete the work. This is in accordance with the agreement between the company and the city made by the former City Council. The company has agreed to lay the Bailey Avenue tracks in three annual instalments.

Ottawa, Ont.—The Morrisburg & Ottawa Electric Railway has asked the Ontario Legislature for an extension of time in which to build its proposed line from Morrisburg to Ottawa. [May 15, '15.]

Beaumont, Tex.—The Beaumont Traction Company has received a franchise from the Council to remove its car tracks from Doucette Street for a distance of three blocks and to construct and operate an extension of the line to the Magnolia refinery, south of the city.

Burlington, Tex.—The Burlington Traction Company has asked the Council for a franchise to construct a line on South Winooski Avenue from Pearl to Main Streets, to connect with the tracks on those two streets.

Tacoma, Wash.—The Tacoma Railway & Power Company has filed an acceptance of the power contract and franchise agreement authorized by the Council, and under this contract the company has agreed to the following stipulations: The extension of the Pacific Avenue line to South Forty-sixth Street; changing the present south Tacoma route to operate over the Tacoma Avenue fill; and the connection of the Tacoma Avenue and Point Defiance lines at Division Avenue.

TRACK AND ROADWAY

Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—This company reports that it expects to build a spur track to the Mobile & Ohio Railroad passenger station and to improve its line between Tuscaloosa and Holt.

Fresno (Cal.) Interurban Railway.—Construction work has been begun by this company on a 7-mile extension to its lines from Barton Vineyard to Kutner's Colony. Upon the completion of this extension construction work on the line to Clovis will be begun. This is to be followed by extending the Kutner Colony line to Centerville, 12 miles. Rights-of-way have been secured for all of the extensions except parts of the line to Clovis. The material for all of the construction work has been assembled and permission to proceed has been obtained from the Railroad Commission of California. The work will be done by the Mahoney Brothers Company of San Francisco.

Pacific Electric Railway, Los Angeles, Cal.—Construction work on this company's line to connect with Hawthorne and El Eegundo has been begun by the company at South Los Angeles.

***Pensacola, Fla.**—George H. Hervey has received notice from Washington that a bill authorizing him to construct and operate an electric railway on the military reservations of Fort Barrancas and Fort McRae has passed the Senate, after its favorable recommendation. It is planned to connect the proposed railway with the Pensacola Electric Company's line to Fort Barrancas.

East St. Louis & Suburban Railway, East St. Louis, Ill.—Work will be commenced at once by this company on the relocation of its track on the Rock Road, St. Louis, from the side to the center of the street.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—Plans are being made by this company to build a concrete and steel viaduct 50 ft. in length over a street in Glencoe, Ill. This company has been making repairs on its tracks on Genesee Street, Waukegan, Ill.

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company will replace two or three small trestle bridges and reinforce one steel viaduct as soon as the weather permits. Contracts for this work have been let to the Joliet Bridge & Iron Company.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—A report from this company states that a contract has been let to the Union Switch & Signal Company for equipping the single-track line between Wheaton and Geneva with its T.D.B. system of block signals.

Tri-City Railway, Davenport, Iowa.—The Council of the city of Rock Island is asking this company for the extension of a line south of Eighteenth Avenue on Seventeenth or Twenty-fourth Street entering territory recently annexed in South Rock Island.

***Keokuk, Iowa.**—Plans are being considered for an electric line from Keokuk to Iowa City, via Washington and Mount Pleasant, and forming a connection with Waterloo. Robert N. Carson, Iowa City, is interested.

New Orleans Railway & Light Company, New Orleans, La.—The City Council has directed the New Orleans Railway & Light Company to proceed with the construction of the South Claiborne Avenue line from Broadway to Carrollton Avenue. This action was taken on recommendation of Commissioner of Public Utilities W. B. Thompson. The extension must be completed by March 3.

Boston, Mass.—Bids will be received by the Boston Transit Commission until March 2 for the construction of Section F, Dorchester Tunnel. The section is located between Foundry Street and West Fourth Street, and includes the Broadway station with a loop and incline for surface cars. The structure is to be mainly of reinforced concrete and structural steel. Specifications and forms of contract may be obtained at 15 Beacon Street. [Nov. 20, '15.]

Metropolitan Street Railway, Kansas City, Mo.—The contract for grading the extension of this company's Troost Avenue line from Forty-eighth Street to Seventy-third Street has been awarded to Edward Meegan by the Board of Public Works. W. C. Mullins was awarded the contract for grading Twenty-fifth Street from Southwest Boulevard to Broadway. The company will also reconstruct the bridge over the Kaw River at Ohio Avenue. The structure will be a through riveted truss bridge, have one 400-ft. and one 215-ft. span, superstructure of steel and foundation of concrete. The American Bridge Company has the contract for the steel spans. The substructure work consists of remodeling one abutment, removing two piers and one abutment and building two piers and one abutment. Waddell & Son, Kansas City, Mo., engineers.

Fallon (Nev.) Electric Railroad.—At the annual meeting of the stockholders and directors of this company the old board of directors was re-elected. Manager E. S. Berney reported that the grading for the road is practically completed as far as Sand Point. The work includes bridges and culverts over the water courses and the grade is now in condition to receive ties and rails. The Southern Pacific

Company has built a switch about a quarter of a mile east of the Y to connect with the Fallon Electric Railroad's line and provide for the transfer of freight. Arrangements have been made with the Southern Pacific Company for the lease of rails for the entire trackage of the company with an option to purchase same. Tentative negotiations have been entered into for the purchase of ties pending the placing of the bond issue that is now being financed in the East.

St. John (N. B.) Railway.—This company is now operating its cars between East and West St. John over the new arch bridge, which replaces the old suspension bridge across the St. John River at the reversing falls.

Salem-Pennsgrove Traction Company, Salem, N. J.—Construction work has been begun on this company's proposed line from Salem to Pennsgrove. [Jan. 1, '16.]

City Electric Company, Albuquerque, N. M.—This company has placed an order with the Colorado Fuel & Iron Company for steel rails and track equipment to be used in the construction of the company's proposed extension to the University of New Mexico.

International Railway, Buffalo, N. Y.—It is reported that alternative plans have been submitted to the Ontario Railway & Municipal Board for changes on this company's line near Queenstown Heights, Ont., where a serious accident occurred on July 7, 1915. Some time ago, it is said, the board submitted a plan proposing a new down-grade single-track line which would take one continuous curve, leaving the existing line for up-grade traffic. The company's alternative plan is to partially reconstruct the existing double-track line by lengthening the curves and cutting down the gradients.

Interborough Rapid Transit Company, New York City.—Bids were opened for the second time by the Public Service Commission for the First District of New York for the installation of tracks on the White Plains Road extension of the Lenox Avenue branch of the first subway. This extension is a three-track elevated railroad extending from the present terminus at 180th Street, north over private property and White Plains Road to 241st Street, near the northern city boundary. The commission first opened bids for this work on Nov. 23, when the Coast & Lakes Contracting Company, Inc., was the lowest bidder at $53,930.50. This company stated that it had made a mistake in its bid and requested permission to withdraw. The commission, however, awarded it the contract. Subsequently the company asked that the contract be readvertised, and filed a stipulation with the commission agreeing to bid upon the readvertisement not more than $94,280.50, which was the amount it stated it intended to bid in the first place. According to the unofficial totals of the bids received on the second bidding the Coast & Lakes Company was the lowest bidder at the figure it stipulated to bid, the other bidders' figures being about $112,000 to $115,000. The contractor must begin work within thirty days after the delivery of the contract and complete it within four months.

New York Municipal Railway, Brooklyn, N. Y.—During the week the Public Service Commission for the First Districk of New York opened bids for the construction of Section No. 2-A of Route No. 12, a part of the Broadway-Fourth Avenue subway in Brooklyn, for operation under the dual system agreements by the New York Municipal Railway Corporation. Section No. 2-A lies in Flatbush Avenue between Prospect Park Plaza and the Brighton Beach Railroad at Malbone Street. The plans call for a two-track underground railroad, and the work must be completed within twenty months from the delivery of the contract for operation, and entirely completed within twenty-four months. This is a part of the line which will connect the Fourth Avenue subway with the Brighton Beach Railroad. All the rest of the line is now under contract. According to the unofficial totals of the bids the two lowest bidders were the Degnon Contracting Company at about $1,370,000, and the Litchfield Construction Company at about $1,468,000.

Lake Shore Electric Railway, Cleveland, Ohio.—Engineers of this company are preparing detailed plans for the proposed East Federal Street viaduct to replace the present structure and to eliminate the Himrod Avenue grade crossing, Youngstown. The cost is estimated at $672,000. Frank Lillian, city engineer, is preparing plans for the approach from Cedar Street, the cost of which is to be divided between the city and the Lake Shore Electric Railway.

***Xenia, Ohio.**—Arrangements have been effected by the Greater Dayton Association to lend its efforts to the furthering of a project designed for the construction of an electric railway from Xenia to Blanchester, via Wilmington and from Xenia to Washington Courthouse.

Enid (Okla.) City Railway.—Work will soon be begun by this company replacing all of the old girder rails in the city with 65-lb. T-rails. This will require the rebuilding of the Grand Avenue line from the northeast corner of the square to Walnut Street at a cost of about $5,000.

Sand Springs Railway, Tulsa, Okla.—Besides constructing various extensions, this company will double-track its line between Sand Springs and Tulsa.

***Spartanburg, S. C.**—Plans are being considered to construct a line from Spartanburg via Walnut Grove and Cross Anchor to Clinton. Among those interested are L. H. Wilson, president of the Bank of Cross Anchor; W. W. Harris, Clinton, and T. B. Thackston, Cedar Springs.

***Texas Airline Interurban Company, Columbus, Tex.**—This company is being organized to construct an interurban electric railway between Columbus and Gonzales and between Austin and Port Lavaca. Part of the right-of-way has been secured. Ben R. Hunt, Columbus, is reported to be interested.

Northern Texas Traction Company, Fort Worth, Tex.—Work will soon be begun by this company on the reconstruction of its Daggett Avenue track. The work will include the stretch from Jennings Avenue to Henderson Street. The 56-lb. rails will be substituted by 70-lb. rails.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—Among the improvements contemplated by this company during this spring is the construction of car shops at Torrance, about 10 miles south of Los Angeles, for the joint use of the Pacific Electric Railway and the Southern Pacific Railroad. The buildings, which will cover a site of 125 acres, will be mostly of steel frame construction and will be so designed as to provide for the construction of all future cars for the line. The company's present shops on East Seventh Street, Los Angeles, which handle repair work only and provide storage facilities, are to be vacated to make way for a new $10,000,000 market terminal. Further details in regard to these improvements are published on page 376 of this issue.

Tulsa (Okla.) Street Railway.—Plans are being made by this company to erect a brick station on Kendall College campus.

Lehigh Valley Transit Company, Allentown, Pa.—This company has begun the construction of a new brick passenger and freight station at Center Square, Guynedd Valley.

POWER HOUSES AND SUBSTATIONS

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—This company will do some extensive improvement work this year, among the proposed changes being the enlargement and re-equipment of the boiler plant, the installation of a railway unit in the electric department, the replacing of much of the present gas pipe, new boilers at the plant and the sinking of a deep well. The heating plant will also be enlarged and the mains extended.

International Railway, Buffalo. N. Y.—This company has placed in position 500,000 circ. mil cables to carry 9000 kw. of electrical energy bought by the company for additional power on its local lines. In a statement Edward G. Connette, president of the company, said that the additional power is required to operate nearly 1000 cars daily on the Buffalo city lines. The five power substations are being equipped with additional machinery, including seven 1000-kw. rotary converter. Power will be carried direct from the Niagara Falls power plants to the substations by new 500,000 circ. mil cables. Several of the cables have already been strung in Broadway from Jefferson Street to the Bailey Avenue substation and in Seneca Street from the Imson Street substation to South Cedar Street. A total of $175,000 is being expended in this work, which is expected to be completed by spring.

Manufactures and Supplies

ROLLING STOCK

Boston Elevated Railway, Boston, Mass., has issued specifications for ten new surface cars.

Jersey Central Traction Company, Keyport, N. J., is inquiring for new air-brake equipment.

City Light & Traction Company, Sedalia, Mo., is expecting to purchase eight light one-man cars.

London & Port Stanley Railway, London, Ont., has ordered three interurban trail cars from the St. Louis Car Company.

Claremont Railway & Lighting Company, Claremont, N. H., expects to purchase one set of trucks for freight service.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., expects to purchase within a month fourteen air-brake equipments.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., on Feb. 15 lost fifteen cars in a fire which destroyed its car barn.

Rhode Island Company, Providence, R. I., contemplates fifty new cars similar in type to the equipment ordered in 1914. It is reported that the Laconia Car Company received the order for the car-bodies.

Cumberland & Westernport Electric Railway, Cumberland, Md., reported in last week's issue as expecting to purchase three interurban cars, has ordered this equipment, through H. L. Doherty & Company, New York, from the Southern Car Company.

Fort Scott & Pittsburg Railway, Fort Scott, Kan., a new line described on page 376 of this issue, is in the market for six 50-ft. cars, this equipment to be purchased through the L. A. Wells Construction Company, 34 Wade Building, Cleveland, Ohio.

Chicago & Milwaukee Electric Railroad, Highwood, Ill., will exercise its option to buy fifteen more all-steel passenger motor cars, similar to those ordered during 1915. The J. G. Brill Company will furnish the bodies and trucks; the Westinghouse Electric & Manufacturing Company, motors and control; General Electric Company, brakes.

Jamestown (N. Y.) Street Railway has ordered ten city cars with trucks from the St. Louis Car Company. These will have low floors, 24-in. wheels, four GE-247-B motors, fully-inclosed platforms flush with the main floor, cross-seats, all-steel framing, wood roofs and floors, continuous T-posts, steel letterboards, wood trim, and a length over all of 42 ft.

Oklahoma Railways, Oklahoma City, Okla., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 8, 1915, as having ordered six closed semi-steel, double-truck prepayment motor passenger cars from the St. Louis Car Company, has specified the following details for this equipment:

Seating capacity	44
Weight of car body only,	16,000 lb.
Bolster centers, length	17 ft.
Length of body	29 ft.
Length over vestibule	40 ft.
Width over sills	8 ft. 3¾ in.
Width over all	8 ft. 6 in.
Height, rail to sills	3 ft. 3½ in.
Height, sill to trolley base,	8 ft. 6 in.
Interior trim,	Birch, mahogany finish
Headlining	3/16-in. Agasote
Roof	Arched
Underframe	Steel
Air brakes	West.
Control	K-35 G-2
Couplers	Van Dorn
Curtain fixtures	Cur. Sup. Co.
Curtain material	Pantasote
Destination signs	Hunter
Fenders	Ry. Co.
Gears and pinions	Nuttall
Gongs	Elec. Ser. Sup. Co.
Heaters	Peter Smith, hot air
Headlights,	Crouse-Hinds Type C, arc
Journal boxes	Symington
Motors,	4, West. 92 A, outside hung
Paint	Chicago Varnish Co.
Registers	Sterling Meaker
Sanders	Elec. Ser. Sup. Co.
Sash fixtures	O. M. Edwards
Seats	Cross and longitudinal
Seat material	Wood slats
Step treads	Universal
Trolley catchers	Knutson No. 2
Trolley base	Standard No. 14
Trucks	Brill No. 27
Varnish	Chicago Varnish Co.
Ventilators	Peerless
Wheels	American

TRADE NOTES

Q. & C. Company, New York City, announces that it has discontinued its representation of the Ross-Schofield system of circulation of water in locomotive boilers.

Ohio Brass Company, Mansfield, Ohio, has moved its New York office from the tenth to the eighteenth floor in the Hudson Terminal Building, 30 Church Street, Room 1822.

Hoyt & McWilliams, New York City, specialists in investment securities, announce that W. J. McGovern has become associated with them and will manage their public utilities department.

Philadelphia Holding Company, Philadelphia, Pa., has received an order to equip with four radial trucks the four cars recently ordered by the Corning & Painted Post Railway, Corning, N. Y.

Curtain Supply Company, Chicago, Ill., has received an order to equip with ring fixtures and Rex all-metal rollers the Pantasote curtains for the 200 subway cars recently ordered by the New York Municipal Railway.

Protective Signal Manufacturing Company, Denver, Col., has arranged to take over the manufacture and exclusive sales privileges for the automatic flagman signals owned by the National Signal Company, San Francisco, Cal.

F. B. Cutter Company, New York City, has recently sold thirteen double-truck used cars to one customer, for immediate delivery. The cars sold were all in good physical operating condition, and were bought on a first inspection.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has appointed R. L. Wilson, manager of the railway division, as assistant general superintendent, looking directly after trades apprentices, employment, working conditions and other matters of a similar nature.

DuPont Fabrikoid Company, Wilmington, Del., has received an order to equip with its Fabrikoid material the curtains for the thirty-one new cars recently ordered by the Wilmington & Philadelphia Traction Company, Wilmington, Del., from The J. G. Brill Company. The material is waterproof, washable and uniform in thickness, and comes to the purchaser in a roll, thus eliminating waste in cutting.

Mathews-Northup Company, Buffalo, N. Y., is urging the adoption of Tuesday, Feb. 29, as "Prosperity Day," and its celebration throughout the country. On this extra day of the year the country will be millions of dollars richer on account of the extra twenty-four hours of time in this year, as compared with last year, and the suggestion is made that all be urged to talk, think and feel prosperity, forget his personal worries and boost.

American Abrasive Metals Company, New York City, is calling attention to some figures recently obtained at the Safety Exposition at Cleveland, Ohio, which show the extreme importance of eliminating the commonplace hazard of falling or tripping. In the year 1915, in thirty-four corporations, comprising railroad, gas, electric light and power, and hydroelectric companies there was a total of 226 casualties. Of these accidents seventy-nine, or 20 per cent of the total, were caused by falling or tripping and resulted in 20 per cent of the total days of lost time. Falling objects caused sixty-six, or 17 per cent of the total number of casualties, and resulted in only 12 per cent of the lost time. Electric shocks caused thirty or only 8 per cent of the total number of casualties, and resulted in only 13 per cent of the total lost time.

ADVERTISING LITERATURE

Sherwin-Williams Company, Cleveland, Ohio, has issued a reprint of a paper entitled "Railway Paint Specifications, Why?" which was delivered by Philip L. Maury, manager railway sales department of this company at the twelfth annual convention of the Maintenance of Way Master Painters' Association.

NEW PUBLICATION

Authentic History of the United States Steel Corporation. By Arundel Cotter. The Moody Magazine & Book Company, New York City. 231 pages. Cloth, $2.

This book is not a compilation of steel statistics but a very interesting narrative regarding the formation, growth and policies of the United States Steel Corporation. Readers cannot but secure therefrom an excellent idea of what this mammoth corporation means in American industrial life.

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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ELIMINATING A NON-PRODUCTIVE ITEM

The conversion of two private cars into revenue-producing parlor cars on the Empire United Railways, which is described upon another page of this issue, is something more than an ingenious adaptation of a means at hand to develop untapped sources of revenue. It is a step that is singularly significant of the best spirit of the times. The use of private cars for officials may have been magnificent, but it is not railroading, and the so-called business car, with its burden of overhead charge that brings no return, is an anomaly in the present day of real business principles. On the Empire United Railways the converted cars in parlor-car service have brought thus far a direct annual return at a rate of less than $4,000 each, and this is very much below the average earnings of a standard car in regular operation. But, on the other hand, these receipts are amply sufficient to pay for operating the cars, and since no new investment is involved in their operation, the indirect return that has come in this instance through the stimulation of traffic may be entered as a clear gain.

LARGE LAMPS IN CAR WIRING

The introduction of the high-efficiency incandescent lamp within the past few years seems to have brought with it at least one problem of considerable intricacy. This is the question whether it will pay to rewire a car for the gain that comes through the use of a few large-capacity lamps instead of a large number of small-size units. When the industry had nothing better than the carbon filament lamp, the problem did not exist, because the carbon filament, with its low light-producing ability per unit of current, at least had the very definite advantage of almost indefinite ruggedness—something that seems to be lacking in the tungsten filaments even under latest methods of manufacture. In consequence, the matter of filament thickness and consequent physical strength has become an important factor in lamp life. Thick filaments, of course, are permitted only when the current flow is large, and the lamp of maximum size is thus able to withstand the greatest and longest-sustained vibration, such as is inevitable upon a railway car. Indeed, experience has amply demonstrated that the smaller lamps do not stand up in railway service as well as the larger sizes, and since the latter are now known to give a satisfactory lighting arrangement, their use should be the aim for all lighting schemes. Although there are, no doubt, instances where the expense of rewiring a car to permit their installation is unwarranted, there are also many cases where the reverse is true, and in either event the problem holds enough of importance to be worthy always of consideration.

THREE-WIRE SYSTEM IN LOS ANGELES

The proposed installation of the three-wire system in Springfield, Mass., as recorded in the issue of this paper for Dec. 18, makes the description of an actual installation of the three-wire system of distribution in Los Angeles of especial interest. The author is S. H. Anderson, electrical superintendent Pacific Electric Railway, and the system has been in use by that company for more than a year. From this fact and the length of line equipped, 125 miles, it will be seen that the test has been conducted for a considerable time and on a fairly good-sized scale. The news that the three-wire system is in such extended use in Los Angeles will, we believe, be of considerable surprise to a great many electric railway engineers, as little has been said about the system up to this time. We assume that this has been the case not so much because of uncertainty on the part of the railway officials as to the efficacy of this method of reducing the track voltage, but of doubt as to whether the operating conditions of the property would prove there, as elsewhere, to be incompatible with the necessities of operation under the three-wire method. But evidently the troubles experienced in other cities have been overcome by care in the engineering layout of the distribution system, and the difficulties of lack of balance have not been experienced.

RISING CAPITAL COST

That the cost of railway capital has risen in recent years is a statement generally accepted without argument as being true, but when one finds definite figures on this rather intangible subject they are interesting if only as corroborative evidence. For this reason we pass on to our readers the illuminating data just compiled by the Bureau of Railway News and Statistics. Taking as a basis the listings of steam railroad bonds on the New York Stock Exchange since 1900, this bureau finds that since 1905, when the issues at 4 per cent or under reached the high point of 95.8 per cent of the total of $538,584,000 listed, the issues at such rates have gradually decreased until in 1915 they represented only 9.77 per cent of the total of $325,655,000 listed. Of course, the nominal interest rate on bonds does not necessarily indicate the cost of the capital acquired, on account of discount and premium sales, but for railroads as a whole the nominal rate approaches the effective rate with sufficient approximation to indicate that the cost of railroad capital is showing an upward tendency. If one were to include with the bond listings the short-term note issues, which at 5 per cent and 6 per cent have in the last few years increased rapidly in use, the rising tendency would be still more apparent. It is important also to note that in 1905 $245,961,000 or about 45 per cent of the bond listings were for new capital and the remainder for refunding, but that the amount devoted to the former use reached as low a point as $78,624,000 or 24 per cent in 1915. These figures prove nothing numerically so far as electric railways are concerned, but they do indicate what is as true for these carriers as for steam railroads—that rising capital cost under stationary rates and unrestricted expense burdens is not the proper prescription for transportation development. If the public has so increased the transportation hazard that a further gradual rise in capital cost is inexorable, then it must assume the burden or forego the needed development.

FREIGHT AND COST OF LIVING

An undertaking of more than usual interest in connection with the ever-present problem of reducing the cost of living is being projected in Los Angeles. This is the erection of a new large market for the sale of foodstuffs and other farm products which will be brought directly to the market by the cars of the interurban electric railway system which centers in Los Angeles. In fact, the market is to be erected on land now belonging, in part, to the Pacific Electric Railway, although that company has no direct financial interest in the proposed undertaking.

For years a number of interurban lines, particularly in the central states, have been of great service to the farmers as carriers of their products directly to the cities, and the milk car has been a part of the equipment of a number of roads. We believe, however, that it was Prof. Clyde L. King of the University of Pennsylvania who first showed the importance of a system of cheap electric transportation directly from the farmer to the markets of a city, and the effect which such a system would have upon the cost of living, in a report made in 1913 to Mayor Blankenburg of Philadelphia. Professor King made a very careful analysis of the subject and found that if some system of direct transportation from the produce farms to the markets could be arranged it would obviate three very serious factors in the cost of retailing fresh vegetables and other foodstuffs. The first was the transportation from the farm to the steam railroad freight station. The second was the delay on the steam railroad in taking the foodstuffs to the freight station in the large city. The third was the cost of delivery from the freight station to the market. His proposed remedy was, in brief, direct routeing from the farm to the market.

This is what the Los Angeles installation proposes. In other words, it is the first step, certainly on a large scale, to meet the economic question of reducing the cost of living in large cities by introducing the most economical method of bringing the farmer and the consumer together. If the experiment in Los Angeles proves successful, a larger field of usefulness for the electric roads should be opened up by this method.

SALVAGE VALUES IN ELECTRIFICATION

In discussions of the commercial possibilities of steam railroad electrification the question of salvage value obtained from the released steam locomotives has rarely received very serious attention. This has, perhaps, been due to the fact that, until the present time, there has been little definite information upon which to base conclusions, with the result that estimates have ranged between wide limits. In general, they have erred on the side of conservatism and apparently in most cases have been lower than necessary.

The recent completion of the Norfolk & Western electrification, however, has given at least a definite basis upon which to consider the matter. In this case the electrified zone is practically a separate division of the main line. Prior to electrification a definite number of steam locomotives of a single type were assigned to do the work of the division, and when electric operation began these machines, thirty-four in number, were replaced by twelve electric locomotives. The substitution was complete, and except for the effect of a steadily rising tonnage, the twelve electric engines are now doing exactly the same work that was done by the thirty-four steam machines.

The standard type of steam engine that was displaced in this case weighed about 540,000 lb., including the tender, and the new value, which may be set at about 7½ cents per pound, would thus be $40,500 for each machine. The thirty-four engines displaced by electricity would then be worth $1,375,000 or some 45 per cent of the announced cost of the whole electrification.

On the Chicago, Milwaukee & St. Paul electrification now under construction, forty-two electric locomotives will replace approximately eighty steam engines. The variations in traffic and the shifting of motive power prevent a direct estimate of the salvage value of the latter, but an approximation based upon probable averages would indicate that this should be about 20 per cent of the total investment. Manifestly, this figure is smaller than that obtaining on the Norfolk & Western electrification because of the much lower density of traffic on the transcontinental road. In fact, the figure 20 per cent seems to represent about the minimum that might be expected under any conditions, because the St. Paul has unquestionably a lighter tonnage than any of the lines that have thus far been electrified. This road, it is true, passes over three mountain ranges within the limits of the 440-mile electric zone, and to the extent that these grades require pusher service, the number of steam locomotives needed to handle the traffic would be increased over normal conditions. However, the grades constitute one of the major reasons for introducing electric operation and on this account their influence in increasing the number of steam locomotives may be largely discounted. On the other hand, the Norfolk & Western's salvage value of 45 per cent represents presumably the maximum attainable figure.

The grades are very heavy and comprise a large percentage of the electrified line, three steam engines being used on each train prior to the advent of the electric locomotives. In addition the traffic, amounting to twenty-six east-bound trains daily, is exceptionally heavy, and these features in turn tend to offset the fact that the total cost of the installation included expenditures for a power station.

It appears, therefore, that the average salvage value of steam locomotives involved in a main-line electrification should be between 20 per cent and 45 per cent of the total cost of the installation, these figures being based on new value. In consequence, the item constitutes an important consideration in connection with calculations of possible economies due to electrification. A reduction of one-third of the investment, which is the equivalent of a salvage of 33 1/3 per cent, might well be sufficient to make an otherwise apparently unprofitabl installation into a very attractive proposition, and it would seem that more attention ought to be paid to this feature in connection with every preliminary calculation of electrification economics.

REGULATION MUST BE IMPARTIAL

Too much criticism of public service commissions by the public comes from the idea that the chief purpose of the commissions is to reduce rates. A case in point is the attack on L. D. Brandeis before the Senate judicial sub-committee because he, as counsel for the Interstate Commerce Commission in the 5 per cent rate case, dared to forget the "public" character of this body so far as to state that to his mind the carriers had proved their need of increased net income. We are not concerned here with the fitness of Mr. Brandeis for high judicial office, but we are interested in the assumption of certain public advocates that since the public did not favor certain rate increases, the counsel for the commission was, by virtue of this fact alone, derelict in his duty in giving an impartial ear to proof submitted by the railroads.

We had hoped that such evidences of mental bias on the question of corporate regulation were a thing of the past. In the early days of regulation, to be sure, utilities generally feared that the powers conferred upon regulatory bodies would be used primarily for the imposition of greater burdens on utilities simply in answer to public demands, and, indeed, we have often suspected that many citizens loudly supported the regulation propaganda because they had a sneaking idea that the natural result would be reduced rates and increased service. With the growth of the regulatory system and its more nearly perfected operation, however, a truer conception of the functions of commissions has generally risen, for it has been clearly realized that such bodies are not *ex parte* public tribunals sitting in judgment over utilities, but are impartial bodies pledged to restrain exorbitant and unjust public demands as much as to put wayward and recalcitrant corporations aright. While capable of a wider interpretation of their empowering acts than courts are of general statutes and constitutional provisions, commissions are real judicial tribunals which must hold the scales of justice as level as do the courts.

The misconception of the regulatory theory that has seemed to underly the stated objection to Mr. Brandeis may not be widespread, but it is unfortunate that it should exist at all. We are glad to observe that the new commissioners in New York City, as evidenced by their recent comments in one case to the effect that the question is not how many people would like to have increased transfers but whether it would be reasonable to impose an order on the company, have the true conception of the way in which their functions should be exercised. To strengthen our point, however, we will go far away from the scene of the turmoil in New York and cite the case of the Manitoba Public Utilities Commission, whose point of view in this matter is all the more interesting because it is not presented in any particular case but is laid down in the latest annual report as a warning because of repeated public offences.

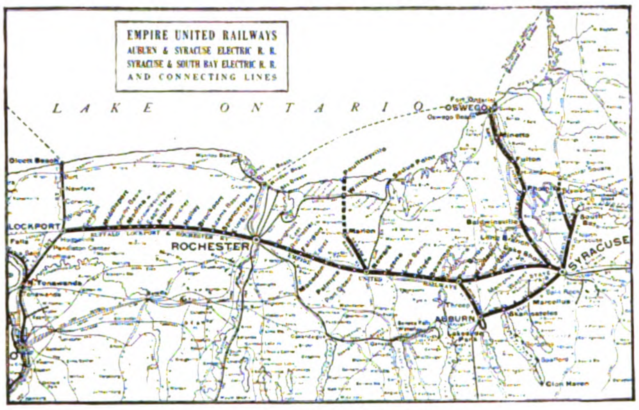
Complaints made to this commission, it is said, fall under two heads, the first covering trouble caused by the acts or neglect of individual employees. In such cases, the commission states, the public is too likely to judge a whole system by isolated acts of a small percentage of men under standard, who, even with great care in selection, will always be found where a large number are employed. Anyone who would judge fairly the operations of a utility, and more especially electric railway and telephone systems, must remember this human element. On these systems as a whole such weaknesses are no more than existing in other labor-employing undertakings, and are probably considerably less. The other class of complaints concerns demands for improvements and increased service. In the commission's opinion, such demands are often made thoughtlessly and without regard to financial possibilities or the likelihood of operating loss. There is a want of appreciation of the fact that in sparse communities reduction of rates retards new construction and service improvement, and takes away the financial basis of a commission order for such betterments. Furthermore, the commission finds that there is a tendency to look at the rate of dividend paid by electric railways and draw conclusions superficially, it being forgotten that to regulate a utility so severely as to restrict its productiveness to the current commercial rate of interest is to stifle the enterprise.

The foregoing notes from the commission's report ably prove that judicial calmness and impartiality are not at all incompatible with the exercise of the regulatory power, but to sum the matter up we shall simply quote the commission's conclusion: "These various considerations are frequently forgotten or deliberately overlooked by persons, sometimes in fact by elected representatives, who unwarrantably create discontent against what, in view of the rates and street facilities, is reasonable public service. A commission is bound to meet and deal with all these matters with a due regard to public service, but at the same time to withstand attempts to suppress a utility through the medium of the commission." Truly a Solomon sat in judgment here!

Parlor Cars to Stimulate Traffic

The Empire United Railway Has Introduced a Fast Parlor Car Service Between the Cities of Rochester and Syracuse, N. Y., Using Converted Private Cars—The Direct Revenue from This Service Approximates $7,500 Annually

DURING the past year a fast parlor car service has been placed in operation under novel conditions by the Empire United Railways. This property includes a high-speed route between Rochester and Syracuse, N. Y., which parallels the main line of the New York Central Railroad. The steam trains make the run between the two cities in about two hours, operating a dozen trains daily in each direction, while the interurban road, with a somewhat longer route of 86 miles, makes a running time between terminals of two hours and forty minutes, including seventeen stops at various towns and villages along the line. In consequence, the competition for the through traffic is severe, and it was with the idea of attracting a greater share of this that the parlor car service was inaugurated. An important contributing circumstance was the ownership, by the electric railway company, of two special cars which could be thus utilized to good advantage.



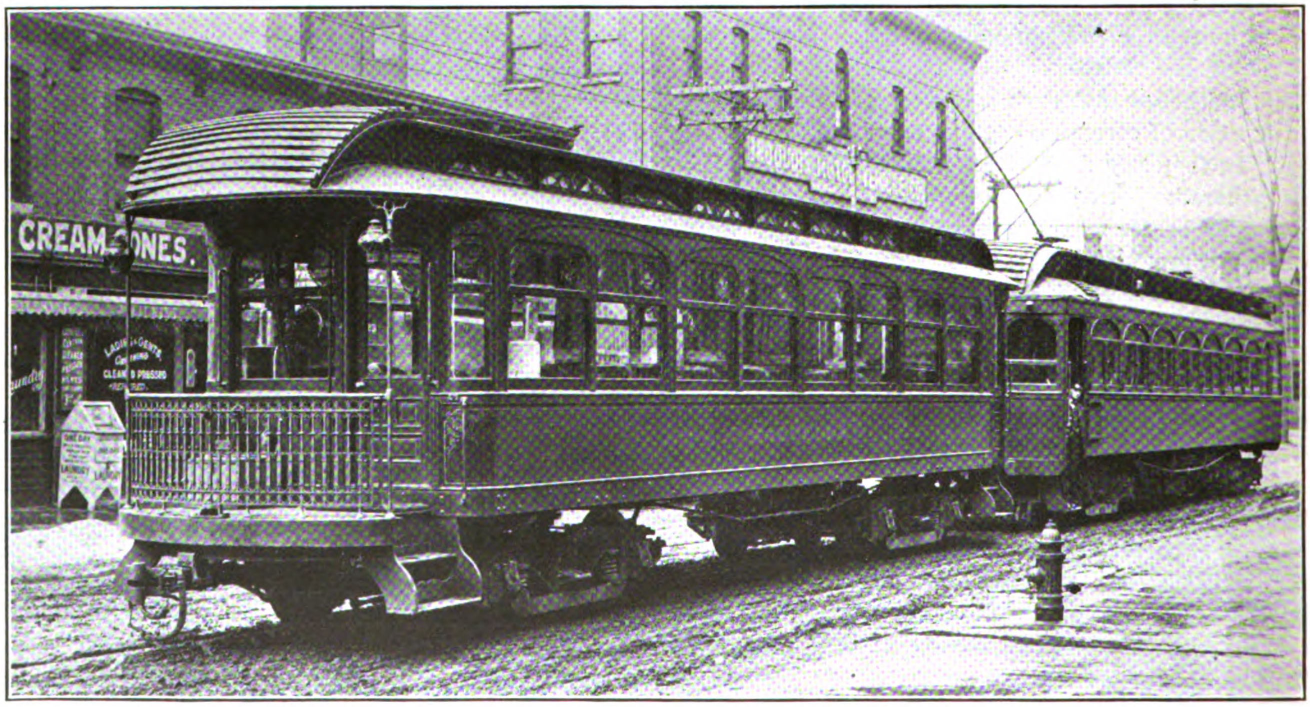
EMPIRE UNITED RAILWAY PARLOR SERVICE—MAP OF SYSTEM

PRIVATE CARS CONVERTED TO PARLOR CARS

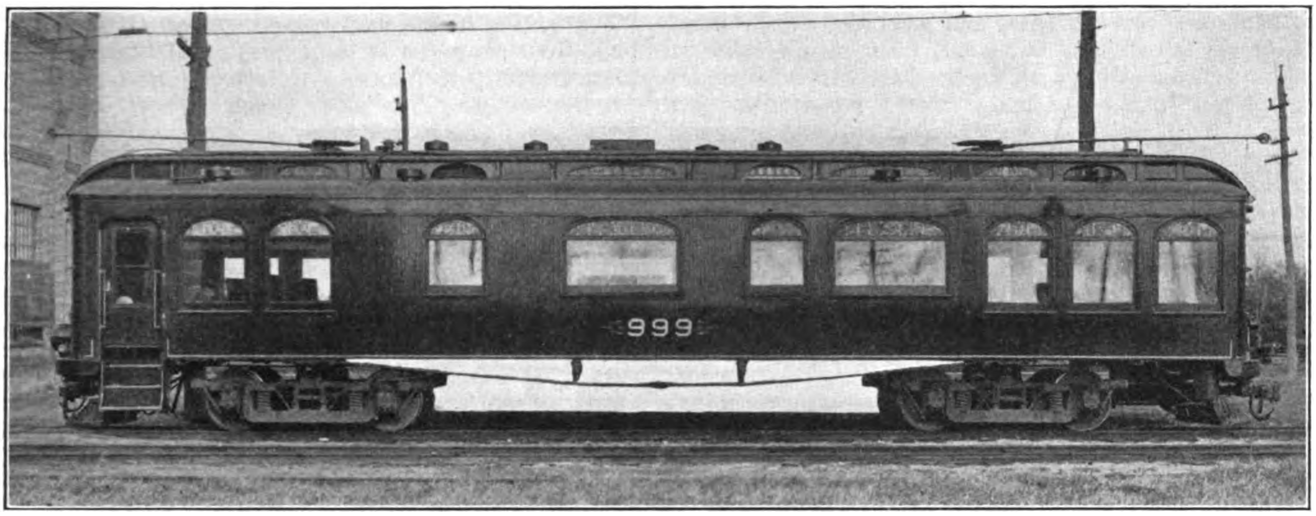
Both of these cars were typical large business cars designed for official trips over the line. They were beautifully finished inside and out and were well equipped to afford the utmost comfort in travel. Under existing conditions, however, each one represented a very considerable investment which brought no direct return, and their use for the proposed parlor car service was considered to be an excellent opportunity to place them in revenue-producing operation.

To make the cars suitable for the parlor car service, only minor changes were necessary. In general, the interior partitions which originally divided the cars into various compartments were not disturbed, but the kitchenette, stateroom and other similar arrangements with which the cars had been originally equipped were rendered superfluous by the new service and were removed. The space which they occupied was then converted into seating compartments for passengers. Large wicker chairs were installed in the body of each car, and in the section reserved for smokers leather upholstered armchairs were provided. The latter section, it may be said, is located at the front end of the car in each case, the cars being operated in one direction only, so that entrance to the main seating compartments is effected directly as passengers board the rear end of the car.

No special facilities for entrance and exit were found to be needed, owing to the relatively small number of parlor car seats that are installed, the number in one car being thirty-five and in the other car forty, and



EMPIRE UNITED RAILWAY PARLOR CARS—PARLOR CAR "SYRACUSE" OPERATED AS A TRAILER



EMPIRE UNITED RAILWAY PARLOR CARS—PARLOR CAR "ROCHESTER" PRICR TO CONVERSION

although one of the cars has no vestibule, involving four steps from the ground level to the car floor, no difficulty has been experienced on this score.

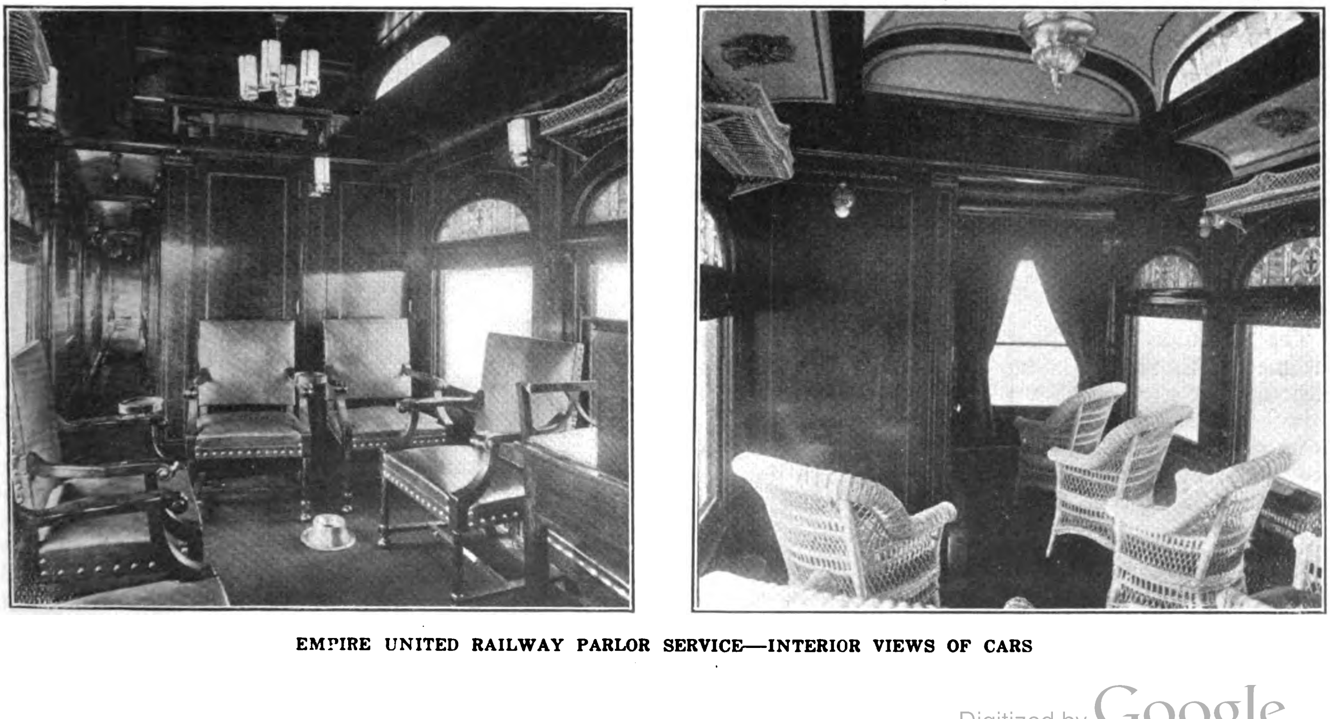
Changes in the interior equipment were minor in character. The most important was the installation of a Peter Smith coal-fired heater to save current, as power is purchased by the railway company on a straight kilowatt-hour basis from one of the Niagara power companies. These heaters have nickel-plated trimmings and a completely nickel-plated hood and blower. This makes an exceedingly fine appearance, the elaborate finish having been adopted solely for ornamental purposes, as the heaters are exposed in the interior of the main seating compartment. The lighting is of the semi-indirect type, with shaded incandescent lamps. The car floors have been left covered with soft and heavy carpet, and the highly-finished interior woodwork has been allowed also to remain, giving an exceptionally luxurious effect.

When they were converted into parlor cars, the two private cars were renamed respectively "Rochester" and "Syracuse." The former is equipped with control and motor apparatus and, in its present service, draws a trailer for a day coach. The electrical equipment consists of four Westinghouse No. 118, 125-hp. motors, and the total weight of the car and its equipment is 90,000 lb. Originally, this car was divided into six different compartments, and when the private car equipment was being removed it was not deemed advisable to remove these partitions until the results of the new service had shown beyond any doubt that it would be permanent. In consequence, these partitions were left in place, but it is expected that in the future they will be taken out to leave only three compartments, namely, the main seating compartment, the smoking compartment and a lavatory.

The car named "Syracuse" is a trailer which weighs 50,000 lb., and this car is drawn by one of the standard passenger cars used in the interurban service of the railway company. The latter type of car weighs 87,500 lb. and is equipped with four Westinghouse No. 119, 125-hp. motors. The "Syracuse" was originally a private car having a dining-room, kitchenette and two observation compartments, but in its conversion the dining-room section was removed, leaving only a main compartment, a smoking compartment and a lavatory.

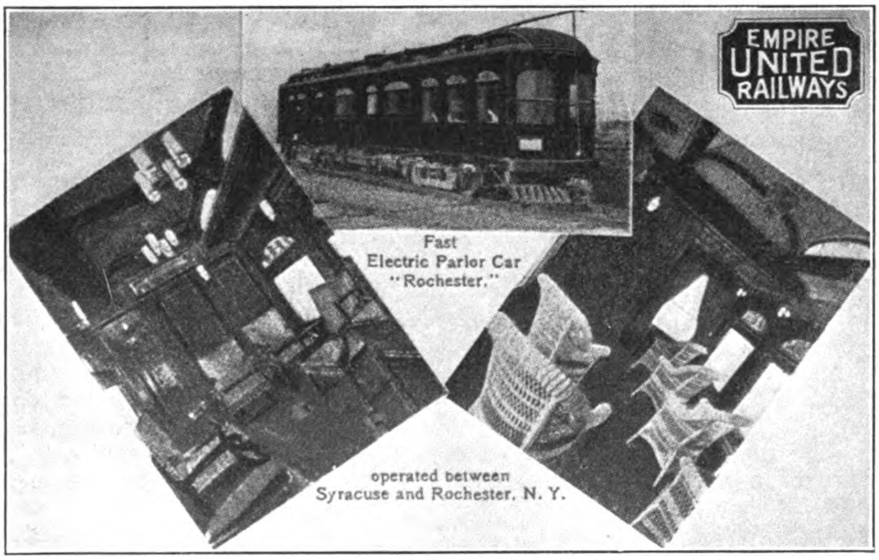
DETAILS OF THE SERVICE

In all cases the parlor car trains consist of a motor car and trailer. No trouble has been experienced with



EMPIRE UNITED RAILWAY PARLOR SERVICE—INTERIOR VIEWS OF CARS the equipment on the cars, and with the exception of the first week or two there has been no difficulty in making schedule time with the trailers. In the original service four parlor-car trains were operated in each direction daily, except on Sundays, cars leaving Syracuse at 7.10 a. m., 11.10 a. m., 1.10 p. m. and 5.10 p. m., and leaving Rochester at 8 a. m., 10 a. m., 2 p. m. and 4 p. m., but very recently this service has been increased as outlined in another paragraph. The actual running time for the 86 miles, as aforementioned, is two hours and forty minutes, so that westbound cars have ten minutes and eastbound cars thirty minutes lay-over. In practice it has been found that these lay-overs are ample to allow for any incidental delays that may take place. For the parlor-car trains there are seventeen intermediate stopping points, and a considerable portion of the traffic is between these towns and the larger cities. Nevertheless, a flat charge of 25 cents is made for a seat in the parlor car, regardless of the distance that is traveled.

On an average, approximately 100 passengers ride in the parlor cars each day, during the eight trips, so that the yearly receipts from the two cars is of the order of $7,500, an attractive return in view of the fact that practically no additional investment was involved in the introduction of the service through the purchase of new cars.


EMPIRE UNITED RAILWAYS
Fast Electric Parlor Car "Rochester."
operated between Syracuse and Rochester, N. Y.

EMPIRE UNITED RAILWAY PARLOR SERVICE—TYPICAL ADVERTISING POSTCARD

However, the real reason for the installation of the new service was not so much because of the revenue obtained from the sale of parlor-car seats but rather to encourage the through travel between Rochester, Syracuse, Auburn, an important intermediate city from which connection is made to the main line between Rochester and Syracuse by means of a short branch road.

That results have justified the company's expectations in this regard is demonstrated by the fact that, although the general slump in electric railway receipts throughout the country has appeared in the form of a decrease of about 10 per cent in passenger earnings on the Empire United Railways, the through business between the cities of Rochester, Syracuse and Auburn has shown no decrease at all.

Publicity for New Service

Numerous ingenious schemes have been devised by the company to attract attention to the improved conditions of travel which have been brought about by the inauguration of the parlor car service. Of these, perhaps the most novel is the operation of taxicab service to transport passengers to or from the interurban railway terminus. This plan, which is now on trial in Syracuse, was planned solely as a convenience for the patrons of the Empire United Railways, and although it is designed to be self-supporting the rates are maintained at a low figure, so that it really offers a material advantage to the railway passengers. The type of machine that is used is of the highest grade, with upholstery of mohair, making the service like that which would be afforded to the owner of a limousine rather than that expected from the ordinary taxi. The taxi service is advertised largely by distribution of small cards, bearing on one side the schedule of rates and displaying prominently the telephone number of the company's operator, to encourage the calling of the taxicab by telephone by prospective passengers.

Publicity for the parlor car service is provided also by the distribution of advertising post cards, and a typical one of these is reproduced in an accompanying illustration. In addition, attention is called to the service in the company's folders, and provision has been made for advance reservations of parlor car seats at the terminals in Rochester, Syracuse and Auburn. The hotels in the various cities along the route are furnished with framed schedules, showing the leaving time of all trains, and at the bottom special notation is made of the fact that parlor car service is afforded on certain trains. Personal solicitation by the traffic department also keeps the hotel managements active in turning business toward the electric railway.

In general, the experience with the new service, which, it should be said, was conceived by Ernest Gonzenbach, general manager Empire United Railways, has been thoroughly satisfactory in every respect. As a matter of fact the direct returns, even during the first year of operation, have been such that the company has recently reconstructed a standard passenger car, which had been built with a somewhat more elaborate finish than usual, into a parlor car similar in character to the two which were originally placed in operation.

This car was placed in regular service on Feb. 3 to amplify the original parlor car schedule, and it enables the company to provide a two-hour parlor service out of Syracuse and Rochester during the entire day. The first parlor car now leaves Syracuse at 7.10 a. m. and the last one at 5.10 p. m., while from Rochester the service begins at 8 o'clock in the morning and ends at 6 o'clock in the afternoon.

To supply energy to the last electrified section of the Lancashire & Yorkshire Railway, from Manchester to Bury, via Heaton Park and for future lines, which has recently been electrified, a power station has been built a few miles out of Manchester. The generators consist of two 5000-kw. 6600-volt turbo-alternators, made by Dick, Kerr & Company, which are supplying three-phase current to two substations, Victoria Station, Manchester and at Radcliffe, also a third turbine unit, consisting of a 500-kw., three-phase, 25-cycle Westinghouse geared turbine set to generate current at 440 volts for auxiliary uses.

Three-Wire System in Los Angeles

This Installation Has Been in Use for More Than a Year on 125 Miles of Track, and Important Reductions in Track Voltage Have Been Obtained—Advantages and Disadvantages Discussed

By S. H. ANDERSON
Electrical Superintendent Pacific Electric Railway

At the present time the Pacific Electric Railway has the three-wire system of distribution in use on 125 miles of track. On a part of this track the system has been in use now for more than a year, so that the company has had an opportunity to study the efficiency of the system as a means of reducing the voltage gradients in the track and thereby improving the electrolysis conditions in the adjacent territory.

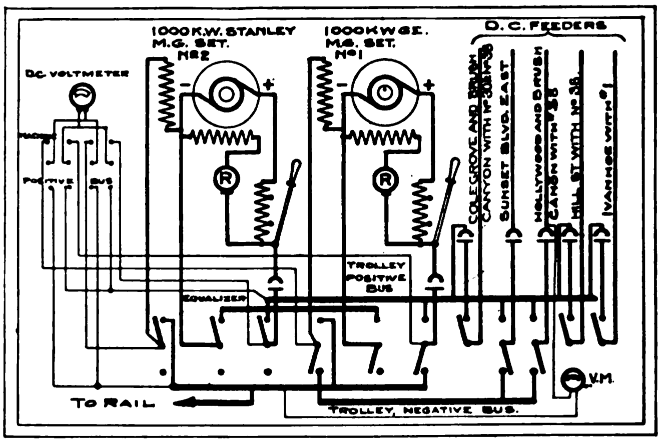
The trolley is broken up into insulated sections alternately positive and negative to the rails. The motor generator sets in the substations are run two in series, the neutral between the two motor-generator sets being connected to the rails and the positive and negative terminals being connected to the corresponding sections of the trolley. There are four of the Pacific Electric Railway Company's substations so arranged, and all of the trolley fed from these stations is operated on the three-wire system. The names and locations of these substations and the equipment in them is as follows:

Name	Location	Equipment
Olive	Los Angeles	two 1000-kw. motor generators
Sherman	Sherman	one 1000-kw. motor generator one 400-kw. motor generator
Pasadena	Pasadena	two 1000-kw. motor generators two 600-kw. motor generators
Altadena	Altadena	two 200-kw. motor generators one 400-kw. motor generator

Total capacity of motor-generator, six sets..............7,400 kw.

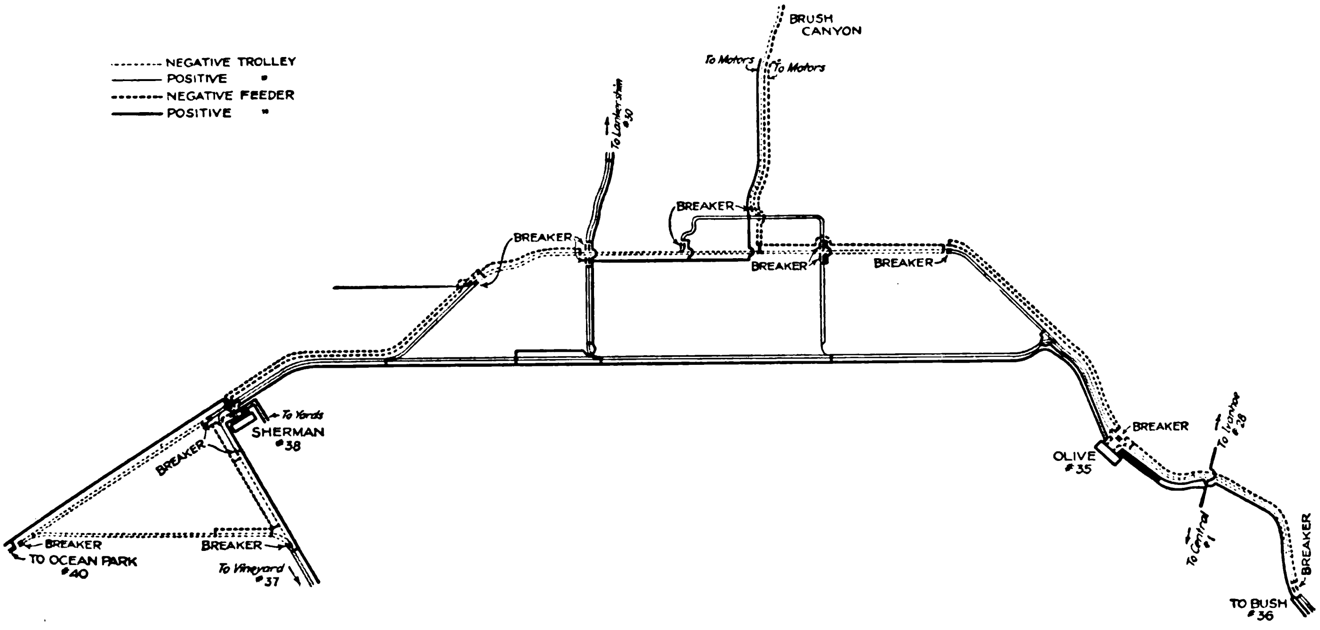
The upper diagram shows the connections for the Olive substation, and the second diagram the arrangement of feeders and trolleys supplied from this substation and the Sherman substation. The territory between these substations consists largely of a high-class residential district called Hollywood. The largest part of the traffic over the company's lines in this district is local, but includes also interurban service to the San Fernando Valley and to beach resorts.

The introduction of the three-wire system did not require any very extensive changes in substations and feeders. At Olive substation it involved nothing but a few changes in switchboard connections. At Sherman substation it involved changes in switchboard connections and the installation of a 400-kw. motor-generator set. No additional feeders were required, but the old feeding system was rearranged somewhat and sectional insulators installed in the trolley wire. Between the positive and negative sections of the trolley two standard 600-volt sectional insulators were used, spaced 6 ft. apart.

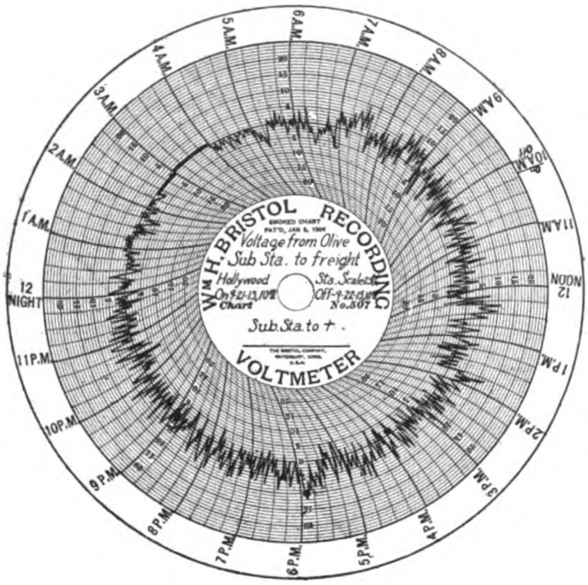

1000 K.W. STANLEY M.G. SET. No. 2
1000 KW GE. M.G. SET. No. 1
D.C. FEEDERS
D.C. VOLTMETER
POSITIVE BUS
R
R
COLEGROVE AND BRUSH CANYON WITH No. 30 & No. 35
SUNSET BLVD. EAST
HOLLYWOOD AND BRUSH CANYON WITH No. 38
HILL ST WITH No. 38
IVANHOE WITH No. 1
TROLLEY POSITIVE BUS
EQUALIZER
TO RAIL
TROLLEY, NEGATIVE BUS.
V.M.

THREE-WIRE SYSTEM—CONNECTIONS ON BACK OF SWITCHBOARD, OLIVE SUBSTATION

When the system was laid out an effort was made to divide the positive and negative sections so that the average over-all voltage from the substations to a point on the track midway between the substations would be


NEGATIVE TROLLEY
POSITIVE "
NEGATIVE FEEDER
POSITIVE "
BRUSH CANYON
To Motors
To Motors
To Lankershim #30
BREAKER
BREAKER
BREAKER
BREAKER
To Yards
SHERMAN #38
BREAKER
BREAKER
TO OCEAN PARK #40
BREAKER
To Vineyard #37
OLIVE #35
BREAKER
To Ivanhoe #28
To Central #1
BREAKER
TO BUSH #36

THREE-WIRE SYSTEM—DIAGRAM SHOWING POSITIVE AND NEGATIVE TROLLEYS AND FEEDERS approximately zero. After the system was placed in operation it was found necessary to shift the location of one set of sectional insulators slightly to secure this result. At Brush Canyon there are a number of motors operating a stone quarry and connected between trolley and rails. These motors take about 400 amp., which was formerly all returned through the rails to Olive and Sherman substations. When the three-wire system was put in effect, one-half of these motors were put on a positive feeder and one-half on a negative feeder so that this load was almost entirely removed from the rails.



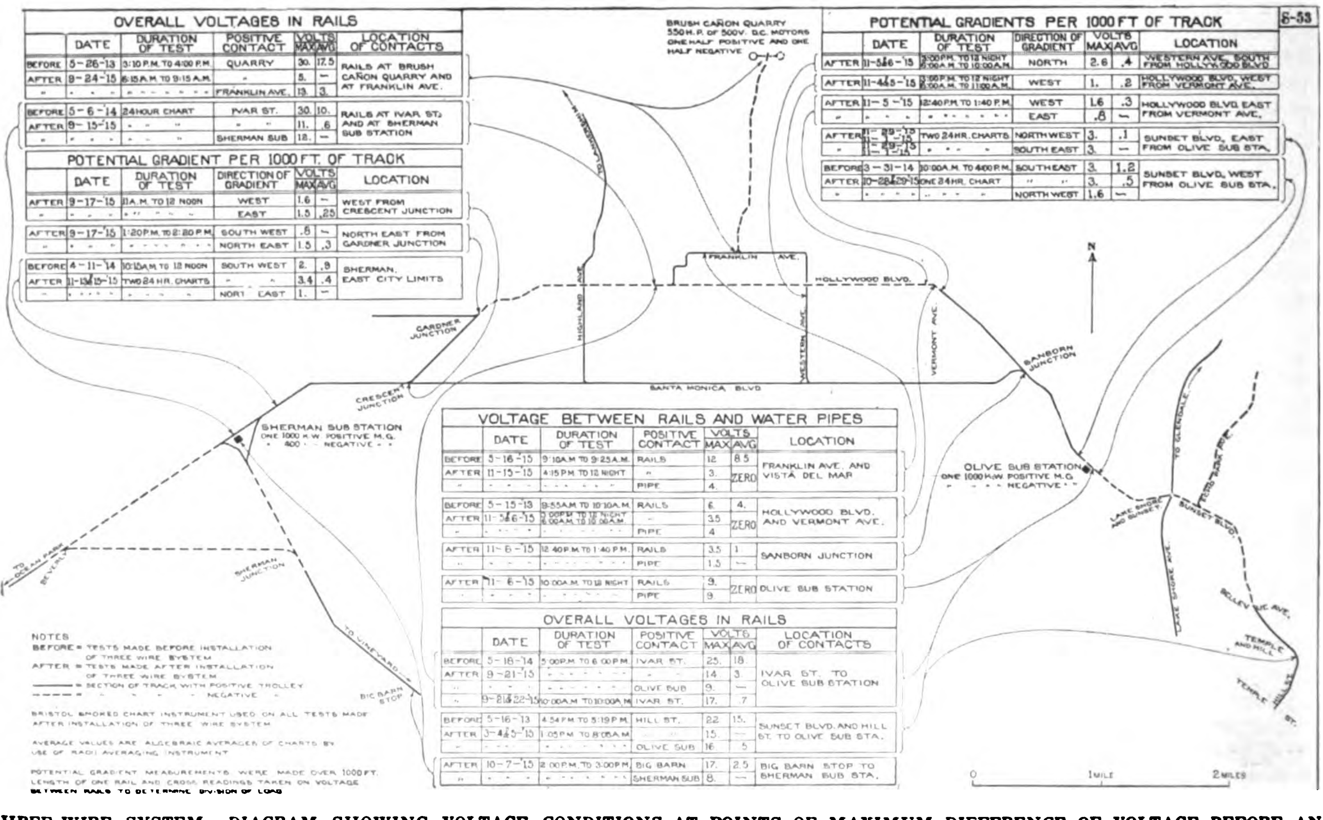
THREE-WIRE SYSTEM—VOLTMETER CHART FOR TWENTY-FOUR HOURS BETWEEN TRACK AT HOLLYWOOD FREIGHT STATION AND NEUTRAL BUS AT OLIVE SUBSTATION

At Pasadena and Altadena substations the general arrangement is similar to that at Olive and Sherman. At neither Pasadena nor Altadena substations was it necessary to install any additional equipment in order to make use of the three-wire system.

RESULTS SECURED BY THE USE OF THE THREE-WIRE SYSTEM

The large chart on this page shows the voltage conditions which obtained in the track between Olive and Sherman substations before and after the use of the three-wire system. It will be seen that with the use of this system the track voltage has been very greatly reduced. There are still voltage swings in the track of considerable magnitude, but they reverse rapidly in direction and the algebraic average voltage is everywhere very low. For example: the voltmeter chart reproduced on this page shows a continuous twenty-four-hour record of the voltage in the track between Olive substation and the freight station near Ivar Street on Hollywood Boulevard, a distance of 3 miles. Ivar Street is positive to Olive substation a maximum of 14 volts and is negative to Olive substation a maximum of 9 volts, Ivar Street being positive to Olive substation an algebraic average for twenty-four hours of only 0.7 of a volt. Electrolytic action on underground pipes is proportional, other things being equal, to the average voltage drop in the rails rather than to the maximum voltage drop, so that it will be seen that such action in this case has been reduced to a very small amount. Previous to the use of the three-wire system, Ivar Street was positive to Olive substation 25 volts maximum and 18 volts average for one hour, no twenty-four-hour record having been taken.

In the chart below showing voltages before and after the change was made, the points for measurement selected are those where the maximum gradients were found. It would be an easy matter to reduce them still further by shifting the sectional insulators, but it would be at the expense of the over-all voltage and was not considered desirable.



OVERALL VOLTAGES IN RAILS

	DATE	DURATION OF TEST	POSITIVE CONTACT	VOLTS MAX	VOLTS AVG	LOCATION OF CONTACTS
BEFORE	5-26-13	3:10 P.M. TO 4:00 P.M.	QUARRY	30.	17.5	RAILS AT BRUSH CAÑON QUARRY AND AT FRANKLIN AVE.
AFTER	9-24-'15	6:15 A.M. TO 9:15 A.M.	"	5.	—	
"	" " "	" " " " " " "	FRANKLIN AVE.	13.	3.	
BEFORE	5-6-'14	24 HOUR CHART	IVAR ST.	30.	10.	RAILS AT IVAR ST. AND AT SHERMAN SUB STATION
AFTER	9-15-'15	" " "	" "	11.	.6	
"	" " "	" " "	SHERMAN SUB	12.	—	

POTENTIAL GRADIENT PER 1000 FT. OF TRACK

	DATE	DURATION OF TEST	DIRECTION OF GRADIENT	VOLTS MAX	VOLTS AVG	LOCATION
AFTER	9-17-15	11 A.M. TO 12 NOON	WEST	1.6	—	WEST FROM CRESCENT JUNCTION
"	" " "	" " " "	EAST	1.5	.25	
AFTER	9-17-'15	1:20 P.M. TO 2:20 P.M.	SOUTH WEST	.8	—	NORTH EAST FROM GARDNER JUNCTION
"	" " "	" " " " " "	NORTH EAST	1.5	.3	
BEFORE	4-11-'14	10:15 A.M. TO 12 NOON	SOUTH WEST	2.	.9	SHERMAN, EAST CITY LIMITS
AFTER	11-13&15-'15	TWO 24 HR. CHARTS	" "	3.4	.4	
"	" " "	" " " "	NORTH EAST	1.	—	

POTENTIAL GRADIENTS PER 1000 FT OF TRACK

	DATE	DURATION OF TEST	DIRECTION OF GRADIENT	VOLTS MAX	VOLTS AVG	LOCATION
AFTER	11-5&6-'15	3:00 P.M. TO 12 NIGHT 6:00 A.M. TO 10:00 A.M.	NORTH	2.6	.4	WESTERN AVE. SOUTH FROM HOLLYWOOD BLVD.
AFTER	11-4&5-'15	3:00 P.M. TO 12 NIGHT 6:00 A.M. TO 11:00 A.M.	WEST	1.	.2	HOLLYWOOD BLVD. WEST FROM VERMONT AVE.
AFTER	11-5-'15	12:40 P.M. TO 1:40 P.M.	WEST	1.6	.3	HOLLYWOOD BLVD. EAST FROM VERMONT AVE.
"	" " "	" " " " " "	EAST	.8	—	
AFTER	11-29-'15 11-1-'15	TWO 24 HR. CHARTS	NORTH WEST	3.	.1	SUNSET BLVD., EAST FROM OLIVE SUB STA.
"	11-29-'15 11-1-'15	" " "	SOUTH EAST	3.	—	
BEFORE	3-31-14	10:00 A.M. TO 4:00 P.M.	SOUTHEAST	3.	1.2	SUNSET BLVD. WEST FROM OLIVE SUB STA.
AFTER	10-28&29-'15	ONE 24 HR. CHART	" "	3.	.5	
"	" " " "	" " " "	NORTH WEST	1.6	—	

VOLTAGE BETWEEN RAILS AND WATER PIPES

	DATE	DURATION OF TEST	POSITIVE CONTACT	VOLTS MAX	VOLTS AVG	LOCATION
BEFORE	5-16-'15	9:10 A.M. TO 9:25 A.M.	RAILS	12	8.5	FRANKLIN AVE. AND VISTA DEL MAR
AFTER	11-15-'15	4:15 P.M. TO 12 NIGHT	"	3.	ZERO	
"	" " "	" " " " " "	PIPE	4.		
BEFORE	5-15-'13	9:55 A.M. TO 10:10 A.M.	RAILS	6.	4.	HOLLYWOOD BLVD. AND VERMONT AVE.
AFTER	11-5&6-'15	3:00 P.M. TO 12 NIGHT 6:00 A.M. TO 10:00 A.M.	"	3.5	ZERO	
"	" " " "	" " " " " "	PIPE	4		
AFTER	11-6-'15	12:40 P.M. TO 1:40 P.M.	RAILS	3.5	1	SANBORN JUNCTION
"	" " "	" " " " " " "	PIPE	1.5	—	
AFTER	11-6-'15	10:00 A.M. TO 12 NIGHT	RAILS	9.	ZERO	OLIVE SUB STATION
"	" " "	" " " " "	PIPE	9.		

OVERALL VOLTAGES IN RAILS

	DATE	DURATION OF TEST	POSITIVE CONTACT	VOLTS MAX	VOLTS AVG	LOCATION OF CONTACTS
BEFORE	5-18-'14	5:00 P.M. TO 6:00 P.M.	IVAR ST.	25.	18.	IVAR ST. TO OLIVE SUB STATION
AFTER	9-21-'15	" " " " " " "	" "	14.	3.	
"	" " "	" " " " " " "	OLIVE SUB	9.	—	
"	9-21&22-'15	10:00 A.M. TO 10:00 A.M.	IVAR ST.	17.	.7	
BEFORE	5-16-13	4:54 P.M. TO 5:19 P.M.	HILL ST.	22	15.	SUNSET BLVD. AND HILL ST. TO OLIVE SUB STA.
AFTER	3-4&5-'15	1:05 P.M. TO 8:05 A.M.	" "	15.	—	
"	" " "	" " " " " " "	OLIVE SUB	16.	.5	
AFTER	10-7-'15	2:00 P.M. TO 3:00 P.M.	BIG BARN	17.	2.5	BIG BARN STOP TO SHERMAN SUB STA.
"	" " "	" " " " " " "	SHERMAN SUB	8.	—	

NOTES
BEFORE = TESTS MADE BEFORE INSTALLATION OF THREE WIRE SYSTEM
AFTER = TESTS MADE AFTER INSTALLATION OF THREE WIRE SYSTEM
——— = SECTION OF TRACK WITH POSITIVE TROLLEY
- - - - = " " " " NEGATIVE "

BRISTOL SMOKED CHART INSTRUMENT USED ON ALL TESTS MADE AFTER INSTALLATION OF THREE WIRE SYSTEM

AVERAGE VALUES ARE ALGEBRAIC AVERAGES OF CHARTS BY USE OF RADI AVERAGING INSTRUMENT

POTENTIAL GRADIENT MEASUREMENTS WERE MADE OVER 1000 FT. LENGTH OF ONE RAIL AND CROSS READINGS TAKEN ON VOLTAGE BETWEEN RAILS TO DETERMINE DIVISION OF LOAD

THREE-WIRE SYSTEM—DIAGRAM SHOWING VOLTAGE CONDITIONS AT POINTS OF MAXIMUM DIFFERENCE OF VOLTAGE BEFORE AND AFTER INSTALLATION OF THREE-WIRE SYSTEM

Results secured in Pasadena and Altadena are similar to those secured in Hollywood.

DISADVANTAGES OF THE THREE-WIRE SYSTEM

The chief disadvantage in the use of the three-wire system lies in the fact that the load factor on the individual units in the substations is reduced somewhat and the substation losses thereby increased. Also, the losses in the trolley feeders are increased slightly. Under some conditions this would be serious. Under the conditions obtaining on the Pacific Electric Railway, where the three-wire system is used, these losses have been largely compensated for by the reduction in the power loss in the track.

Among minor points, the fact might be mentioned that luminous arc headlights on the cars will not burn satisfactorily when the current is reversed through them. On the Pacific Electric Railway, incandescent headlights and carbon arc headlights are used where the three-wire system is in operation and are satisfactory. Where cars are equipped with storage batteries for operating the control equipment and where the batteries are charged from the trolley while cars are in service, it would in some cases be necessary to install polarized relays in the charging circuits to prevent reversal of current through the batteries. This has not been necessary on the Pacific Electric Railway on account of the short distance which such cars operate over negative trolley.

There have been no serious operating difficulties encountered where the three-wire system has been used on the Pacific Electric Railway either in the substations, on the lines or on the cars.

COMPARISON OF THE THREE-WIRE SYSTEM AND INSULATED NEGATIVE FEEDER SYSTEM

Under favorable conditions, such as exist where there are a sufficient number of units in the substations and a sufficient number of feeders to carry out a three-wire system of distribution, such a system can be installed at a small fraction of the cost of an insulated negative feeder system, and it can be operated with much less loss than that incident to the use of an insulated feeder system of equal effectiveness.

There is nothing that can be accomplished in the matter of electrolysis mitigation by the use of an insulated negative feeder system which cannot also be accomplished by a three-wire system of distribution.

Cost of Power Plant Chimneys

Among the data filed by the Bay State Street Railway with the Massachusetts Public Service Commission in the pending fare case were the detailed costs of power plant equipment. Some details of the chimneys of these plants are given below, together with their costs, including 14½ per cent for engineering, interest, insurance, contingencies, taxes and organization.

Haverhill Plant: Circular brick stack; 137 ft. high; inside diameter at top 6 ft.; built in 1892; cost $6,195.

Byfield Plant: Circular brick stack; 80 ft. high; inside diameter at top 5 ft.; built in 1899; cost $3,463.

Chelsea Plant: Circular brick stack, supported by granite foundation on piles; height 152 ft.; inside diameter at top 8 ft.; built in 1891; cost $9,365.

Essex Plant: Square brick chimney, supported by granite foundation; 70 ft. high; inside diameter at top 5 ft.; built in 1895; cost $2,444.

Lawrence Plant: Custodis brick stack; built in 1910; 150 ft. high; inside diameter 8 ft.; cost $5,594.

Lowell Plant: Brick chimney, supported on concrete base resting on 40-ft. piles; built in 1890; 195 ft. high; inside diameter at top 9 ft. 8 in.; cost $16,507.

Salem Plant: Circular brick stack on granite foundation with timber piles; height, 158 ft.; inside diameter at top 8 ft.; built in 1893; cost $12,216.

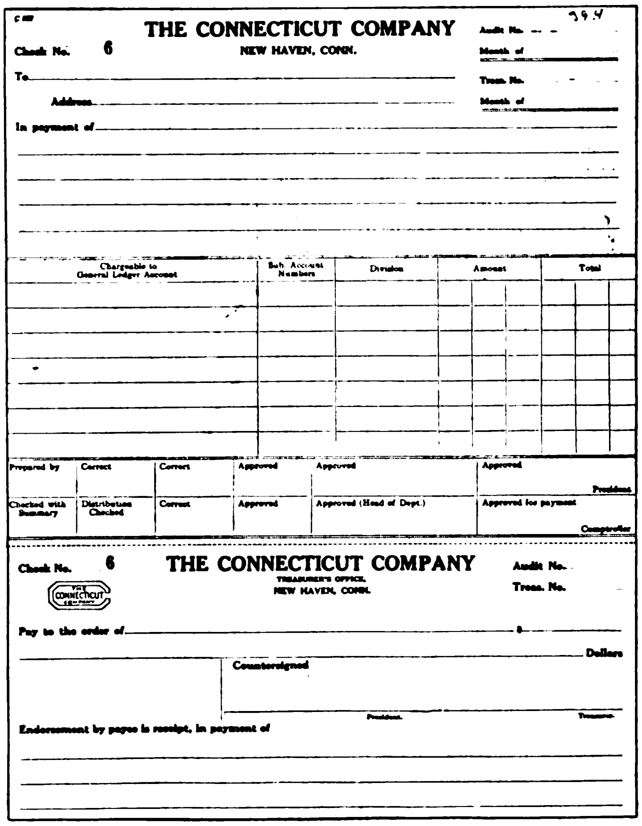
East Woburn Plant: Custodis stack; 175 ft. high; inside diameter at top 9 ft.; built in 1912; cost $6,903.

Quincy Point Plant: Two radial brick stacks of the Custodis type; 125 ft. high; pile and concrete foundations; built in 1903; each stack cost $12,252.

New Form of Voucher Check

After Six Months' Trial the Connecticut Company Testifies to Time-Saving and Economy of Device Shown Below

THE Connecticut Company, New Haven, Conn., recently devised and put into use a new form of voucher check in which electric railway accountants will undoubtedly be much interested. The front of this voucher check is shown in the accompanying illustration, the back of it containing only the name of the company and spaces for the voucher number and the month. The voucher is prepared in the auditing department on a typewriting machine. The distribution is shown on the face of the voucher, which enables the items to expenses, etc., to be passed directly to the books without turning over papers. The check portion is written in favor of the payee when the voucher is prepared, thus saving the treasury department a great deal of work. The treasurer's office has merely to date the check, stamp the name of the bank where it is payable and sign it. The president's approval appears on the check as a countersignature, which has the advantage of both approving the payment and countersigning the check. The approval of the auditor or comptroller appears on the voucher, and then, if necessary, on the check as a countersignature. I. A. May, comptroller of the company, states that the new form has been in use for about six months and has demonstrated that it is a time-saver and therefore an economical device to use.



THE CONNECTICUT COMPANY
NEW HAVEN, CONN.

Check No. 6
Audit No.
Month of
To
Treas. No.
Address
Month of
In payment of

Chargeable to General Ledger Account	Sub. Account Numbers	Division	Amount	Total

Prepared by	Correct	Correct	Approved	Approved	Approved President
Checked with Summary	Distribution Checked	Correct	Approved	Approved (Head of Dept.)	Approved for payment Comptroller

Check No. 6
THE CONNECTICUT COMPANY
TREASURER'S OFFICE,
NEW HAVEN, CONN.
Audit No.
Treas. No.
Pay to the order of $
Dollars
Countersigned
President.
Treasurer.
Endorsement by payee is receipt, in payment of

VOUCHER CHECK—SHOWING NEW FORM RECENTLY ADOPTED BY THE CONNECTICUT COMPANY

Accident Reduction in Chicago

The Elevated Railroads of Chicago Received "Honorable Mention" from the American Museum of Safety Committee on Award of the Brady Medal—A Summary of the Accident Prevention Work of This System Is Given Below

THE efforts of the Elevated Railroads of Chicago in the direction of accident prevention have been chronicled from time to time in the columns of the ELECTRIC RAILWAY JOURNAL, the latest extended account appearing in the issue for Aug. 21, 1915. This article was reprinted in the September issue of the *Elevated News*, a publication of the Elevated Railroads issued under the editorial direction of H. A. Johnson, master mechanic. The following statement of some recent safety work done was in part the basis on which the award was made.

FACTS ABOUT THE ELEVATED RAILROADS

These railroads operate approximately 69 miles of road, including 54 miles of two-track, 8 miles of three-track and 7 miles of four-track road. They serve the greater part of Chicago and the adjoining towns of Evanston, Wilmette, Oak Park, Forest Park, River Forest, Hawthorne and Clyde, which had a combined population of 2,300,000 according to the 1910 census. There are five divisions of which the Union Loop is the central one, the others being spread out in fan form. The loop district traffic is greatly congested. Travel is mostly of the long-haul variety, the surface lines taking care of the shorter runs. All of the lines but the outlying portions are on elevated structure.

Tom Moore
CIGAR 10¢
Little Tom 5¢
SAFETY FIRST

SAFETY ON THE CHICAGO ELEVATED—PROTECTION IN CABLE SPLICING; PROTECTION IN TRACK WORK; CANVAS PROTECTION IN THIRD-RAIL WORK

THE SAFETY MOVEMENT

The Metropolitan division began the safety work in 1910 by the appointment of a committee which made inspections of the property and reported on possible improvements to reduce accidents. After the consolidation of the elevated roads in 1911 safety committees were appointed in four divisions, each consisting of the division general foremen of the way and shop departments, the division supervisor of service and a representative of the claim department. These report to a central safety committee.

In 1914 the central committee began the publication of the *Safety Bulletin*, a four-page paper which is the official organ of all welfare work. In November, 1914, a safety engineer was appointed to devote all of his time to this work and he, with the electrical engineer and the medical examiner, assumed the work of the central committee which was then named the "Employees and Safety Committee."

A "Watch Your Step" crusade resulted in firmly establishing this phrase in the public mind and this was followed by effectively advertising "safety first" with catchy explanatory sentences. The staff photographer made photographs to illustrate incorrect and correct procedure from the accident reduction point of view. These were reproduced on lantern slides and used effectively at employees' meetings. Several of these scenes are reproduced herewith.

While the accident problems are different in a system operating largely elevated track from those of surface lines, these problems are nevertheless present, as is illustrated by the following analysis of the 1914-1915 record. During this year 15,700,000 train-miles and 49,300,000 car-miles were run with the loss of eleven lives and 584 other casualties. None of the fatal accidents were train or shop accidents. Three persons, two of them intoxicated, fell from platforms in front of trains, one employee was shot in a hold-up, a fifth person dodged under a closed gate on a grade crossing in spite of the flagman's efforts to stop him and stepped in front of a train, while the remaining six persons were trespassing when struck by trains.

An analysis of the injuries to passengers in other than train accidents shows that 82 per cent of them result from the following causes: (1) Falling on station stairs or platforms; (2) falling in cars or on or between car platforms; (3) falling between car and station platforms, and (4) air-door and gate accidents. Efforts are being made to reduce these accidents by getting at the causes. Better lighting is being introduced to reduce the first class of accidents, and stair treads covered with gravel roofing paper and edged with alundum nosings have been introduced. In winter the stairs are kept clear of ice and well sanded. Accidents on cars, being largely due to the presence of bulky packages in aisles and to irregularities in controller operation, are being reduced by prohibiting the former and keeping the equipment and operating discipline at a high standard. As considerable clearance is necessary between the edges of station and car platforms constant admonitions to "watch your step" have been used with good effect and the clearance spaces are brightly lighted. The reduction of gate and door accidents is partly a matter of discipline and partly of education of passengers. When necessary, extra platform men have been provided to assist in loading and unloading trains.

OTHER EFFORTS TO REDUCE ACCIDENTS

During the year ended June 30, 1915, many special devices were installed to reduce accidents and the use of other equipment was extended. Only a few of these will be mentioned.

At one junction a detector route locking scheme was applied, by which the track signal circuits were so connected that when one of two diverging routes is set up, the other cannot be cleared until a train has taken the first. It can only be unlocked by the towerman going to the bottom of the tower, breaking the glass cover of a box and pushing the button therein.

Arc lamps at grade crossings have been replaced with high-wattage tungsten lamps to improve the illumination. Gates have been painted in brilliant red and white, while enameled steel signs, always vertical, have been hung from the arm ends.

By the elevation of 4 miles of track on the Evanston-Northwestern division, thirty-three grade crossings, with their attendant dangers have been eliminated.

To prevent pedestrians from dodging under gates at grade crossings simple aprons, consisting of wood or metal strips suspended parallel to the gates, were installed on street and sidewalk gates.

Wherever large bodies of men are working on the tracks which are in use, in addition to the flagmen stationed to protect them a portable automatic trip is placed on the track at a considerable distance from the men. This is normally in the "danger" or trip position and can be cleared and held clear only by means of a rope manipulated by the flagman.

SAFETY ON THE CHICAGO ELEVATED—WORK ON THE EVANSTON TRACK ELEVATION

In the shops among the improvements introduced last year were the following:

Low bridge warning guards on roof trusses, a railing along the crane walk and a hand rail on the crane were installed for the protection of the crane operator.

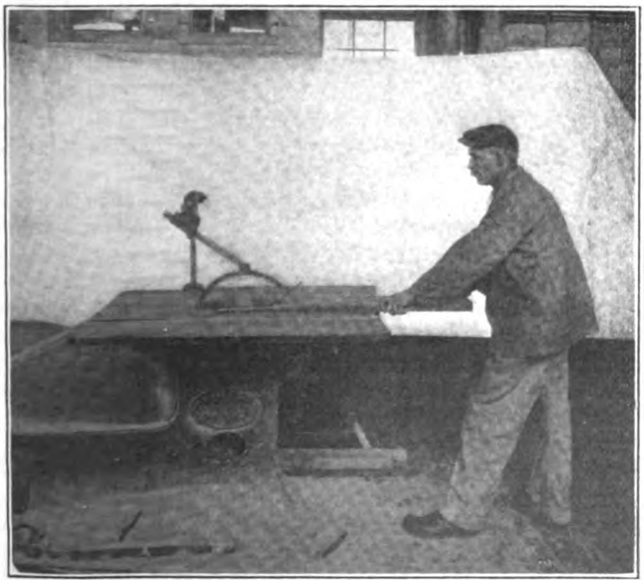
Set screws and other projections on line shafting were removed.

A guard cable was installed in the shop to prevent the trolley traveler from falling if derailed.

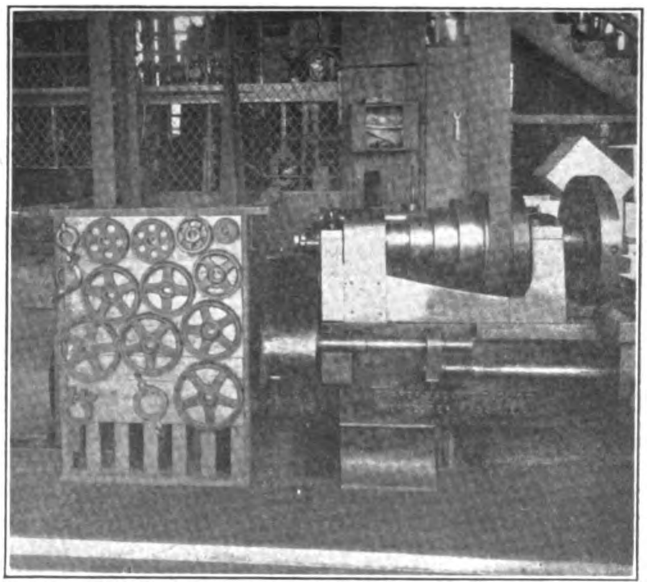
Hydraulographs were placed on all wheel presses to check press fits of wheels and gears.

On the cars the fire extinguisher equipment was extended, safety suspensions and stronger gear case supports were put on a number of cars, obsolete brake valves were exchanged for modern ones, many truck brake beams were replaced with heavier ones, safety stops were added to toggle-bars, truss-rods and car gates, etc.

On the roadway it was found that, during repairs, material falling from the elevated structure caused a number of accidents to persons passing below. This



SAFETY ON THE CHICAGO ELEVATED—GUARD ON CIRCULAR SAW



SAFETY ON THE CHICAGO ELEVATED—GEAR GUARDS ON LATHE source of accident was practically eliminated by the use of canvas sheets hung below the site of the work, or where this did not suffice the ground below was inclosed by red fences and patrolled by watchmen.

Special red guard boxes have been provided to cover the conductor rails when workmen are employed near them, as illustrated in an accompanying halftone.

Extra 10-in. x 10-in. iron-faced guard rails are being installed on the elevated structure as a safety precaution. To date these have been placed on sharp curves and bridges only.

PHYSICAL AND MENTAL STANDARDS OF EMPLOYMENT, AND DISCIPLINE

An important element of the safety work of the Elevated Railroads is the examination and training of employees. The methods used in the medical department were fully explained by Dr. H. E. Fisher, the company surgeon, in an article printed in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 7, 1915, page 216. An article on first-aid methods followed in the issue for Sept. 11, page 430.

The central safety committee has compiled a set of safety rules which are contained in a booklet of which a numbered copy is loaned to each employee. Persons in charge of work are required to see that these rules are understood.

During the past year the "honor system" of administering all rules has been applied in place of punishment for infraction thereof, and excellent results have been secured.

EDUCATIONAL SAFETY WORK

During the year covered by this summary, the safety engineer gave a number of illustrated lectures before schools, improvement clubs, etc. These have been supplemented by lectures by the medical examiner, all going to show how the public can reduce the number of accidents. Thousands of letters have been sent to school teachers asking co-operation in eliminating stone throwing by pupils.

The employees have been instructed through every possible channel and a suggestion contest, with a substantial prize, was inaugurated last spring.

In conclusion it may be stated that the chief operating difficulties of this system are imposed by the Loop Division. The loop consists of 2 miles of double track on which are eleven stations. Fifty per cent of all revenue traffic is carried to and from this area of 1½ square miles. At times 190 trains comprising 925 cars enter it hourly, on an average of a train of 4.9 cars on each track every thirty-eight seconds. During the year the track elevation under traffic, described above, also introduced dangers. In spite of all this, however, the safety record was excellent, the company being a close second in the competition for the Anthony N. Brady medal.

Ten Difficulties of Regulation

Ten difficulties of state regulation of public utilities were named by H. O. Garman, chief engineer Indiana Public Service Commission, at a recent joint meeting of the Indiana Engineering Society and the Indiana Sanitary & Water Supply Association. They are as follows: Resentment on the part of the municipalities toward state interference; change of personnel of commission after the members have been educated to their duties by experience at the expense of the public; lack of continuity of policy owing to changes in organization; attempts at political advertisement on the part of some city officials by starting trouble where no real trouble exists; lack of some form of civil service restriction for the protection of the commission in obtaining its employees; lack of a co-operative spirit; political ambitions of commissioners; lack of publicity of the right sort concerning the activities of the commission; lack of confidence in the commission, and lack of funds to carry on the work properly.

Ice Gorges Damage Illinois Valley Line

Floods Disable Two Plants of the Northern Illinois Traction Company Resulting in Temporary Stoppage of Service

UNPRECEDENTED floods in the valley of the Illinois River and its tributaries, due to the combination of a warm rainfall, melting snow and ice gorges, seriously damaged and put out of service several sections of the Chicago, Ottawa & Peoria Railway Company's line between Marseilles and Peru, Ill. The flood reached its crest on Jan. 21, but subsequent ice gorges maintained the river at a high stage, making it impossible to repair certain damaged sections up to as late a date as Feb. 12. The water in the Illinois River backed up until it was 10 ft. above the crest of the Marseilles dam, which supplies water to the hydroelectric plant of the Northern Illinois Light & Traction Company, also at Marseilles. Although the level of the flood at this stage was 17 in. above the generator room floor, damage to the electrical equipment was slight, consisting largely of water-soaked insulation. The plant was out of service from the afternoon of Jan. 21 until the morning of Jan. 23. The steam plant of this company at La Salle, Ill., was also out of service from Jan. 21 until the evening of Jan. 24.

CLEARING ICE FLOODS FROM INTERURBAN TRACKS ON THE CHICAGO, OTTAWA & PEORIA RAILWAY SYSTEM

Damage to the lines of the railway company, aside from interrupted energy supply, consisted chiefly of flooded and ice-gorged tracks where the overhead lines were literally mowed down. As shown in the accompanying illustration, the ice was piled up from 6 ft. to 8 ft. high over the tracks at some points, and two bridges were carried away when the gorge broke. As soon as the Illinois River receded, men were put to work clearing the track. At one point it was covered with ice for ¼ mile. Axes, ice tongs and shovels were used to cut a roadway through the piles of ice. West of Ottawa about 3 miles of track were also covered with water and ice, and the pole lines destroyed. At a number of other points along the line, which follows the Illinois River valley for practically its entire length, the tracks were flooded and the pole lines cut down. While the actual damage to physical property amounted to not more than $25,000, the loss of three days' operation added materially to this amount.

C. E. R. A. Holds Annual Meeting

Utility Regulation as Seen by the City Manager and the Public Utility Commission, and Steam Railroad Electrification Were the Central Themes of Thursday's Papers at the Dayton Meeting

MORE than 220 members and guests attended the annual meeting of the Central Electric Railway Association, held at the Miami Hotel, Dayton, Ohio, on Feb. 24 and 25. Charles L. Henry, president of the association, presided over the sessions. On Thursday evening the first annual banquet of the association was held, with an attendance of 237 persons. Special cars to the Dayton meeting were run by the Terre Haute, Indianapolis & Eastern Traction Company from Indianapolis, Ind., by the Fort Wayne & Northern Indiana Traction Company from Fort Wayne, Ind., by the Michigan Railways from Jackson, Mich., by the Cleveland, Southwestern & Columbus Railway from Cleveland, Ohio, and by the Toledo Railways & Light Company from Toledo, Ohio.

THURSDAY MORNING SESSION

The Thursday morning session was opened with the annual address of the president, followed by the annual report of the Central Electric Traffic Association by A. L. Neereamer, chairman, and the annual report of the Central Electric Railway Accountants' Association, by F. T. Loftus, president. H. M. Waite, city manager of Dayton then addressed the association. L. C. Bradley, assistant district manager Stone and Webster, Houston, Tex., who was on the program for an address, was unavoidably prevented from being present at this meeting. Secretary Neereamer then read the minutes of the last meeting and reported sixteen new applications for membership.

Following the adjournment five special cars, furnished through the courtesy of the People's Railway, transported the entire party to the plant of the Ohmer Fare Register Company. At this point luncheon was served in the company's assembly room, following which Col. Robert Hubler introduced J. F. Ohmer who addressed the association. After outlining the advantages of Dayton and its form of government, Mr. Ohmer called attention to the employees' welfare work of his organization. Suggestions are solicited from all employees and remarkable results have been obtained. Mr. Ohmer mentioned instances where the cost to manufacture certain parts of his registers had been greatly reduced. In one instance the cost was reduced from $5.40 to $1.16, and in another from $80 to $30. Twice a year the company offers cash prizes for the best suggestions. The company also gives an annual picnic for its employees and their families. It bears the entire expense and at the same time does not deduct from the wages of the employees payment for the time spent at these picnics. The work is much appreciated by the employees.

Mr. Ohmer believed that employees' welfare work of the character illustrated in his plant should be applied to all railway organizations. He believed that the men in the ranks and not those in the official positions were best fitted to offer suggestions for the advancement of the industry. Mr. Ohmer also called attention to the slogans posted about his shop and apropos of these suggested that the conductors of all railways should have signs containing their names which could be inserted in racks where they could be seen by every one on the cars. Such signs would increase the public's respect for the conductors and at the same time impress them with the responsibility of their tasks.

President Henry commended Mr. Ohmer for his excellent suggestions and extended to him the thanks of the association for his hospitality. Following an inspection of the various departments of the fare register plant the party returned to the Miami Hotel where the association program was continued.

THURSDAY AFTERNOON SESSION

Hon. Beecher W. Waltermire, chairman of the Public Utilities Commission of Ohio, the first speaker at the afternoon session, discussed the function of the public utility commission. After calling attention to the wonderful progress made in the past fifty years, he said that these rapid strides had created new problems. He cited the instance of the candle of the past which could be bought anywhere and of which the price was governed by the laws of supply and demand. To-day the public utility furnishes that service and it is owned and operated as one company. If this utility was unregulated it could fix the quality of service and the charge for it. The same condition, he said, was also true of heat, means of communication and transportation.

Mr. Waltermire averred that some individuals contended that if they made great inventions these belonged to them to use as they pleased. He said that such a condition existed only so long as the invention was not given to the public. So it was with any service upon which the public was dependent, and this gave rise to the need for regulatory commissions. States have prescribed means of regulating these utilities but it was never intended that these means should be used to the disadvantage of the public utilities. There are certain rights which the public is justified in asserting and in turn there are certain rights which the utility can properly assert. The utility has a right to manage its property and to fix a charge for its service that will pay a fair return on the investment in the property. In maintaining a balance between these rights the function of the commission is simply that of an unbiased umpire.

Instead of creating discord a commission should bring about harmony. There was no more reason why a public should quarrel with its utility than that it should quarrel with its merchants. There cannot be progress without them, and the utilities, on the other hand, cannot prosper without the public. Differences between the public and the utilities arise from two principal causes. Either the utility is made the football of politics or it is selfish in its dealings with the public. With the advent of the utility commissions the frequency of these controversies is declining.

Mr. Waltermire emphasized the economic side of the problem by stating the laws which governed the economics of public utilities were just as fixed as any others. The pendulum swings both ways. If the public demands too much, capital becomes timid, and if the utility is arbitary it loses business. The equitable solution of the problems confronting utility commissions is only possible by approaching them with an open mind. The commission is in a position to render this service and also eliminates the delays incident to action in the courts.

In closing Mr. Waltermire said that many of the difficulties affecting public utilities were due to a lack of information. The mass of men are honest and if they know what is right they will decide justly. He believed that the reports to the commissions were in a way reports to the public and tended to bring about a better understanding.

I. W. Hershey, engineer Westinghouse Electric & Manufacturing Company, then read a paper on the electrification of the Norfolk & Western Railroad, a portion of the paper being illustrated with lantern slides. An abstract of the paper will appear in next week's issue.

REPORT OF SECRETARY-TREASURER

A. L. Neereamer, secretary-treasurer of the Central Electric Railway Association, presented at the meeting his report for the year ended Dec. 31, 1915. The cash on hand on Jan. 1, 1915, amounted to $2,802, and the receipts during the year raised the total to $9,538. After the payment of expenses there remained at the end of the year $979 of cash on deposit and $2,126 of investments. This latter amount covers twenty shares of 6 per cent stock of the Railroadmen's Building & Savings Association, amounting to $2,000, and a running account on five shares on which has been paid $126. Of the expenditures for stationery and printing, $1,086 was for the printing of tariffs, for which there was received $1,122, leaving a surplus from tariffs of $36. Besides the investments and cash on deposit, there was on Dec. 31, 1915, an amount of $112 due from members, so that the total assets of the association on this date were $3,217, with no liabilities. Mr. Neereamer said that the finances were now in the best condition since the organization of the association.

REPORT OF ACCOUNTANTS' ASSOCIATION

For the C. E. R. A. Accountants' Association F. T. Loftus, president, reported on the progress made during 1915. Among other things mentioned Mr. Loftus said that the book of proceedings was revised in January, 1915, for the year 1914, and a copy was sent to each member. The by-laws were amended to permit the secretary of the Central Electric Railway Association to be elected secretary of the Accountants' Association. They already have the same treasurer. The recommendations of the association regarding the handling of passenger and freight accounts were revised and enlarged to cover developments. The book of accounting forms was discontinued and a system of indexed filing pockets installed in its stead in order to allow an expansion, to reduce the labor of filing and to reduce the expense of shipping, when supplying members with samples of forms requested. A copy of the index to the accounting forms file was supplied to each member. Mr. Loftus suggested that other departments take advantage of the system of report-form filing and said that if forms were forwarded to the secretary and marked so as to show the department using them and the manner of use, the association would gladly donate its services in filing and indexing the forms presented.

In addition to describing the work of the association for 1915, Mr. Loftus gave a general review of its activities since its formation. He then referred to the electric railways which had entered, or were considering entering, the electric light and power field and said that already many questions had been presented as to the handling of the accounting work. To meet this demand, the committee on electric light and power accounting was formed and will endeavor to present a comprehensive system for a small business of this nature at the meeting in June, 1916.

Mr. Loftus said that one stumbling block which had stood in the way of the uniform accounting plans of the association had been its inability to enforce its plan for settlement of monthly traffic balances by bank draft. In 1910 much time and correspondence were spent in endeavoring to line up all members to the use of this method, but although most of the larger and medium sized companies had adopted it, many continued to use one or the other of four different plans. As the settlement by bank draft is by far the easiest and most satisfactory method and is in use by the majority, the association feels that if the matter were thoroughly investigated by the executive officials of the roads at fault, all would at once enter into its use and the uniformity so greatly desired in interline accounting would be secured.

REPORT OF TRAFFIC ASSOCIATION

As chairman of the Central Electric Traffic Association, Mr. Neereamer submitted a report of the work done during 1915. He gave many of the statistics presented by him at the annual meeting of the Traffic Association, published on page 210 of the issue of this paper for Jan. 29, and in conclusion referred to the plan of establishing a basis for uniform class rates, on which a committee has been working for more than two years; also to the revision being made of the exceptions to the official classification in order to comply with the decisions of the various commissions and courts. In conclusion he referred to the "intangible benefits" derived by the member companies and said that during 1915 these had been more apparent than ever before.

Annual Address of President

Charles L. Henry Discusses Progress and Needs of the Central Electric Railway Association and of the Industry at Large

AT the opening of his address President Henry referred to the flood in Dayton in 1913 and to the wonderful recuperative powers shown by the city. He then spoke of the increase in membership of the association during the past year. A year ago it represented 4166 miles of interurban railway, but this total had now grown to 4838 miles. The Detroit United, which was a member a year ago to the extent of 56 miles of its track, had now brought in its entire interurban system, an aggregate of 421 miles; the Michigan United with 377 miles had also become a member and the Louisville Interurban had joined with 92 miles of railway. The "supply" members total 127 and represent nearly all of the principal companies manufacturing or selling electric railway material within the territory.

Continuing, Mr. Henry said that the association was formed ten years ago by the union of what had theretofore been an Indiana association and an Ohio association, and its years have been years of prosperity and usefulness. In this connection he mentioned many of the important improvements for which it had been largely responsible, such as the standard code of rules, standard accounting forms and blanks, interurban equipment standards and associated traffic work, the latter including an interchangeable mileage book, improved ways of handling baggage, joint tariff rates providing for through tickets, and an interurban map. In the traffic department Mr. Henry said that perhaps the most important thing pending at this time is the preparation of a joint folder covering the time tables of all the roads within the association and giving full information regarding interline business so that prospective patrons will be able from it to learn just what they can do in traveling over the various electric lines of this territory. This work is in the hands of a special committee, which is now considering bids for its publication. It will of course take some time to complete the work, but when it is done Mr. Henry was sure that every member of the association would be proud of it.

The president also referred to the committee appointed by him to confer with and assist the committee of the American Electric Railway Association in its conferences with the National Bureau of Standards relative to the publication of a code of standards by that bureau. This committee has done valiant and useful work and Mr. Harvie, chairman of the American Association's committee has testified to the great assistance it had rendered. The speaker also referred to the successful boat trip of the association last June and to the three-day trip which the association would take in June next on the Great Lakes.

Mr. Henry then complimented the Union Traction Company of Indiana and its officers and men on their receipt of the Anthony N. Brady medal for the greatest progress made during the year in work to conserve the safety and health of the public and the company's employees. He believed this award would be an additional stimulus in safety work among all the association members. He added that statistics recently compiled by him for forty-nine of the association's interurban members showed that they had carried during 1915 94,610,290 passengers without a single fatal accident, either to passenger or employee.

The speaker then described the different fields which were occupied by the sectional and national electric railway associations and said that they did not duplicate each other's work. Moreover, there had never been the least clash between them. He also paid a tribute to the valuable assistance rendered to the Central Electric Railway Association by those representing the manufacturing and selling part of the industry. On this point he said: "We have had their co-operation from the first, and the force and importance of that co-operation has grown as the years have passed, and our ten years' experience has demonstrated that any electric railway association that does not have the manufacturing and selling part of the industry interested in its affairs and a part of its active membership is not in a position to accomplish in full measure the work to be done by such an association."

THE STATUS OF THE INDUSTRY

President Henry continued as follows: "The last few years have been very trying years to our industry, especially the interurban part thereof. Disappointments have come to the industry because the promoters and builders of interurban roads were not able to foresee the development and growth of their children and consequently could not anticipate the changes that would be necessary in the construction and equipment of such roads and the increase of expense incident to their operation. It never occurred to any one in the beginning of the industry that such expensive construction of track and roadway, or such high-priced heavy cars with the wonderful electrical equipments now in use, costing such large sums of money, would be necessary, nor did they foresee the increased expense of maintenance and operation which would necessarily follow the class of construction and the kind of equipment now demanded. They knew practically nothing at that time of automatic signals, M. C. B. couplers, hot water heaters, air brake equipments and the dozen more incidental matters, the need of which has developed year by year. Moreover, they could not have understood that within such a short period of time the cost of all material for construction or for maintenance, and the wages of trainmen employed on the cars, mechanics in the shops and help about the power houses and otherwise upon the various parts of the property, would be so largely increased in line with the increased cost of living and other expenses. All of this increase has been on the expense side, and it has been an impossibility to keep up with this increased cost and expense with the rates of fare for travel which were originally thought sufficient for interurban service; nor has it, for various reasons, been possible to make any very considerable increase in such rates of fare. Hampered by legislative restrictions and by rules of, and by rulings made by, the various public service commissions, the interurban companies have practically been held down to the original rates of fare, notwithstanding the increased cost of construction, maintenance and operation referred to. Just about this time there also came into the field a new competitor—the automobile with its high powered engine—which has taken from us a great deal of the patronage we formerly had; and in the city service the 'jitney' style of automobile has worked sad havoc in the receipts of many companies.

"All these things have caused the owners and operators of interurban and city electric lines to study every feature of the situation and to strive in every way possible to hold down the expense of maintenance and operation, and at the same time in some measure, if possible, to make good the inroads made upon their income by the automobile competition. This has been made more difficult in many ways by the now well established and general supervision of these industries by the various public service commissions of the nation and state, as well as the restrictive acts of legislatures and many burdensome provisions by city councils and other city authorities.

"It is a pleasure to me to say at this point that the Public Service Commission of Indiana has, during these trying times, taken a broad, comprehensive and officially patriotic view of the condition of the interurbans, and has sought in many ways to aid them, while, on the other hand, they have thrown very few, if any, obstacles in the way of the managers thereof. This is perhaps largely true on account of the fact that the interurbans on their part have closely and cordially co-operated with the Public Service Commission of Indiana on all questions involved in the construction, maintenance and operation of these roads, so that there has been very little friction between the commission and the electric railway companies. I understand that the commissions of the other states in which the electric railway members of this Association are located, have shown a very similar disposition, but I am not familiar enough with the details to discuss them and, therefore, confine my statement to the State in which I live.

"Nothing in recent years has come into the lives of the American people—city, town and country—that has been of more benefit to them and added more to their convenience and happiness than the interurban service, and these people, when they fully understand the questions involved in the situation, will not see that service crippled when anything they can reasonably do will prevent it. The automobile has of course come into the transportation field to stay and will continue to fill its legitimate part, but the 'fad' feature of automobile riding will gradually wear off, and the time will soon be here when a very large part of the people will cease to think of automobile rides, and the interurbans will carry their old time allotment of passengers. It will be found that we can spread and extend our passenger service in various ways, especially in long distance rides which are already being secured in satisfactory numbers by improved equipment and added service. There are other fields also for us to cultivate. We must push our service strongly in the freight and express line because there is a very large part of this business to which we are justly and fairly entitled, and which we can take care of and handle better than the steam railroads, and from it we may secure large and profitable revenue. I anticipate, therefore, that at no distant day the receipts of the interurbans will be fully up to what they ought to be. We can not expect, nor indeed ought we to expect, any large increases in the rate of fares, for it is the cheap fare of interurbans which has largely given us the field we have. No doubt the legislatures of the various states will, as they ought in the interest of steam railroads, repeal the statute which makes a minimum fare of 2 cents per mile, for it is evident to every one that the steam railroads can not perform the service demanded of them for the rate of fare they are now permitted to charge, and there are some electric railways which may be obliged to increase their fares above 2 cents per mile. We must, however, in most cases, look to increasing the amount of our patronage rather than the charge we may make for the service.

"On the other hand, with the public fully educated as to the needs of the interurbans and the difficulties they have to contend with, we may reasonably expect that many of the burdens can be removed from our shoulders. We ought not to be charged with the expense of street improvements in the villages, towns and cities; the taxes against us ought not to be over-burdensome; and the public should, and will, assist us in bringing about a change of public sentiment to the extent that false claims can not be successfully prosecuted against us growing out of accidents where no real injury or, at best, only a slight injury is suffered by the claimant.

"Let us, therefore, bend our energies to the education of the public mind so that it will be generally understood and accepted that we are acting as agents of the public, furnishing them service which they find it to their advantage to have us furnish rather than to undertake to operate the railroads themselves. With this idea fully established in the public mind, the entire situation will be changed and the public will be our friends on all proper occasions.

"This association has a great future before it; it will not live or attempt to live on its past work but will go forward along such lines as may from time to time be marked out, strengthening and fortifying the industry in all its weak places, giving constantly improved service, making our lines more popular with the traveling public, and by this means bring to our stockholders and bond holders a reasonable compensation for the money they have invested and will invest in these properties.

"I thank you, gentlemen, for the uniform support which you have given me during my administration; but for this support, I should not have been able to accomplish anything; with it, I have tried to do the best I could during the twelve months that you have permitted me to act as your president. With the adjournment of this convention, I will cease my official connection with the association, but I assure you that my interest in it will not in the least lag because I am not officially connected with you."

N. Y. E. R. A. Holds Meeting in Albany

Governor Whitman and Prominent Municipal Officials and Railway Executives Address Members on Feb. 24—Discussion on Feb. 25 Was Focussed on Shop Methods, Car Heating and Ventilation, Fare Collection and Mutual Indemnity Insurance

THE returning prosperity of the country was evidenced by the splendid attendance of about 200 members at the dinner on the evening of Feb. 24 opening the quarterly meeting of the New York Electric Railway Association. The dinner, which was held at the Ten Eyck Hotel, Albany, N. Y., was a success not only in numbers and menu but also in the list of splendid speakers whose names had been kept secret most successfully. When John J. Dempsey, president of the association, announced their Honors the Mayor of Albany, the Mayor of Troy, the Secretary of State of New York and the Governor of New York as the public's spokesmen at the gathering, the situation was not unlike that of an old-fashioned surprise party.

During the dinner J. F. Stevens, Mayor of Albany, welcomed the delegates to Albany and pledged them the freedom of the city. After the dinner the first speaker introduced was Governor Whitman, who discussed in a general way the point that the great problems confronting the State to-day are not to be solved solely by legislators and executives, but that the public must depend upon the wisdom and loyalty of the great number of men trained along all the lines of business (including the electric railway industry) that are of vital concern in the nation's life. Governor Whitman said that more dissatisfaction in regard to electric railway service would always exist in the crowded centers, but that it must not be supposed that the carriers did not have officials of the greatest fitness, actuated by the most sincere and honest motives in performing service not only for the benefit of the stockholders but also for the better welfare of the public.

Francis M. Hugo, Secretary of State, described the growth of the automobile industry and also of electrical enterprises and emphasized particularly the need of co-operation of steam railroads, electric railways and automobiles in the "preparedness" movement, as well as the necessity for a state-wide plan in regard to the elimination of grade crossings. He said that the State had not done its entire duty in this latter regard, and he made a plea for larger appropriations and more co-operation on its part to destroy the grade-crossing evil. Mr. Hugo also stated that the prosperity of public utility corporations is intimately connected with the prosperity of the communities, and he deprecated the legislative interference of past years. This, however, is now decreasing, for the public has come to a better realization of the benefits to be derived through co-operation with all the business institutions of the country, including the public service corporations.

Cornelius F. Burns, Mayor of Troy, mentioned the need of better co-operation between utilities and municipalities. Other speakers were: C. S. Sims, vice-president and general manager Delaware & Hudson Railroad, and Edward A. Maher, Jr., assistant general manager Third Avenue Railway, New York, N. Y. Mr. Sims in connection with the subject of "dinners" made a few witty remarks about some railways "eating" more than their earnings. Mr. Maher spoke of the importance of electric railways in the State as the largest taxpayers and employers of labor, and he praised the assiduity with which they are constantly studying the problem of better service to the public. He asserted that railway officials should not approach regulatory bodies with a supplicating or cringing attitude but with confidence that they will obtain what they are entitled to for their service to the riding public.

A report of the technical sessions on Feb. 25 will appear in next week's issue. Abstracts of two of the papers are presented below.

Modern Shop Methods

BY P. V. SEE

Superintendent of Car Equipment Hudson & Manhattan Railroad, New York

On the Hudson & Manhattan Railroad the average daily car mileage is 118, the average schedule speed is 17.3 m.p.h., including 1.6 stops per mile, and the schedule speed on the high-speed line is 28 m.p.h. During a day each car encounters curves amounting to forty-two complete round turns and ascends grades equivalent to an elevation of 4685 ft. The minimum radius of curves is 90 ft. and the maximum grade is 5 per cent. All cars have two-motor equipments with full automatic multiple-unit control. Six-car and seven-car trains are operated during rush hours under ninety seconds headway, being controlled with automatic signals and train stops.

Under the above conditions rigid inspection is necessary. Each inspector is paid a bonus of 25 cents per day when his equipment causes no trouble for a week or when he passes a weekly inspection test. This test is made by a man not connected with the inspection force and consists in noticing existing defects or making artificial ones on cars before they enter the inspection shop and checking afterward to determine whether or not the repairs have been made. All work done in the repair shops is checked by the inspection force, and the inspection shop is never allowed to claim that road trouble is the fault of the repair shop.

While the practice of the company is to have repairs made in the shops as far as possible, nevertheless certain classes of light repairs and train defects have to be repaired by road trouble men. A scheme of picking out the best men for this work is employed in which a train in the yard is disabled and the men are tested individually by being put upon the task of repairing it under conditions as nearly as possible like those of the road.

In inspecting the electrical jumpers used in making up trains, one Sunday every three months is devoted to jumper inspection. A jumper test train is taken over the road, stopping at each terminal long enough for the crew to collect all jumpers in the terminal. These are brought into the test train and inserted in sockets wired to the testing board. A current of 25 amp. from the heater circuit is sent through all the jumper wires connected in series, and a 10-point switch is so connected that on each point a 3-volt lamp is connected across one of the jumper wires. While current is passing the jumper is worked back and forth. Both heads are tested at the same time for grounds.

On this road the numerous sharp curves caused the end thrust of the motors to wear out the axle lining collars rapidly. Bronze shims screwed to the lining collars also wore out soon, but collars of high-grade tin babbitt wore better than the original bronze of the lining. The babbitt is cast in a dovetail groove in the collar. Wheels are shrunk on the axles, after heating with gas rings on tread and hub. After cooling the fit is tested in a press to 75 tons.

Traffic conditions on the Hudson & Manhattan Railroad do not permit the setting of control relays by test runs. Also it was desired to set the current element of the relays high to provide power to start trains on 4½-per cent grades with one-half of the cars inoperative. Hence the adjustment is made on the time element by adjustment of the air dashpots with the aid of a stop watch, the current control being set with a 5-volt generator so that the armature will just drop at 525 amp.

The practice of the company in car painting is to use forced drying. For complete repainting the steel is cleaned with the sand blast, six nozzles being operated at once. A car can be cleaned and a priming coat applied in one day. Tests have shown that a No. 16 steel sheet can be cleaned 100 times before it is worn through. After sand blasting a car receives four coats of paint, and with the accelerated drying process three coats can be applied in one day, although two is the usual number. The drying is done in a portable canvas tent by means of electric heaters (See ELECTRIC RAILWAY JOURNAL, March 20, 1915, page 584).

The car-cleaning practice of this company consists in applying paraffin oil with floated silica and then brushing with rotating window brushes driven by small electric drills. This is done once a month at a cost of about $1 per car, 12 cents being for materials and 90 cents for labor. The treatment is not injurious to paint or varnish. Whiting and water are used in cleaning interior surfaces with high-gloss enamel finish.

Heating and Ventilation of Urban Cars

BY HORACE A. ABELL

Assistant Engineer Schenectady (N. Y.) Railway

In order to determine the relative economy of different heating systems for electric railway cars in connection with a modern ventilation system, the Schenectady Railway recently conducted a series of tests on three of its cars which had 28-ft. bodies, an over-all length of 40 ft., and a seating capacity of forty. During the tests, which lasted from Jan. 3 to Feb. 8, 1916, the three cars were operated on the same city line, the operating conditions being kept as nearly the same as possible.

Of the test cars, one, No. 507, was equipped with a coal-burning heater and forced-ventilation system. Test car No. 509 was electrically heated with thermostatic control, having sixteen heating units in the body of the car, and three units in each vestibule. For these heaters, the first circuit consisted of No. 20 wire with a resistance of 13 ohms cold, and a second circuit of No. 20 wire, resistance 10 ohms cold. Test car No. 511 was electrically heated without thermostatic control but in all other respects was similar to test car No. 509. Temperatures in this car were regulated, within the limits of error of the motorman, in accordance with the railway company's system of heat signals, under which flags of different colors are displayed at several important points along the different lines to instruct the motorman as to the point of heat to be used. Thus, with an outside temperature ranging between 35 deg. and 45 deg. one point of heat is used, with an outside temperature ranging between 20 deg. and 35 deg. two points, and with an outside temperature less than 20 deg. three points.

Standing tests on the coal-burning heater on car No.

Table I.—Comparative Data Entering into Operating Costs of Different Types of Heaters

	Car No. 507. Hot-Air Heater	Car No. 509. Electric Heater with Thermostatic Control	Car No. 511. Electric Heater without Thermostatic Control
Cost of heating system installed	$131.00	$122.00	$107.00
Interest and depreciation	5% and 10%	5% and 7%	5% and6%
Weight of system complete	450 lb.	475 lb.	475 lb.
Coal consumption, per 100 car-hours	630 lb.	......	......
Power consumption, per 100 car-hours	18 kw.-hr.	849 kw.-hr.	1,064 kw.-hr.
Cost of repair and maintenance per 100 car-hours	$0.045	$0.125	$0.120

507 showed that after the stove had attained its maximum capacity, the temperature of air at the first duct opening in the hot-air line had a temperature of 238 deg., while the eighth or last duct opening gave a temperature of 167 deg., the inside air being recirculated through the stove. When outside air was forced through the stove these temperatures were lowered respectively to 222 deg. and 151 deg.

The principal sources of error encountered in conducting the tests were inaccuracies in reporting the departure and arrival of cars at the station and failure of motormen to follow the heat signals, thus making the power consumption on the car too high or too low. In a number of cases also it was found that cars were left standing in the carhouse with the trolley pole up and with the heat turned on, thus increasing the power consumption per car-hour for the heaters.

From summaries of the results obtained in the tests the accompanying Tables I and II were prepared. These are based upon the direct readings obtained in the tests. However, the inside temperature of car No. 507 was considerably higher than that found in either car No. 509 or car No. 511, because more heat units were delivered by the coal-burning outfit. If allowance is made for this fact, the average cost of energy supplied to car No. 509 should be $15.13 instead of $10.61 per 100 car-hours, as shown in the table, and for car No. 511 the corresponding figure should be $15.13 instead of $13.30.

Interior temperatures of the cars were determined from thermometers placed at four different locations: (1) Equidistant between breathing level and car ceiling; (2) at breathing level; (3) equidistant between breathing level and car floor; (4) at car floor. The readings showed that, with the coal-burning outfit on car No. 507, the average temperatures were respectively 60 deg., 61 deg., 68 deg. and 51 deg. during a period when the average outside temperature was 21 deg., and the average number of passengers in the car was twenty. On car No. 509 the temperatures at the four locations averaged respectively 53 deg., 54 deg., 53 deg. and 52 deg., and on car No. 511 the corresponding figures were 56, 53, 56 and 52. The low temperatures on car No. 509 resulted in its withdrawal from service several times during tests because of complaints of insufficient temperature by patrons, and from this it was deduced that thermostats should be so set as to maintain inside temperatures between 56 deg. and 60 deg.

Another feature of interest in connection with the tests was the discovery that, during a period of seven days when the average outside temperature was 21 deg., an average saving of 36 per cent could have been made in amount of current used by car No. 511 if the motorman had observed instructions perfectly in regard to heater operation. It was found also that the percentage of moisture in car No. 507 varied from 39 per cent to 49 per cent, in car No. 509 from 42 per cent to 52 per cent, and in car No. 511 from 52 per cent to 62 per cent.

Table II.—Operating Costs of Different Heaters on Basis of 100 Car-Hours

	Car No. 507 Coal-Burning Heater with Fan	Car No. 509. Electric Heater with Thermostatic Control	Car No. 511. Electric Heater without Thermostatic Control
Interest and depreciation	$0.391	$0.291	$0.234
Maintenance and repairs	0.045	0.125	0.120
Cost of hauling	0.329	0.347	0.347
Cost of coal	1.768	....	....
Cost of power	0.225	10.609	13.304
Labor of attendance	0.532	....	....
Total cost	$3.290	$11.372	$14.005

Table III.—Ventilation Tests on Schenectady Cars

	Cubic Feet of Air per Minute		Time required in Minutes to Effect Complete Change of Air	Number of Changes of Air per Hour
	Intake	Exhaust		
Car No. 507.—Fan stopped	559	475	4.0	15.0
Car No. 507.—Fan running	396*	367	5.6	10.7
Car No. 509	531	396	4.2	14.3
Car No. 511	475	348	4.7	12.8

Jan. 21, 1916. Weather—partly cloudy. Direction of car movement—east and west.

*Exclusive of intake by fan, amounting to 225 cu. ft. per minute. Total inflow 621 cu. ft.

In connection with the ventilation of the cars during the tests, it might be said first that authorities differ as to the volume of air necessary for good ventilation, estimates varying from 1000 cu. ft. to 3500 cu. ft. of fresh air per person per hour. Still other eminent authorities base their recommendation on a change in air in street cars from three times to six times per hour, irrespective of the number of passengers. The latter method seems to be the simplest, as it eliminates the frequent readjustment of the ventilation system. In all cases during the tests, these figures were greatly exceeded, as shown by Table III.

In each of the test cars six sets of automatic ventilators were installed on the monitor roofs. Anemometer readings were taken of the flow of air at the ventilators while the car was in service and operating at the average schedule speed. Readings were taken at ten-second intervals, and the displacement per minute was determined from the average of these.

In the results shown on Table III it should be noticed that in addition to the ventilator inflow approximately 225 cu. ft. of air per minute was forced into the car by motor-driven fans on the coal-heating units. This gives a total of practically 621 cu. ft. of fresh air forced into the car, of which 367 cu. ft. went out through the ventilators and 254 cu. ft. went out through openings around doors, windows, etc. If the amount of fresh air introduced into the car is taken as a basis, a complete change of air is shown to take place every 3.6 minutes, or 16.7 complete changes per hour. Therefore it is obvious that the equipment on car No. 507 with the motor on the coal-burning unit in operation gave the greatest number of changes of air per hour, and this indicates that a better quality of air should be found in cars using this system of heat and ventilation.

Robert S. Stewart, vice-president and general manager of the United States Motor Truck Company, Cincinnati, Ohio, a recent visitor in Louisville, prophesies that the day is not far distant when railings will be imperative in large cities where the traffic is thickest. Mr. Stewart cited the increasing number of accidents which result from the practice of pedestrians crossing the streets at places other than regular crossings. Mr. Stewart said that the construction of railings at the edges of the sidewalks, with openings at regular crossing points, ought to go far toward removing the dangers traceable in part to increasing use of automobiles.

COMMUNICATIONS

Durability of Electrically-Welded Resistance Grids

PENNSYLVANIA RAILROAD COMPANY
SUNNYSIDE ENGINE HOUSE
LONG ISLAND CITY, N. Y., Feb. 21, 1916.

To the Editors:

In reply to an inquiry regarding the life of the electrically-welded grids described in my article printed in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 12, page 322, I would report as follows:

The first electrically-welded grid was installed on one of our electric locomotives on Sept. 24, 1914, and has not shown any deterioration as yet. As stated in my article, the grids came in for rebuilding about once in eleven months before the practice of welding was begun. We have about eighty-five of these electrically-welded sets of grids in service, and as far as I can see they will last indefinitely. There is no reason why the electrically-welded parts of the grids should not last as long as the resistance parts, as the former parts have about three times the area of cross-section of any other part. The conductivity of the joints is so low that there cannot be any heating in them. THOMAS B. RAY,
Electric Locomotive Repairman.

Collection of Corrugation Data Urged

DALLAS, TEX., Feb. 17, 1916.

To the Editors:

Referring to recent letters in the JOURNAL on rail corrugation I have to take issue with Mr. McWhirter in his theory as to rigid track being the cause, and with Mr. Mullaney in his theory as to the cause being the use of rolled-steel or steel-tired wheels. My reason for so disagreeing is that I have in mind many cases where such corrugation has occurred, and is occurring, on long stretches of the so-called elastic track, ballasted on dirt and ballasted on concrete, and also on track which has never had any traffic on it but that of cast wheels.

This is merely negative testimony, it is true, and only goes to prove that either the corrugation of rail is not due to any one cause or that no one has yet found the one proved cause—if there is only one. The perplexing fact to me is that stretches of rail will be free from this defect for quite a long period of use and will then develop corrugations without any known change in traffic conditions. I have also found places where corrugations have developed in one spot, but have never spread much farther and other places where this spot has spread for blocks. In fact, from experience and from the information derived from others, rail corrugation seems like Topsy in "Uncle Tom's Cabin," "it just grows!"

I believe that we could get nearer to the actual cause, or causes, if we had more exact data from actual experiences, and this letter is to suggest that we each discard all ideas as to the cause and devote our time for a while to a complete record of the effects. The actual cause lies between the wheel and the rail, but the wheel is only a single part of a complex object—the car body, and it might be that there are matters of oscillation of truck or body that would originate the corrugating. Again, the same is true of the rail. It is part of a complex structure and either in that structure or inherent in the manufacture of the rail itself may lie the cause of corrugation.

Therefore, the data collected on this subject must be exceedingly full as well as exact. All possible causes, however seemingly remote, must be recorded, for many matters have arisen in operation where the actual cause was remote and would not have been suspected until facts developed it. It seems to me that the committee on this subject could get up a form mentioning every one of the possible causes of rail corrugation, and have every operator of a railway, where such corrugation occurs, keep his facts on this form as fast as observed and verified. Such a uniform set of observations, free from bias or prejudice, would tend to give us the true solution of this problem much sooner than will a hundred separate experiences not complete as to all possible causes and biased by preconceived theories.

H. S. COOPER.

New York State Bond Figures

NEW YORK, Feb. 23, 1916.

To the Editors:

A further analysis of the statistics for electric railways in New York State outside of New York City, published in the ELECTRIC RAILWAY JOURNAL of Feb. 12, may be of interest. They showed that the chief reasons for the decrease in net income from 149.6 per cent of the 1907 results in 1911 to only 32.5 per cent of these figures in 1915 were the large increases in taxes and interest charges. During the same period the tax accruals jumped from 162.6 per cent to 224.5 per cent and interest charges from 139.1 per cent to 211.3 per cent of the 1907 returns. This increase in interest charges is worthy of examination, lest one should think that the sole cause was the rising cost of railway capital. As a matter of fact, since 1907 the funded debt has been increasing more rapidly than the stock. On June 30, 1907, the capital stock outstanding was about 57 per cent and the funded debt about 43 per cent of the total capitalization, while on June 30, 1915, the corresponding proportions were 47 per cent for capital stock and 53 per cent for funded debt. Of the total increase of about $50,000,000 in funded debt since 1907, $28,000,000 represents roughly the liabilities of the Empire United Railways, Inc., for one-third and of the New York, Westchester & Boston Railway for two-thirds. Thus, while the increasingly large proportion of bonds helped to swell the interest charges, the large new issues mentioned had a vital effect to this end. It is probable that the tendency of interest rates since 1907 has been upward, and that a rather large proportion of the securities authorized was for the development of existing properties rather than for refunding or for entirely new enterprises, but the determination of the relative importance of these as well as the other factors must await a more intensive study of the situation. ACCOUNTANT.

The First Company Publication

VIRGINIA RAILWAY & POWER COMPANY
NORFOLK, VA., Feb. 21, 1916.

To the Editors:

I note a little paragraph in the JOURNAL for Jan. 15 in which the traction company of Sioux Falls, S. D., claims the honor of having been first in the field of company publications with their folder *On the Cars.* In this connection I would like to state that our company, which was then the Norfolk, Portsmouth & Newport News Company, about 1903 started the publication of a little weekly folder which we called *Street Railway Chat.* This has been discontinued several times for intervals of a year or two, but a little more than a year ago it was again revived and enlarged and the name changed to *Public Service Chat.*

E. C. HATHAWAY, Assistant General Manager.

American Association News

Manila Section Jubilant Over Medal Award—Section No. 9 Organized in Portland, Me., by Employees—Gen. George H. Harries Discusses Preparedness in Newark, N. J.—Five Company Membership Enrollments Made Under New Constitutional Provisions

Activities of the Company Sections

MEDAL NIGHT IN MANILA

On Jan. 4 J. H. Pardee, president of the J. G. White Management Corporation, operating managers of the local property, was the guest of honor at an open meeting of Meralco section in Manila. Five hundred persons were in attendance, the meeting being held in the roof garden on the company's building where there are accommodations for large gatherings. Walter A. Smith, newly-elected president of the section, presided.

A. E. R. A. JOINT COMPANY SECTION
TRANSPORTATION
MERALCO
LIGHT POWER
1915

MERALCO JOINT COMPANY SECTION MEDAL

C. E. Haywood, chairman of the program committee, announced the following as the winners of the medals offered by the company for the best three papers presented before the section during the past year, those by officers of the company and by J. M. Bury, winner of the association medal, being debarred from the competition: Gold medal, W. B. Calfee, night carhouse foreman, for his paper on "Personal Efficiency." Silver medal, B. H. Blaisdell, chief engineer of power plant, for his paper on "The Power Plant Department's Part." Bronze medal, Oscar Keesee, for his paper on "The Duties of a Transportation Superintendent."

Mr. Pardee then presented the association gold medal to J. M. Bury, assistant superintendent of transportation. This had been awarded to him for his paper* on "Courtesy." (See ELECTRIC RAILWAY JOURNAL, May 29, 1915.) In presenting the medal Mr. Pardee expressed the gratification of the other officers of the company and himself that the medal had gone to an employee of the Manila company, and emphasized the value of the award in view of the strong competition for it.

C. N. Duffy, vice-president, then handed Mr. Bury a check for 100 pesos, which he had agreed to give to the winner of an A. E. R. A. or N. E. L. A. company section medal. He referred to the fact that he had received the first medal, that a member of the Milwaukee section which he had helped to inaugurate had won the second, and that now a member of the Manila section had won the third medal, all of which was highly gratifying. Mr. Duffy pointed out that there were opportunities ahead of every man, and if he proved capable of embracing them he would advance.

The twelfth meeting of the section, held on Dec. 13, 1915, was a business meeting, the following officers being elected: President, Walter A. Smith, purchasing agent; vice-president, J. M. Bury; secretary, Arthur J. Grant, superintendent of lighting and power installations, and treasurer, H. P. L. Jollye, assistant auditor. William A. Seten, sales agent, was elected director for four years.

NEW SECTION ORGANIZED WITH 1.1 MEMBERS PER MILE OF TRACK

Company Section No. 9, that of the Cumberland County Light & Power Company, was organized in Portland, Me., on Feb. 19 with 122 members.

The section originated in a conference of eight men of the transportation department, two from each division, who met at the suggestion of President A. H. Ford to consider the feasibility of the formation of a section. They appointed, as temporary officers to report a plan, H. J. Bangs, conductor city division, chairman; J. F. O'Neil, clerk mechanical department, secretary, and W. W. Blake, assistant superintendent of track, treasurer. The understanding was that the section, if formed, was to be an employees' organization.

The organization meeting was attended by more than 150 men. It was addressed by E. B. Burritt, secretary of the association, H. C. Clark, editor *Aera;* H. H. Norris, ELECTRIC RAILWAY JOURNAL; Martin Schreiber,

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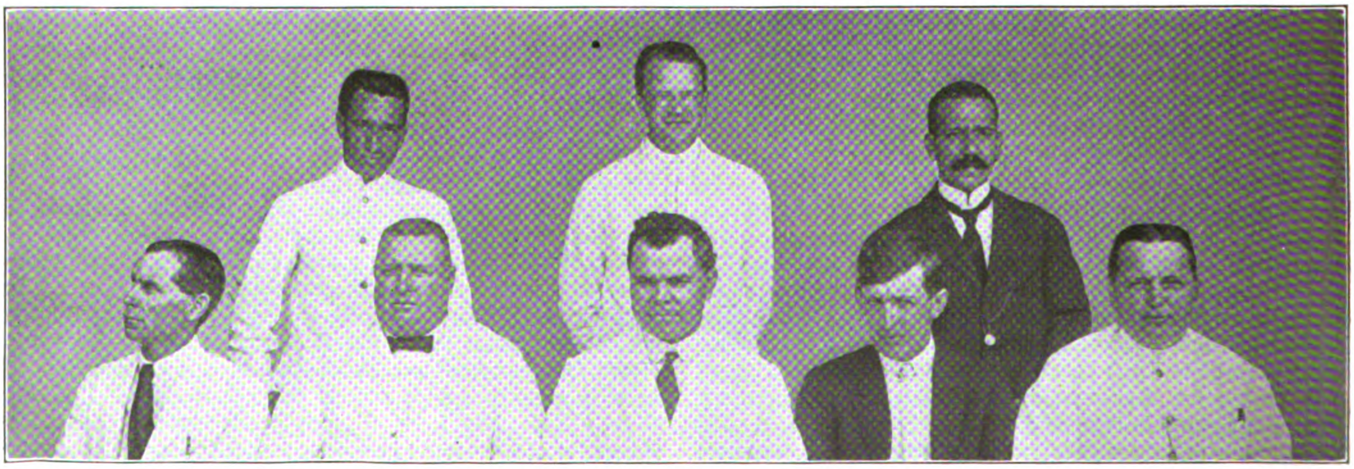
*The *Manila Daily Bulletin* of Jan. 5 printed Mr. Bury's paper in full.



OFFICERS AND DIRECTORS OF MANILA JOINT COMPANY SECTION

Seated, left to right: B. H. Blaisdell, J. M. Bury, W. A. Smith, A. J. Grant, W. A. Seten; standing, left to right: R. Lopez, J. C. Rockwell, C. M. E. Pereira.

chairman committee on company sections and individual membership; C. C. Peirce, vice-president of the Manufacturers' Association; A. H. Ford, vice-president and general manager of the company, and William H. Bradley, president. Mr. Burritt outlined the plan of presenting the section work by himself and other speakers and explained in detail the association organization. Mr. Clark traced the history and aims of the association magazine and requested co-operation in its further development. Mr. Norris gave illustrations of section meetings in the attempt to picture their spirit. Mr. Schreiber told of the work of the sections and showed what the individual member can get from his membership. Mr. Peirce, who was on home ground, gave reminiscences of the early days of the local railway, stated some of the problems of the industry and tried to stimulate his audience to a heartier co-operation in the solution of these problems. Messrs. Bradley and Ford expressed the sympathy of the management with the movement, stating that the officers have something to learn from the men and vice versa.

After the adoption of a constitution the following were elected to the positions named: F. H. Knight, superintendent of track, president; Mr. Bangs, vice-president; Mr. O'Neil, secretary; Mr. Blake, treasurer, and Richard Bennett, clerk commercial department; F. Perley Stanford, conductor Westbrook division, and Victor Brewster, motorman Deering division, directors.

PUBLIC SERVICE SECTION

A meeting of the Public Service Company section was held in Newark on Feb. 17. Two addresses were scheduled; one by Joseph Crawford, trolley inspector of the Board of Works of Newark, the other by Gen. George H. Harries, vice-president H. M. Byllesby & Company.

Mr. Crawford was a member of the "Red Special" party which went to San Francisco last fall to attend the convention of the association in that city. In his lecture he showed a number of interesting views which he took on the trip, among them the methods of marking safety zones in streets in San Francisco, of indicating the cross streets by lettering placed in the concrete curbstones, or set into the pavement near the corner, methods of indicating on the lampposts the nearest house numbers, etc.

The talk of General Harries was on "Preparedness," and the speaker described from actual experience the condition of unpreparedness which existed during the Spanish-American war in 1898. The response of the country to volunteer was prompt, but in many cases the officers and men among the volunteers were untrained. Thus, of seventeen volunteer regiments with which General Harries was acquainted, 60 per cent of the men had never fired a military rifle, and very few understood the first principles of camp hygiene. General Harries emphasized the idea that fighting was only a part, and perhaps a very small part, of a soldier's life. Under the circumstances, there is little wonder that there was great suffering and many unnecessary deaths, as patriotism by itself will not win.

General Harries then pointed out how railway men could assist in the present plans of preparedness. The American Electric Railway Association had authorized the appointment of a committee to co-operate with the War Department, and probably there will be appointed a member on that committee from each military division of the country. Practically every harbor defense along the seaboard has close to it an electric railway, and among the other things which the committee could do would be to determine the best way of utilizing these electric railways and others for the transportation of troops and supplies to these defenses, and from one defense to another, and the connections necessary between these electric roads and the nearest steam roads. It would be very desirable, he said, to have one representative of the committee in each district thoroughly conversant with the transportation situation and working through a sub-committee of transportation men, and to have the machinery of transportation, when the need came, operated by transportation men. When the plans were farther advanced the speaker promised to describe them more in detail, and he hoped for cordial co-operation on the part of the electric railroads.

Activities of the Committees

POWER DISTRIBUTION

A meeting of the Engineering Association committee on power distribution was held in Cleveland, Ohio, on Feb. 2 and 3. In attendance were C. L. Cadle, chairman; E. J. Blair, E. S. Gillette, C. R. Harte, M. J. Kehoe, C. P. Phenecie, R. H. Rice and C. F. Woods. The meeting was called for the purpose of considering sub-committee reports. Condensed minutes of the meeting follow.

A sub-committee reported that, as the national joint committee on overhead and underground line construction had not completed the pending revision of the specifications upon which it is working, nothing could be reported at the time. The revisions of the standard specifications for rubber insulated wire were being studied but no recommendations were ready, and the same was true in regard to the A. I. E. E. standardization rules.

Another sub-committee submitted a progress report on a clearance diagram for semaphore signals, stating that it had met with the joint committee on block signals on Feb. 2. On the subject of line material specifications it was stated that arrangements have been made for a meeting of associations and individuals interested in obtaining a standard for insulator pin threads. C. R. Harte represents the Engineering Association. Further specifications for overhead line material are being drawn up and data are being collected relative to possible standard specifications for high-voltage direct current and catenary construction. The latter will be submitted at the next meeting.

Other sub-committees reported progress on the collection of concrete pole data, third-rail construction data, and the proposed national electrical safety code of the National Bureau of Standards.

STANDARDS FOR CAR LOADING

This committee met in New York on Feb. 16 and arranged for the securing of additional data from member companies. Those present were S. W. Huff, chairman; E. J. Cook and W. F. Ham.

Enrollments Under Revised Constitution

Five companies have to date enrolled as members of the association under the new constitutional provision admitting other than railway companies to membership. These, in order of enrollment, are the General Electric Company, the Drew Electric & Manufacturing Company, the McGraw Publishing Company, Inc., the Westinghouse Electric & Manufacturing Company and the Aluminum Company of America.

The secretary is now beginning to send out formal invitations to companies eligible to membership.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

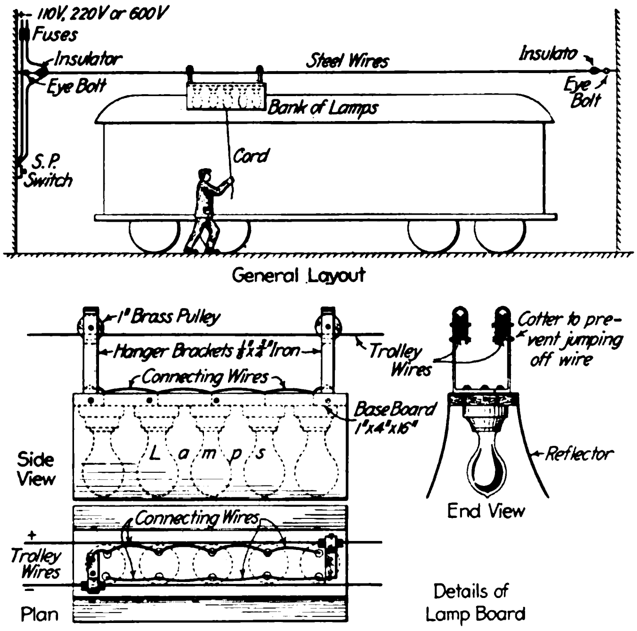
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

A Trolley Lighting Scheme for the Paint Shop

BY G. R. W. ROBERTS
General Foreman Electric Car Equipment Southern Pacific Company, Beaverton, Ore.

In order to meet the demand imposed by the short winter days for additional lighting in shops to permit painting and other work on the cars to be done to advantage, the writer has devised a movable lighting scheme of simple construction, shown in the accompanying illustration, which has proved very convenient and effective.

Two lines of steel or iron wire, steel preferred, are mounted on strain insulators and stretched tight between points on each side of the car to be worked on. One wire forms the positive lead and the other the negative lead for the lamp circuit. The voltage may be that used for the shop lighting, 110 or 220 volts, or that required for operating the trolley car, 600 volts, the lamps being wired either in parallel or series. Suspended from the two wires, which are about 4 in. apart, is a board to which the lamp sockets are screwed on the under side. The board has on top two hanger brackets with small brass pulleys, which are grooved very deep. These hanger brackets carry the current from the wires to the lamp sockets, and the wheels run on the wires from one end of the shop to the other, so that a strong light is supplied exactly where needed for painting, lettering, etc. The lamp board is pulled along the wires by means of a light cord, which hangs from it, reaching to within 5 ft. of the floor. The cord is easily reached, yet does not get in the way of anything. A switch is placed on the wall at a convenient point to control the light. A reflector on each side of the lamp board directs the light downward upon the car. In some shops it may only be necessary to run the wires on one side of the car, away from the windows, and where two tracks come together one bank of lamps will be enough to serve both tracks.



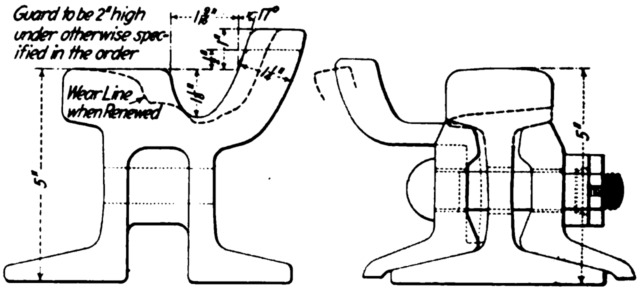
LAYOUT AND DETAILS OF PAINT-SHOP LIGHTING SYSTEM

Use of Manganese Steel in Plain Curves

BY M. BERNARD
Assistant Engineer Way and Structure Department Brooklyn Rapid Transit Company

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 20, 1915, in an article referring to car life of plain curves, data were given for two plain curves located under the Brooklyn Bridge Deck near Fulton and Tillary Streets, Brooklyn, a comparison being made between the life of manganese steel and open-hearth steel rails.

The east-bound curve in this construction was renewed on Oct. 27, 1915. It is located at the foot of a 4½ per cent grade and the middle radius is 37 ft. 7½ in. The construction consisted of a 5 in. double-web manganese steel inner rail, as shown in full lines in Fig. 1, and an 80-lb. A. S. C. E. open-hearth steel outer rail with bolted-on guard as shown in Fig. 2. This curve had been installed in April, 1909. According to our record 3,650,000 double-truck cars passed over this curve during its life. In the new curve the same construction has been retained for the inner rail. The outer rail, however, was made of manganese steel, it having been found by inspection previous to the renewal of the curve that the head of the outer rail had been worn off almost completely in a vertical direction, although the gage line had remained almost intact, due, no doubt, to the protection afforded by the inner manganese steel guard. Sections of the two rails are given in Figs. 1 and 2, and the condition described above is indicated by the lines below the head.



MANGANESE STEEL IN PLAIN CURVES—FIG. 1—INNER RAIL; FIG. 2—OUTER RAIL

This is one of the few locations on our system where the use of manganese steel construction seems to be economical. The life of the original curve containing the 70-lb. A. S. C. E. open-hearth steel, double T-rail was one year and four months. That of the curve described above was six years and six months, which is 4.87 times the life of the original curve. An analysis shows that by the use of manganese steel a saving of about $1,000 was effected. It is a coincidence that this is equal to the excess cost of the manganese steel installation over the open-hearth steel installation, the former having cost $1,600 and the latter $600. An analysis also shows that there would have been no saving if the life of the manganese steel installation had been less than three times that of the open-hearth steel construction.

Labor-Saving Gig for Distributing Long Poles

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco

The appliance shown in the accompanying cut is called a gig, and has been the means of saving the United Railroads considerable labor in the distribution of long high-tension wood poles where the haul was not too long or where the ground was unusually difficult to drive over.

The device consists of a pair of sturdy wheels 4 ft. in diameter, a 2½-in. x 2½-in. x 5-ft. 8-in. arched axle and an 11½-ft. oak pole, the pole having a short iron hook at its axle end for quickly attaching it to its load.

The method of rapidly and easily attaching the heavy pole to the gig at this hook is by means of a grapple consisting of a heavy iron ring, a shackle, two links and two sharp extra heavy hooks patterned after the metal element of a canthook and working somewhat like the well-known iceman's tongs but without the hinge, as shown in the illustration. The points of the hooks are driven into the pole by a hammer.

When the setting of tall poles is under way, the digging and raising tools are hauled to the job by a two-horse wagon and the holes are dug first. While the hole digging was in progress this team used to be idle, the pole hauling having been previously done by another and larger team. If the poles have been delivered by car, as is usually the case, in a pile at some near-by central point, they can be picked up one at a time by the use of this otherwise idle two-horse team and the gig, and distributed at the sites of the holes as fast as required by the pole setters.

The 12 to 1 leverage furnished by the 11½-ft. pole and its 11-in. distant hook enables the wagon driver, aided by one man, to readily swing the 50-ft., 60-ft. or 70-ft. pole up under the axle of the gig well clear of the ground by the tongs and to so balance it that the other end of the pole can be easily raised and fastened to the rear wagon axle. The end of the gig's pole is lashed to the load by a chain. The ice tong idea eliminates all heavy manual lifting or adjusting of slings around the heavy pole and all dragging of poles along the ground. Arriving at its proper location the pole is equally readily unloaded by the two men. By the time the day's holes are dug the poles are all delivered ready for being set.

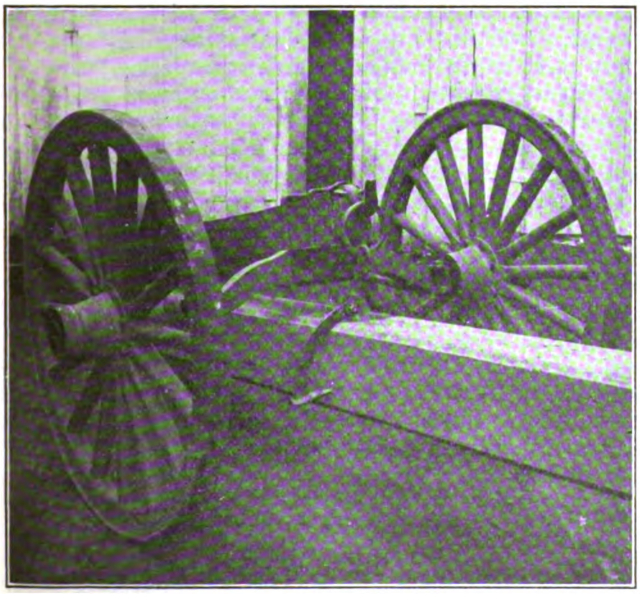
On steep side-hill work this method of distribution is preferable to the use of a large six-horse team, hauling several poles at a time and requiring the services of a big crew of men taken from the hole digging to load and unload the wagon. The wagon and gig plan carries the pole with its center of gravity below the wagon axles and close to the ground. There is less likelihood of this outfit capsizing on uneven side-hill work than when the load is above the axles as with the six-horse team method. In unloading, also, the pole is lowered such a short distance and so gradually that there is practically no danger of it being marred or broken as there is when a pole is lifted up over the wagon wheels and left to roll at random to the ground down skids. When hauling but one pole at a time there is also less liability of the wheels getting stuck in soft ground than when hauling many poles on a large wagon.

On account of complaints from blockading of exits to driveways, from people falling over poles in the dark, etc., it has been found better only to distribute poles enough for the day's work and, in some cases, only at the exact rate at which holes are completed. If a six-horse team is used to haul the poles the team is used for only a few hours and is paid for a whole day. With the gig method the poles for the day are distributed at a time when the two-horse team would be idle. While the poles are being set the team is employed in hauling away the surplus excavated material, thus being kept busy all day and eliminating altogether the need for the larger team for pole distribution.

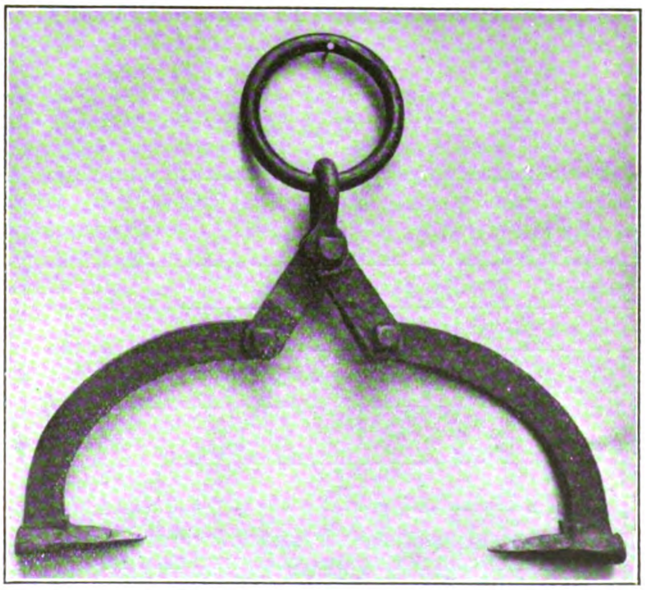
The gig has reduced the cost per pole for distribution enough to repay its cost several times over.

The pole in the illustration is only a short piece used to show the grip of the tongs, no long pole being convenient.

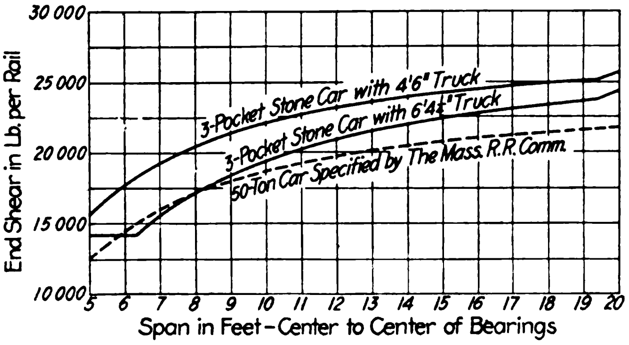
Hot floor oil as a paint substitute for the floors and platforms of the cars of the Evanston (Ill.) Railway has been found to give very satisfactory results after two years of experimentation. Hard maple floors are treated on both sides with a hot oil which does not mar or show service wear like the ordinary floor paints. In addition the oil waterproofs the floor, increases its wear life and need not be applied as often as paint.



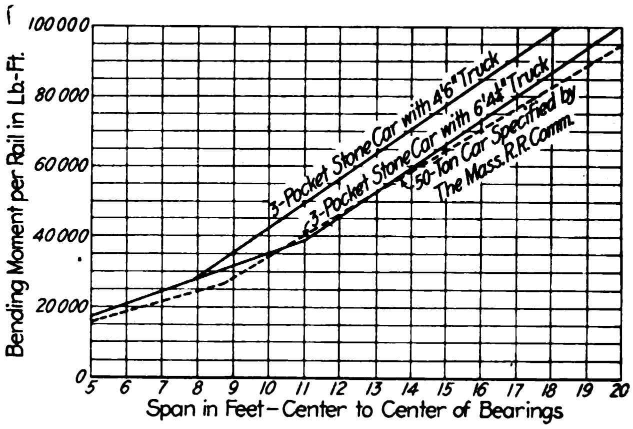
DISTRIBUTING LONG POLES—POLE IN PLACE IN GIG



DISTRIBUTING LONG POLES—POLE TONGS



COMPARATIVE SHEARING STRESSES FOR CARS OF DIFFERENT WEIGHTS AND WHEELBASE



COMPARATIVE BENDING STRESSES FOR CARS OF DIFFERENT WEIGHTS AND WHEELBASE

Connecticut Company Bridge Records

BY W. R. DUNHAM, JR.,

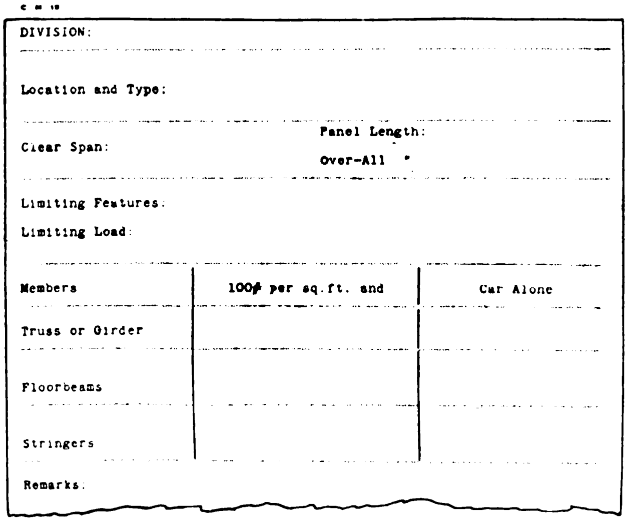
Engineer Maintenance of Way Connecticut Company, New Haven, Conn.

The Connecticut Company operates 700 miles of track, and in this mileage there are 351 bridges. These include all openings of 10-ft. span or greater and are listed and numbered by divisions, each division being indicated by the first, or first and second, numeral. For example, Bridge No. 1015 is No. 15 on Division 10.

The divisions are numbered from the westerly end of the system, which runs nearly east and west, with two branches from the east end northerly. No distinction is made in the numbers between railway bridges and highway bridges occupied by company tracks.

In 1907 the first detailed inspection of all bridges over which this company operates was made, and in considering whether to strengthen old structures or build new a type of car similar to that specified by the Massachusetts Railroad Commission was used, viz.: a car 50 ft. over all with two trucks spaced 25 ft. between centers, wheelbase 5 ft. and total load 50 tons. Bridges are being gradually strengthened for this loading. There are, however, a number which have not been strengthened. In some cases the weight of the cars operated over them does not exceed 36 tons, and as the cost is too great to warrant strengthening them for the infrequent movement of the 50-ton cars these are not allowed to be routed across the light bridges.

For handy reference a digest of this report was made and filed in a loose-leaf binder, showing division, bridge number, location, type of bridge (whether highway or railway), span, capacity of truss or girder (if a highway bridge, capacity is given with and without highway load), capacity of floor beams and stringers, limiting features, limiting load and, at the bottom of the sheet, any restraining orders issued to govern loads or operation across the bridge. This allowed one sheet, reproduced herewith, for each bridge. The digest and the diagrams referred to later were made in duplicate, one for the general manager's use and one for the engineering department. The diagrams are revised semi-annually.



DIVISION:

Location and Type:

Clear Span: Panel Length: Over-All

Limiting Features:

Limiting Load:

Members	100# per sq.ft. and	Car Alone
Truss or Girder		
Floorbeams		
Stringers		

Remarks:

BLANK FOR MAKING DIGEST OF BRIDGE INSPECTION REPORT, DIVISION BRIDGE INDEX, CLASSIFICATION BY TYPE AND LOCATION

In 1913-1914 a complete inspection of all the bridges was again made and a comprehensive report submitted. The same type of car was used for computing stresses, all other loadings being compared with these stresses. For highway bridges an assumed load of 100 lb. per square foot, in addition to the railway loading, was used.

In addition to this digest of the bridge engineer's report there is also a set of diagram sheets, two for each division, one showing the location of all bridges on that division by diagram, together with the number and a distinctive color to indicate the capacity of the bridge. The second sheet shows the bridge numbers, type and location. These diagrams enable the general manager to decide as to the bridge capacities of the various routes on all divisions.

Since there are various types of equipment in use by the company there are various loadings to be considered. All bridges are not of sufficient capacity to carry the heaviest types. By noting from the digest what particular feature limits the operation, the general manager can decide whether the expense of strengthening a certain bridge is warranted and judge the approximate cost. If the business contemplated warrants further investigation, he can ask for detailed plans and estimates. If trusses and floor beams, as well as stringers, are weak, a proposition for handling freight on a certain line might not be worth considering, as a heavy cost for strengthening would be indicated, while if stringers or floor-beam connections were the only weak features, a more careful investigation as to the cost would be made, as the cost of strengthening would probably be small. The general manager can also tell at a glance what, if any, restraining orders have been issued. Copies of restraining orders are sent to the engineering department when issued and noted on the sheets, the engineering department in turn notifying the general manager's office of the necessity for issuing such orders.

In connection with the trolley express business, in 1914 there arose the necessity for providing a service to handle broken stone, and a dump-car equipment was purchased with a capacity bringing the total load up to 54 tons. These cars were 39 ft. 6 in. over all, with truck centers 19 ft. 4 in., and wheelbase 4 ft. 6 in., and the concentrated load with this type of equipment was too great for bridges of this 50-ton class. The trusses or girders were usually of sufficient capacity, but the stringers and floor-beam connections limited the load. As the territory covered by these cars increased, the question of strengthening bridges for this type became a serious one.

A study of the situation was made, and it was shown that by increasing the wheelbase of these cars to 6 ft. 4¼ in. the moments on spans from 10 ft. to 17 ft. would follow closely the moments for the 50-ton standard car with 5 ft. wheelbase. As on most bridges the stringer spans were within these limits, whether plain stringers or between floor beams, a solution of the question seemed to be a change in the trucks. An estimate was made which showed a less cost to change the trucks of these cars, and permit operation of the heavier equipment, than to rebuild or strengthen the bridges. In fact, the cost of strengthening about twelve bridges would have exceeded the cost of the change in trucks, a saving of $8,000 in the cost of strengthening one bridge being shown.

The trucks were therefore changed and nearly all bridges which were built for the 50-ton standard can be used by the stone cars, with a gross load of 54 tons, thus increasing their radius of delivery without excessive bridge reconstruction.

Ampere-Hour Meters on the Annapolis Short Line

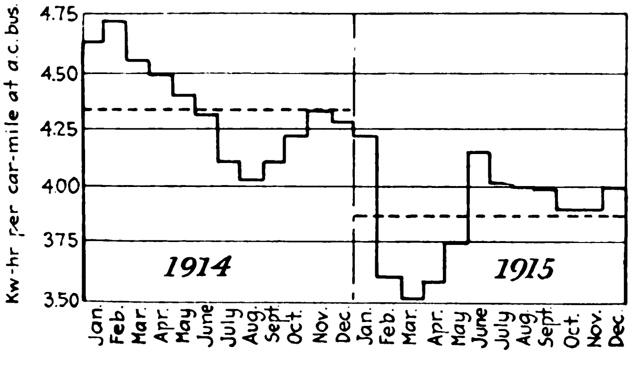
BY D. E. CROUSE

Electrical Engineer Maryland Electric Railways, Annapolis, Md.

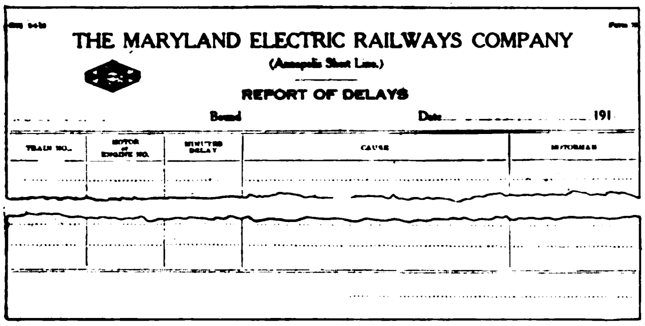
In the issue of the ELECTRIC RAILWAY JOURNAL for April 10, 1915, the installation and first two months of operation of ampere-hour meters on the Annapolis Short Line were described. As these meters have now been in operation for one year it may be of interest to note the results obtained and the conditions existing during that period. This road operates between Baltimore and Annapolis, and is under the management of Allen & Peck.

The form for the motorman's record of energy consumption as shown in the previous article now has an additional column headed "Minutes Over." The reason for considering the time element in a record which already took energy and stops into effect was that the motormen in their zeal to coast were prone to do so at the expense of schedule speed. With a schedule speed of 30.6 m.p.h. and an average of 0.35 stop per mile, any coasting which is not inherent from efficient acceleration and braking quickly indicates itself as reduced schedule speed.

After some months of operation, when it became apparent that the motorman might be coasting at the expense of running time, a careful analysis of transportation delays was made with the view to determining the time lost by abnormal coasting.



METERS ON SHORT LINE—GRAPHICAL RECORD OF UNIT ENERGY CONSUMPTION



THE MARYLAND ELECTRIC RAILWAYS COMPANY
(Annapolis Short Line.)

REPORT OF DELAYS

Bound Date 191

TRAIN NO.	MOTOR or ENGINE NO.	MINUTES DELAY	CAUSE	MOTORMAN

METERS ON SHORT LINE—DELAY FORM USEFUL IN PENALIZING FOR LOAFING

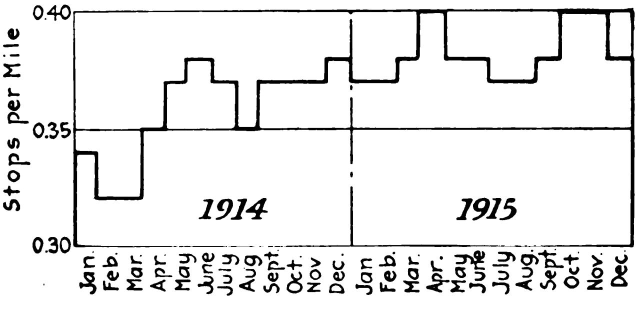
The company's form No. 7, as illustrated herewith, provides for the recording of all delays to traffic in such a manner that legitimate delays such as meeting points, waiting for targets, mechanical trouble, etc., can readily be separated from just plain loafing. The minutes lost by loafing or coasting at the expense of schedule speed are multiplied by two and added to the motorman's ampere-hour overs (see article of April 10). The average figure, which is then posted for comparison, is a composite one whose elements are time and energy based on number of stops. The men quickly became acquainted with the fact that time was a live factor in their records and the undue coasting ceased.

The graph given in one of the accompanying illustrations shows the results of coasting obtained during the past year. In this energy is given in kilowatt-hours per car-mile and stops per car-mile. The graph shows a reduction from April, 1914, to July, 1914, of 0.5 kw.-hr. per car-mile or 11 per cent. This saving was obtained by instructing the men in coasting, but without putting meters on the cars.

It will be noted that from July, 1914, until November, 1914, the energy increased 0.35 kw.-hr. per car-mile or 8 per cent. This may be attributed to the fact that there was no means of checking the records of the men and hence nothing could be done to sustain their interest.

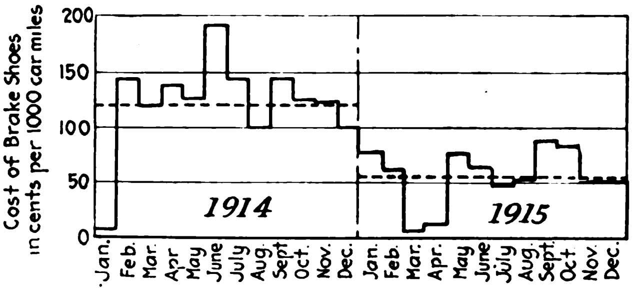
During December of that year Sangamo ampere-hour meters were installed on all cars and, as described in the April 10 issue, were run with dials painted over during the month of January, 1915. Active instruction of motormen began on Feb. 1, 1915, and the graph indicates a reduction of energy from January, 1915, to March, 1915, of 0.7 kw.-hr. per car-mile or 17 per cent. During March and April, 1915, the work which trains were doing increased and it was at this time that the investigation of time lost by coasting occurred.

It was found, however, that the major portion of time lost was due to the increased number of stops and to legitimate delays. A small amount of delay was caused



METERS ON SHORT LINE—GRAPHICAL RECORD OF STOPS PER MILE by excessive coasting during March and April, but when the time element was added to the motormen's delay record, as described above, this variety of lost time disappeared. The elimination of this abnormal coasting and the increased work caused the kilowatt-hours per car-mile to rise during April and May, 1915.

On another accompanying graph it will be noted that the work done, as indicated in stops per mile, has steadily increased since January, 1914. Therefore the saving in energy in 1915 over that for 1914 has been made in the face of increased stops.



METERS ON SHORT LINE—GRAPHICAL RECORD OF UNIT BRAKE-SHOE COST

The following table shows the energy consumption per car-mile for two years past:

Month	1914, Kilowatt-Hours per Car-Mile	1915, Kilowatt-Hours per Car-Mile
January	4.6	4.2
February	4.7	3.6
March	4.5	3.5
April	4.5	3.5
May	4.4	3.7
June	4.3	4.1
July	4.1	4.0
August	4.0	4.0
September	4.1	4.0
October	4.2	3.9
November	4.3	3.9
December	4.3	4.0
Average	4.6	3.9

The saving per car-mile was 0.47 kw.-hr. or 10.8 per cent for 1915 over 1914.

The energy saving for one year was $2,893.26, so that deducting $400, the cost of the meters and installation, there was a net saving of $2,493.26. No help was added to care for the records, the work being done by an office clerk in about one hour each day. The meters have not cost 1 cent for maintenance during the first year, but are being cleaned and inspected now in preparation for the coming year. A representative of the manufacturer visited the property and instructed one of the shop men in the method of taking care of the meters. The work is very simple and the average shop man can easily make the repairs.

The meters are placed in the cabs in plain view of the motorman, and this fact gives a means of knowing just what the energy consumption is between any two points desired.

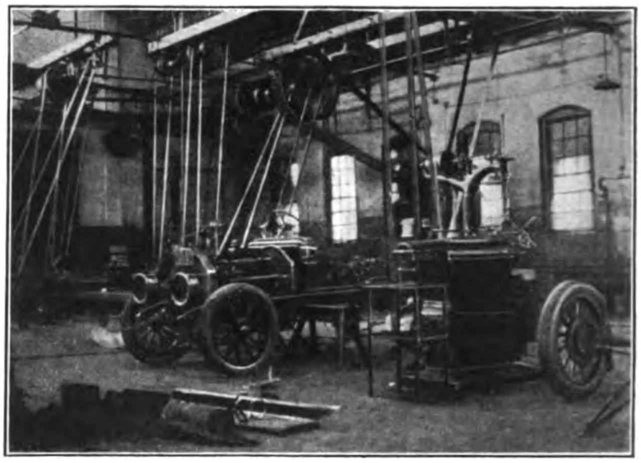
In order to show the consumption of brakeshoes during the years 1914 and 1915, a third graph has been reproduced. The high average for 1914 was caused in part by some faulty brake conditions. However, the similarity between this brakeshoe graph and the graph of energy consumption per car-mile proves that a material reduction in brakeshoe wear resulted from increased coasting. The saving indicated is about 50 per cent. Of this amount we estimate that 20 per cent is due to improvement in braking conditions, and 30 per cent to coasting. This saving would represent approximately $257 in brakeshoes. Therefore, the net saving in energy and brakeshoes for one year was $2,750.

The instruction of motormen is carried on by the assistant trainmaster, and on a road of this size does not consume a great deal of time. The record of stops is obtained from conductors' ticket reports, and these include special stops for non-revenue passengers, waiting for targets, etc.

In summing up it can be stated after one year of operation that the motormen are practically as much interested in the results as they were at the beginning, and that it has been proved that a very substantial saving can be made by coasting even with a high schedule speed. We believe that the ampere-hour meter is a very effective and economical instrument with which to check operation.

Repairing Damaged Automobiles Saves 100 Per Cent

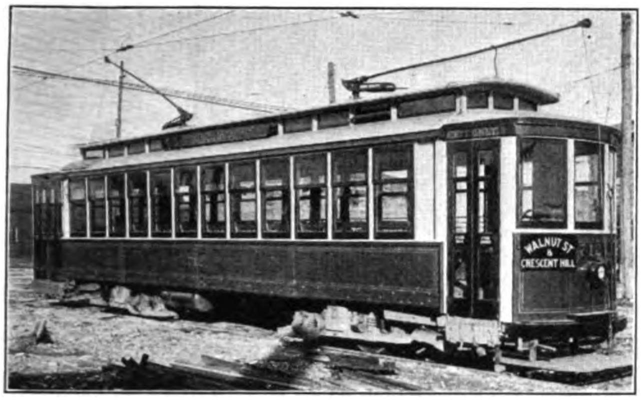
Since Jan. 1, 1916, the Memphis (Tenn.) Street Railway has repaired six privately-owned automobiles which had been damaged by its cars, and effected a saving of 100 per cent over the cost of having the same work done by others. According to the new plan all damaged automobiles are brought into the railway company's shop, where they are repaired by the regular shop force. No particular difficulty was experienced in breaking in the repairmen to do this class of work, because they had become more or less familiar with it through making repairs to the company's automobile service equipment. On the other hand, the addition of this work to that of handling car repairs has made it possible to keep more skilled mechanics on hand for other emergencies. A general view of the repair shop with an automobile undergoing repairs is shown in the accompanying illustration.



REPAIRING DAMAGED AUTOMOBILE IN MEMPHIS RAILWAY SHOP

Yellow Pine Specifications

A bulletin containing the 1915 standard specifications for grades of yellow pine lumber has been issued by the Southern Pine Association, New Orleans, La. The information and data contained in the bulletin embody substantially the specifications for yellow pine lumber recognized generally by the lumber trade for many years. Grading rules are given which classify in detail all of the recognized defects in yellow pine, such as knots, knotholes, splits, shake, wane, red, hearts, pits, rots, rotten streaks, wormholes, pitch, pitch pockets, torn grain, loosened grain, seasoning checks, sap stains, and defects in manufacturing. The bulletin also contains a thorough description, accompanied by reproductions from drawings showing the standard sizes and dimensions of yellow pine flooring, siding, partitions and ceilings.



EXTERIOR OF REBUILT SUMMER CAR

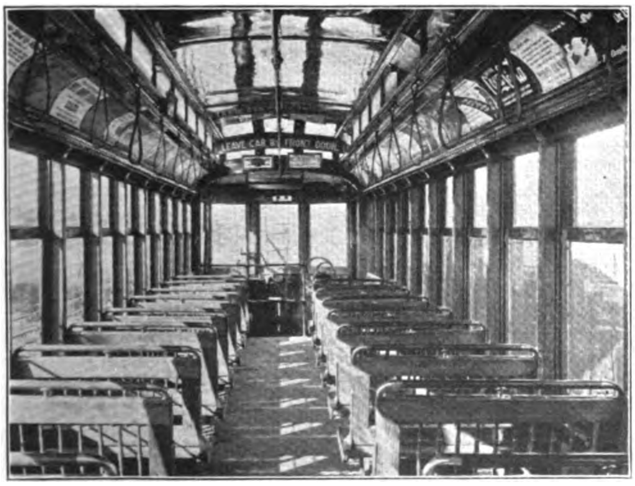
Louisville Railway Reconstructs Summer Cars for Winter Use

The Louisville (Ky.) Railway, as an experiment, has recently converted one of its open summer cars into an inclosed all-the-year-round car, the design of which has proved so satisfactory that the company will soon take steps to convert all of its summer cars in a similar manner. The experiment was made in order to utilize the idle summer equipment during the winter months, and to reduce the frequency of accidents due to persons jumping on and off the running boards of open cars while they are in motion.

The reconstructed car, which is now in operation on the Walnut Street and Crescent Hill line, was turned out at the Louisville Railway's shops at Twenty-ninth Street and Garland Avenue. It is 44 ft. long and 7 ft. 7 in. wide, the car body being 33 ft. long. It has no bulkheads. It is equipped with folding doors, differing in this detail from the company's other closed cars in that they have the safety gates. This arrangement is made necessary by the omission of bulkheads. The windows on this car raise, while the windows on the other closed cars drop. There are twelve windows on each side.

The conductor is separated from the passengers by an iron rail, and controls the entrance, rear exit and rear folding step. The folding exit door and step in the front platform are controlled by the motorman.

The converted car has a seating capacity of forty-five. The summer car seats have been utilized, there being seventeen cross-seats on each side of a 23-in. aisle, and longitudinal seats at each end, each of which seats three passengers with the exception of the one in front on the right, which seats two. The car is equipped with maximum traction trucks, and Westinghouse No. 56 motors. Gold heaters, which the company has been using for some years in its closed cars, are also used in the reconstructed cars.



INTERIOR OF REBUILT SUMMER CAR

It is estimated by John Zoll, master mechanic of the company, that with the material on hand it will be possible to convert three, and possibly four, of the summer cars a week. Thomas H. Minary, assistant to the general manager, was in charge of the work of converting the experimental car, and will direct the work of converting the remainder of the company's rolling stock.

Mechanical Joints Cost More than Welded

During the past two or three seasons the Louisville (Ky.) Railway's track department has been substituting electrically-welded joints for continuous joints and, at the same time, has effected a saving of 50 per cent exclusive of the energy charge. Standard channel splice bars were purchased with 7-in. girder grooved or standard section rail and at the same tonnage price. These plates were delivered to a machine shop, where the ends were cut to approximately a 45-deg. angle with the narrow side of the trapezoid thus formed at the top of the plate. The cuts on the two plates were made so that when they were bolted to the rail they would not come exactly opposite on the web. This was done to relieve internal strains in the web which sometimes develop when the welds of the two plates are made exactly opposite on the rail web.

Preparatory to welding the ends and the bottom of the plate along the base of the rail, the splice bars were bolted in place, just as though a mechanical joint was to be made. The plates were then welded to the web and the base of the rail, and the nuts were spot welded to the bolts. More than 1000 joints of this type have been installed and satisfactory results have been obtained in every instance. In other words, no breakages have occurred in service, although some of the joints have been in the track for more than a year. Comparative costs of the welded and bolted joints show that the former is much cheaper. The comparison which follows, is made on the basis of bolted continuous joints applied to a Lorain section 103-478, which is a 7-in. grooved girder rail.

COST OF MATERIAL AND LABOR FOR A BOLTED JOINT

One pair eight-hole patented mechanical joints complete with bolts and nutlocks	$4.75
Two 10-in. Fig. 8 copper bonds	.76
Labor applying joints	.16
Total cost	$5.69

COST OF MATERIAL AND LABOR FOR WELDED SPLICE BAR

One pair eight-hole splice bars complete with bolts	$2.07
5 lb. welding steel at 5 cents per pound	.25
Labor welding splices	.42
Labor putting up a pair of joints	.18
Total cost	$2.92

All scrap motor brushes are brought into the store room of the Louisville & Northern Railway & Lighting Company, New Albany, Ind., where they are cut to the correct sizes for various types of air compressors. A jig fitted with a hand saw is provided for this purpose, and as a result of the adoption of this practice the company has bought no new carbon brushes for its air compressors for some time. The shop storekeeper cuts up the old motor brushes during spare time, and it has been found that he can saw $3 worth of brushes for approximately 50 cents.

NEWS OF ELECTRIC RAILWAYS

SLOW PROGRESS IN NEW YORK INQUIRY

Resignation of Commission Counsel and Holiday Retard Inquiry—Suits to Establish Validity of Contracts.

The hearing before the Thompson legislative investigation committee in New York continued on Feb. 18 with Theodore P. Shonts, president of the Interborough Rapid Transit Company, as the witness. Some letters from Mr. Shonts to the late Andrew Freedman, a director of the company, were read, but brought out no new essential facts.

On Feb. 19 Mr. Shonts testified that when he told the late Gardiner M. Lane of Boston, then an Interborough director, that he wanted the contract for third-tracking and extending the elevated lines to go to John F. Stevens to pay off "certain commitments and obligations," he meant that he had committed and obligated himself to do all he could to see that the contract went to Mr. Stevens. The phrase, Mr. Shonts insisted, had no reference to the dual subway contracts. It was simply carrying out his long-established policy that, price and quality being equal, he felt at liberty to do a favor for a friend. Mr. Shonts said that he had no explanation to give as to why Mr. Lane and William A. Read resigned from the directorate of the company soon afterward or why Mr. Young was not re-elected.

On Feb. 20 Bainbridge Colby resigned as counsel to the committee, giving as his reason "the disposition of the chairman of the committee to take the examination out of the hands of counsel as soon as he apprehended its drift and to substitute unconsidered and wholly impulsive examination for that which counsel had in mind based upon a careful review of evidence in the committee's possession." The committee promptly appointed Frank Moss as chief counsel, despite the fact that Mr. Moss also is counsel for Robert Colgate Wood, formerly a member of the Public Service Commission, who is now facing trial under a charge of having solicited a bribe. This change delayed the progress of the examination and little was done on Feb. 21 in the way of direct questioning of witnesses. There was no formal session of the committee on Feb. 22, which was a holiday in New York State.

Answering certain questions put to him in an open letter by Senator Charles C. Lockwood of Brooklyn, in order to test his fitness for a public service commissionership, Travis H. Whitney, secretary of the commission, on Feb. 21 gave some interesting facts to the daily press. He denied that the bonuses paid to Theodore P. Shonts, president of the Interborough Rapid Transit Company, and Timothy S. Williams, president of the Brooklyn Rapid Transit Company, and the fees of the outside counsel employed by the Interborough were added to the subway construction account. Speaking of the Shonts bonus Mr. Whitney pointed out that under the "prior determination of cost" of the dual system, the Interborough was to receive $125,000 as an apportionment of the sum of $1,532,000 expended for salaries and expenses of its adminstrative officers during the negotiations. It might be, said Mr. Whitney, that this allowance was paid by the Interborough as a bonus to Mr. Shonts, but the commission did not know of it or even that Mr. Shonts was to get a bonus. It did not affect the apportionment to the company. Mr. Whitney knew nothing about the $100,000 voted to Colonel Williams.

In relation to the injunction suit brought by the Admiral Realty Company against the city, which now appears to have been financially assisted by the Interborough, Mr. Whitney said that the connection of the Interborough was suspected in the same way as it was supposed that the Brooklyn Rapid Transit Company instigated the similar Ryan suit. He pointed out, however, that these were consolidated with the J. J. Hopper suit presented by Clarence J. Shearn, and that that was undoubtedly a bona fide litigation. The payments to the counsel representing the Admiral Realty Company, Mr. Whitney asserted, would be charged in no way against the cost of construction of the new subways.

So he also denied that any heavy legal expenses were to be charged by the Interborough against the contract. Its account for lawyers during several years of negotiation amounted to $65,000, and did not include the fees to Francis Lynde Stetson, Morgan J. O'Brien, Winthrop & Stimson, Untermyer & Marshall and Hays, Hershfield & Wolf.

After asserting that the evidence before the Thompson committee showed that the accounts of the traction companies were looked into with great strictness by the commission, Mr. Whitney, replying to questions concerning the Fourth Avenue subway signal contract, said his part in its negotiation as secretary was only in conferences. As it was handled directly by the commissioner, the counsel and chief engineer, he had officially no right to approve or disapprove of it. Mr. Whitney did not approve of the method followed in awarding that contract. In the same way Mr. Whitney asserted that he did not approve the letting of the contracts for the third-tracking of the Manhattan elevated lines on the percentage basis. As for the Brooklyn third-tracking, he said his views were so favorable to the plan put forward the committee of 100 had printed and distributed what was known as the Whitney-Harkness report against the Fulton Street third tracks.

On Feb. 23 the committee again went into the three taxpayers' suits referred to by Mr. Whitney in his statement. The same legal point was involved in all of these suits and for convenience they were consolidated. The point at issue in the suits was whether the city had a right to become a partner in a private enterprise. The case went from the Supreme Court to the Appellate Division and to the Court of Appeals. It has already been established that J. P. Morgan & Company refused to finance the Interborough Rapid Transit Company in carrying out the subway contracts until the courts had passed upon their validity. Earlier in the day Bainbridge Colby, former counsel to the committee, went on the stand and said he had received a message from George W. Young, former Interborough director, who was on his way to Palm Beach, Fla., and that Mr. Young had expressed his willingness to return at any time and go before the committee. Senator Thompson sent word asking him to appear on Feb. 26.

PRESIDENT KING TALKS ON CONSOLIDATION

Employing the text "Let's Talk It Over and Be Fair About It," Clarence P. King, president of the Washington Railway & Electric Company, Washington, D. C., in an informal talk on Feb. 19, before the Federation of Citizens' Associations on public utility questions, sounded the keynote of a campaign to be immediately launched by that body for greater co-operation between citizens and the utility corporations in improving the services furnished by them.

Mr. King referred briefly to some of the methods that might be employed for relieving congestion on the traction lines. Abolishment of compulsory fire stops, establishment of skip stops during the rush hours, readjustment of express service and other features were touched upon. Most significant of his statements, however, was the declaration that the basis of future development of Washington's street railway lines must be the consolidation of all the traction lines and the electric power company operating in the District. He declared that consolidation offered the only means of financing extensions and rearranging trackage so as to meet the traffic problems of the future. Mr. King stated that the consolidation project had been recommended to Congress by a former board of commissioners, and that it offered the only feasible solution of the vital problems of the local traction situation.

The committee, by a unanimous vote, was instructed to confer not only with Mr. King, but with the heads of other local public service corporations, and to submit a program of co-operation which, if popularly subscribed to, will lead to improvements in service that ordinarily would be sought by administrative and legislative means.

BEMIS DALLAS REPORT PRESENTED

Complete Report Not Yet Ready—Summary of New Franchise Provisions—Utilities Consider Proposed Terms Unreasonable

Recommendations for the solution of the traction and electric lighting situation in the city of Dallas, Tex., were filed with the Board of City Commissioners on Saturday, Feb. 19, by Edward W. Bemis, economist and public utility expert, who had been employed by the city to analyze the situation and present recommendations for a new ordinance and new franchises to the traction and electric lighting companies. The report was promptly adopted by the Board of City Commissioners and the proposed franchises were as promptly rejected by Stone & Webster, owners of the properties. Stone & Webster were represented during the negotiations by Russell Robb, a partner in the firm, who has been in Dallas from Boston for several weeks studying the situation and giving information to Mr. Bemis.

Following rejection of the "model franchise," proposed as a result of the investigations conducted by Mr. Bemis, it was announced by the administration that a charter amendment embodying the adoption of the franchise would be submitted to a vote of the people at the city election on April 4, that the city would seek to condemn the present Stone & Webster franchises if the company does not change its mind and adopt the franchise offered, and that the franchise then would be granted to some other corporation. The franchise proposed embodied the following ideas:

The street railways east of the river should be capitalized at $3,500,000, upon which the company would be allowed to earn a maximum of 6 per cent net per annum.

The electric lighting property should be capitalized at $3,600,000, upon which the company would be allowed to earn 7 per cent net annually, maximum.

Electric light rates should be reduced to a figure not determined definitely, but which would not be more than 8 cents per kilowatt-hour as against 10 cents per kilowatt-hour, as at present.

All revenues above operating expenses and allowed net earnings should be devoted to reduction in fares and light rates.

Complete rehabilitation of the street car lines and the electric light plant and extensions of service of both.

The franchise to be determinate for ten years only. After that period the city either would have the right to take over for itself or some corporation offering better terms both the street railway and lighting systems, upon payment of a stipulated sum.

Appointment of a public supervisor to represent both the interests of the investors in the properties and of the citizens of Dallas, the supervisor to have jurisdiction in ordering improvement of service and equipment.

Arbitration of differences between the public utilities company and the city.

The proposals were rejected by Stone & Webster on the ground that the capitalization and rate of income proposed are both too low. They claimed a value of $5,000,000 each on the light plant and the traction lines east of the river, an aggregate of $10,000,000, and wanted to be allowed to earn 8 per cent upon this capitalization. Last year the light plant cleared $520,000, a return of more than 10 per cent of its value as figured by Stone & Webster. The street railway system was operated at a profit in 1914, but not last year because of the operation of the jitneys. As a general proposition, from year to year, it has not paid large returns.

Allowing the earning rates of 6 per cent and 7 per cent respectively for the street railways and lighting systems, the model ordinance would provide that the earnings would be cumulative not to exceed 1 per cent in any one year. That is, if the street railway company, for example, should earn only 3 per cent one year and 9 per cent the next, it could make up but 1 per cent of the first year's deficit out of the surplus of the second year. There would be provided under the model franchise, however, an interest fund of $150,000 for each utility. When this fund grew to as much as $200,000, rates automatically would go down. When the fund sank to less than $100,000 they would go up.

To start with, street cars would be allowed a 5-cent cash fare, as the second step in reduction they would sell six tickets for 25 cents, with a universal transfer. The rate would not be changed in less than three years in order to provide funds for building up the plant and improving service. The next steps in fare reduction would work automatically. As profits of the company increased, rates would go down. If profits decreased rates would go up. But always there would be the universal transfer feature.

A formal report has not been filed yet by Mr. Bemis. He worked out the valuations and turned them over to the board at once, and his typewritten report will be submitted within ten days.

City Attorney Charles F. O'Donnell will begin at once to draft the proposed charter amendment and also the franchise ordinance which the board seeks to have accepted.

Following the conference with the Board of City Commissioners and the formal rejection of the proposition submitted by the city on the report of Mr. Bemis, Charles F. Wallace, president of the Dallas Electric Light & Power Company, gave out a statement in part as follows:

"The total actual investment in the street railways as of Sept. 30, 1915, the date to which the examination of Mr. Bemis extended, was $5,300,000. Mr. Bemis proposes that these properties be valued at $3,500,000, a loss to investors of $1,800,000, and that earnings be limited to 6 per cent on this reduced valuation.

"The total actual investment in the lighting company property as of the same date was $4,400,000. Mr. Bemis proposes a valuation on this property of $3,500,000, a loss to investors of $900,000, and that the return on this reduced valuation be limited to 7 per cent.

"The city's plan would require the railway companies to make an additional investment for additions, extensions and improvements of about $750,000, and would require the lighting company to make an additional investment of about $1,500,000, including the completion of the underground work. The companies would be willing to make these improvements if placed in a position to finance them.

"The city further proposed a reduction in street railway fares which would cost, according to the companies' estimates, a loss in earnings of 12 per cent to 15 per cent. This reduction, if applied to the year 1915 gross earnings on the basis of 12 per cent would have left only $29,444 with which to take care of interest, dividends and depreciation, after paying ordinary operating expenses and maintenance, or less than 1 per cent even at Mr. Bemis' valuation.

"Under the proposed plan, therefore, the owners of these properties would have available as a return on their existing total investment of $9,700,000, and as a basis for financing the additions and improvements required by the city, only the allowed earnings from the lighting company of 7 per cent on $3,500,000. The impossibility of raising money under these conditions is apparent.

"In other words, the situation, difficult as it has been in the past, would be impossible for the future, and the companies were compelled to state frankly to the Board of Commissioners that the plan proposed would mean ruin to the properties, serious loss to the investors and disappointment to the citizens of Dallas. It is impossible for the companies to work out the situation or to improve it under the proposed plan."

CHICAGO TRACTION COMMISSION HOLDS HEARINGS

General information concerning the Chicago traction situation is being obtained by the new Chicago Traction & Subway Commission through public hearings. Three hearings were held during the week beginning Feb. 13, and others will be held later. Civic organizations, clubs and others interested in the betterment of Chicago's local transportation facilities were invited to these meetings to express themselves concerning local transportation questions. At one of the meetings the attorney for the Cook County Real Estate Board stated that the payment of 55 per cent of the net earnings of the street railways to the city was undesirable. A more satisfactory plan would be to spend this money for improving service. Henry M. Brinckerhoff has been appointed chief engineer of the commission as noted on page 426 of this issue.

ANOTHER RAPID TRANSIT PROPOSAL IN CINCINNATI

M. E. Springer, an engineer at Cincinnati, Ohio, on Feb. 9 made public a comprehensive plan for a combination steam and electric belt line about that city and union stations for steam and interurban roads. The proposed belt line would touch all the industrial districts and most of the residence suburbs, circling the city somewhat similarly to the proposed municipal loop. The union station for the steam roads would be located at Court, Plum and Canal Streets, with the interurban terminal just to the south of it and separate terminal conveniences for steam and interurban roads. The plan will soon be presented to the various railroads for their consideration.

E. W. Edwards, chairman of the rapid transit commission, said on Feb. 10 that the plan seemed good for the entrance of the railroads, especially those from the West, but he doubted the feasibility of electrifying any portion of the terminals and the joint terminals. He advised that this plan and that of the municipal loop be kept separate, so that there will be no confusion when the people are called upon to decide the question of a bond issue in April. On the other hand, William Rheel, president of the Cincinnati Real Estate Exchange, favored the plan because the people would not be called upon to finance the construction through a bond issue.

The street railway committee of the City Council considered on Feb. 11 the franchise asked by the West End Rapid Transit Company. Residents of Price Hill, who objected to the grant on the ground that it might prevent their securing an elevated structure in the future, were asked to submit a plan considered satisfactory to them.

KANSAS CITY COMPANY STATES ITS PURPOSES

New Company in Kansas City Issues Through Its President Statement to the Public

Philip J. Kealy, president of the Kansas City (Mo.) Railways, on Feb. 15 issued a statement to the people of Kansas City, outlining the policy of the company, indicating the partnership of the city in the street railway, and suggesting the mutual advantage of co-operation for the best service. The statement follows in part:

"Ownership of the street railway lines passed to the Kansas City Railways Company to-day. Under the ordinance of July 7, 1914, this company takes charge with the city as partner. It means a new order in Kansas City street railway affairs, built upon the recognition of mutual interests of the city and the company in the operation of the company. There will be no dodging of issues, no quibbling over demands or orders of the Missouri or the Kansas Public Service Commissions as to service.

"To that end as rapid and as adequate schedules as it is possible to maintain will be inaugurated, particularly during the rush hours. This means more cars. Additional cars of the type recently installed will be placed in service as rapidly as possible. Improved power equipment will be procured.

"Every pledge or agreement contained in the ordinance will be kept. Political influence will not be resorted to in an attempt to secure concessions or to escape the fulfillment of contractual obligations. This institution will not be a political institution. It has no place in politics. Its interest lies wholly in the upbuilding of Kansas City. As the city expands, so is it planned to expand the railway system.

"Of that which is history in street railway affairs this new company had naught to do. Situations arose upon which men justly agreed and disagreed. But they are of the past. Surely, resentment because of them cannot be cherished against the incoming management. Such conditions shall not arise under the present control, which will regard every person in Kansas City as friendly and refuse to believe otherwise until the contrary has been proved.

"The management wants the co-operation of the press, the business interests through the Commercial Club, the Police Department and the people as a whole in an effort to make the Kansas City street railway system the best in the land. As time goes on this co-operation will be sought in more detailed ways."

BUS SERVICE ESTABLISHED IN NEW ROCHELLE

Motor-bus operation at a 5-cent fare in New Rochelle, N. Y., began on Saturday, Feb. 19, this being the first bus line introduced under the provisions of the Thompson bill in the State of New York as outlined in the ELECTRIC RAILWAY JOURNAL for Oct. 30, 1915, page 929. Four buses are in service on two routes which are partly competitive with parallel lines of the local electric railway company, and a ten-minute service on regular schedule is given from 7 a. m. to 1.30 a. m. The buses seat about fifteen passengers on longitudinal seats, and are provided with front entrances, having folding doors that are operated by the driver. The pay-as-you-enter system of fare collection is employed and non-registering fare boxes are used. A novelty appears in the change-making system. Each driver is provided with a number of small envelopes containing change for dimes and quarters, and one or more of these is handed to any entering passenger who offers such a coin in payment for his fare.

As yet the service is very lightly patronized, but this is no doubt due to the lack of general knowledge that the buses are finally in service, the commencement of operations having been very much delayed beyond the time originally set. On the other hand, complaints have already been made regarding the great height of the bus floors, the extreme swaying and jouncing of the light body, and the discomfort of the narrow longitudinal seats. Nevertheless, the opening of the service meets with great favor by residents along certain portions of the route that are at considerable distances from the electric railway line. Some of them state that the bus service saves them as much as fifteen minutes in their daily trips to and from the railroad station, the bus routes passing through districts occupied altogether by commuters who travel daily to New York City, of which New Rochelle is really a suburb. Both routes pass gasoline filling stations on which are prominently displayed signs reading, "Gasoline 24 cents," and this may be acting as a deterrent among patrons, to some of whom the privilege has been extended of subscribing at par to the stock of the company.

CLEVELAND COMMISSIONER OPPOSED TO STOPPING INTERURBANS AT CITY LIMITS

Fielder Sanders, street railway commissioner of Cleveland, Ohio, has reported to the Council of Cleveland in accordance with the resolution on the advisability of the Council taking steps to cause interurban cars to terminate at the city limits. Mr. Sanders said in part:

"In my judgment such action would be wholly inadvisable. It is a matter of common knowledge that the interurban railway system has been of tremendous advantage in building up the city of Cleveland and the suburbs surrounding. I know of no cities in the United States with the exception of Cincinnati and Chicago in which interurban cars are not permitted to come to the center of the business district. In Cincinnati, four lines stop at the city limits, but only because of the fact that those lines have a different track gage from the city tracks, and a movement is now on foot in Cincinnati to devise plans for an interurban central terminal station.

"To forbid the entrance of the interurbans would restrict the growth of the city and the growth of its business, by making ingress necessarily more difficult. In the same way it would restrict egress both of strangers and citizens, making it difficult to know what city car connects with the interurban car that the traveler wishes to get at the city limits.

"It would, in my mind, have an inevitable tendency to keep people out of the city by effectively erecting a wall around the town. The chief drawback to the present system is the fact that all the interurbans converge in the Public Square and cause at times great congestion and very frequently interrupt the ordinary operation of the city system. This drawback may, however, be obviated either by rerouteing the suburban cars, or, which is the more logical way of solving the problem, by the interurban car lines joining and coming into Cleveland by private right-of-way to a central terminal as is done at Indianapolis. The Council should not take the steps contemplated by this resolution."

TRAFFIC COMMISSION FOR TORONTO

On Feb. 7 the Council of Toronto, Ont., approved the principle of the appointment of a traffic commission, which should have absolute control of all transportation matters within the city limits. On Feb. 10 City Solicitor Johnston advised the Board of Control that special legislation or the consent of the people would have to be secured before the proposed commission could even supervise the working of the civic car lines. Mr. Johnston said that under the provisions of the public utilities act the consent of the people must be obtained before a municipal body could delegate its powers to a subordinate organization. Mayor Church said that while the city solicitor was correct in his interpretation of the law, there was nothing to prevent the city making application to the Legislature for an amendment to the act to enable it to appoint a commission and to confer upon the commissioners all the powers now enjoyed by the municipality. He said that it was essential if the city was to be developed that it should own and control the means of transportation.

CIVIC FEDERATION PRESENTS MINIMUM WAGE REPORT

A year ago the minimum wage commission of the National Civic Federation entered upon an inquiry into the minimum wage question. The commission inquired into conditions in the eleven states in the country where such laws already are in force. It has just completed its investigation and it recommends:

1. That Congress pass a resolution directing a joint investigation by the Department of Labor and the Department of Commerce, which shall be provided with money enough to make the inquiry a thorough one.

2. That some means be devised for determining what is a fair day's work before standards be set up for a fair day's pay. At present, the commission finds there is no knowing what a fair day's work is. Some unbiased, unprejudiced agency, therefore, is recommended that will enable the employer to know what "he is to get" for his money and what the employee "will have to give."

CINCINNATI BELT LINE PLANS PRESENTED

M. E. Springer formally presented his combined steam and electric belt line plans to the Rapid Transit Company of Cincinnati, Ohio, on Feb. 18. He explained the advantages he believes the plan has over the proposed municipal loop. The main idea is that in combining the two on the same route, he will not only give the interurban railways an entrance to the business section of the city, but in addition will furnish a commercial belt line for the steam roads that will be invaluable in the development of the manufacturing and wholesale business of the city.

Members of the commission questioned Mr. Springer closely on a number of points. Mayor Puchta said he would not favor placing anything in the way of the bond issue that is to be placed before the people in April, but if the Springer plan has special merit it can be taken up afterward. Further conferences are to be held, at which engineers representing Mr. Springer, the railroads and the Rapid Transit Commission will be present.

CLEVELAND TRACK CONSTRUCTION APPROVED

The Council of Cleveland, Ohio, on Feb. 21 acted favorably on the Cleveland Railway's application for authority to relay tracks on Cedar Avenue and Broadway and make other track improvements, all at an estimated cost of $905,427. Fielder Sanders, street railway commissioner, outlined the position of his department. He said that he will strive to reduce the present fare. He said further that his force will be detailed to learn the cause of the deficit of $590,000 in the company's maintenance fund.

M. F. Bramley became plaintiff on Feb. 19 in a second suit to prevent the construction of subway approaches to the new Detroit-Superior bridge across the Cuyahoga River. He seeks to enjoin the city officials from entering into a contract that will give the county the right to tear up the city streets.

WAGE INCREASE GRANTED IN DETROIT

A new wage agreement has been entered into between the Detroit (Mich.) United Railway and its motormen and conductors, following a series of conferences attended by officials of the company and representatives of the street car men's associations. The new agreement, which was accepted by the men at a union meeting on Saturday night, Feb. 19, provides for a substantial increase in pay to the employees on both the city and the interurban lines of the system. It is estimated that the increase will cost the company more than $250,000 yearly. It will affect about 3000 employees.

The agreement provides that all men now paid 25 cents an hour shall be paid 27½ cents an hour, and at the end of a probationary period of three months shall be advanced to 32½ cents an hour. All men now paid 30 cents an hour shall be paid 32 cents an hour, and at the end of nine months 35 cents an hour. All men now paid 32 cents an hour shall be increased to the maximum rate of 35 cents an hour. All men entering the service after Feb. 16 shall be paid: First six months, 27½ cents an hour; next twelve months, 32½ cents an hour; thereafter, 35 cents an hour.

Under the new arrangement passenger car men are privileged to apply for freight, milk, express and mail runs when vacancies exist, assignment to be according to seniority.

Short Norfolk & Western Electric Extension Proposed.—Plans for an extension of the Norfolk & Western electric zone have been authorized, the new electrified track reaching the town of Pocahontas, west of Nemours on the present electrified section of the main line. The extension will cover approximately 3 route miles.

Question as to What Constitutes Construction.—Mayor Harry E. Davis of Cleveland, Ohio, has asked the director of law for a ruling as to whether the relocation of water mains for a short distance in Euclid Avenue constitutes an act of beginning work on the proposed subway by the Cleveland Rapid Transit Railway.

Commissioner Sanders Plans for Relief from Congestion.—At a meeting with several members of Council recently, Fielder Sanders, street railway commissioner of Cleveland, Ohio, suggested as a means of relieving congestion in the Public Square four-track loops, overhead pasageways to the tracks and loading platforms between the tracks. Mr. Sanders advanced this plan as a temporary measure until underground terminals can be built, but it would undoubtedly meet with opposition from many Councilmen as well as the city plan commission, because of the appearance it would give the square.

Reduction in Cleveland Valuation Refused.—The Ohio State Tax Commission, on Feb. 16, refused to reduce the valuation of real estate used in the operation of the Cleveland Railway from the figures fixed by former County Tax Commissioners Fackler and Agnew. For the year 1915 the commissioners added $308,000 over the previous year, making the value $1,280,000. They did, however, allow a reduction on the real estate not used in the operation of the road. Officials of the company contended that the increased valuation on its property is not fair, because three utility corporations are the only interests affected, the commissioners having failed to complete a general revaluation of all city property.

Detroiters Urged to Buy Stock.—The stock of the Detroit (Mich.) United Railway has been listed on the Detroit Stock Exchange. Under the caption "How to Become a D. U. R. Stockholder; Buy a Share of Stock" *Electric Railway Service*, published by the railway, said in its issue of Feb. 18: "The Detroit United Railway is owned by its stockholders. These stockholders live in Detroit, New York, Montreal—in fact, they are scattered pretty well over the face of the earth—just as are the stockholders of other large institutions. Any person can become a stockholder and part owner of these properties on purchasing one or more shares of stock. You can purchase a share of stock of the Detroit United Railway just as easily as you can purchase a bushel of potatoes at the corner grocery."

Work on Philadelphia Subway and Elevated to Be Rushed.—William S. Twining, newly appointed director of transit of the city of Philadelphia, Pa., has given out the following statement in reference to the work now being done by the city: "Satisfactory progress is being made upon the City Hall station section of the Broad Street subway. Thirty-six per cent of the work on the column foundations for the Frankford elevated, from Callowhill to Unity Streets, has been completed and the erection of the steel structure is expected to be started about April 1. Contracts have been executed, with the approval of the Public Service Commission, for the foundations and steel superstructure of the Frankford elevated through the business section of Frankford, Unity Street to Dyre street."

Pacific Claim Agents' Index Bureau Elects Officers.—At a meeting of the board of directors and members of the Pacific Claim Agents' Index Bureau held at Portland, Ore., on Feb. 12, the bureau elected B. F. Boynton, claim agent of the Portland Railway, Light & Power Company, Portland, Ore., president; J. S. Mills, claim agent of the San Francisco-Oakland Terminal Railways, Oakland, Cal., first vice-president; H. G. Winsor, claim agent of the Tacoma Railway & Power Company, Tacoma, Wash., second vice-president; H. K. Relf, claim agent of the Spokane, Portland & Seattle Railway, Portland, Ore., treasurer. The election of all officers, except the president, is to take effect on April 1. The election of the president took effect immediately. The oragnization has decided to move the index bureau to Portland, Ore., to be permanently located there.

Report on M. I. T. Traffic Research Department.—A reference to the electric railways traffic research department of the Massachusetts Institute of Technology appears in the report of the president of the institute, just issued. It is contained in the statement of the electrical engineering department, contributed by Prof. Dugald C. Jackson, and says: "The electric railway traffic research has been continued in the investigation of changes in receipts, expenses, investment, rate of return, and other factors for a number of street railway companies since the time of their electrification. By gathering a large amount of statistical data of this sort, it is hoped that it will be possible to trace the effects of important changes in operating conditions, and the effect of growth of population and suburban extension of cities upon the finances of the street railway companies in question." The expenses of the department during the past year are shown to have been $2,192.89.

Fort Smith Voters Ratify Bridge Contract.—At a special election held in Fort Smith, Ark., on Feb. 8 the voters of the city ratified the contract made between the Free Bridge Commission and the Fort Smith Light & Traction Company covering the operation of cars across the bridge over the Arkansas River between Fort Smith and Van Buren. The company agrees to charge a cash fare of 10 cents from any point in Fort Smith to any point in Van Buren, with transfer privileges in either city, and to sell tickets in books of sixteen, eight and four, at $1, 50 cents and 25 cents respectively. The company also agrees to keep tickets on sale at not less than five places in Van Buren and not less than ten places in Fort Smith. The company is to pay to the Bridge Commission of the Fort Smith and Van Buren district 5 cents out of each 10-cent fare paid and 1¼ cents on each ticket. These payments are to be made in full compensation for the use of the bridge and its approaches by the company.

Harbor Commission Promises a Ferry Loop for San Francisco Municipal Cars.—Following the signing of a permanent injunction prohibiting "C" and "D" cars of the municipal railway lines in San Francisco, Cal., from using the ferry loop, a petition was taken before the Board of Harbor Commissioners by representatives of the Municipal Railways, requesting permission to construct and maintain upon the Embarcadero a third loop over which municipal cars might be operated, or if in the opinion of the board an additional loop would interfere with traffic, that the permit under which the United Railroads maintains the outer loop be revoked and the loop be removed by the corporation, in order that the city might replace it with a loop for the operation of municipal cars. The board promised that the municipal cars would be accorded the same privileges as the United Railroads, but final action was delayed until the United Railroads could be notified to have representatives present at the hearing. The United Railroads is using the ferry loops under a month to month agreement, revocable at any time upon thirty days' notice.

Financial and Corporate

ANNUAL REPORT

Capital Traction Company

The statement of income, profit and loss of the Capital Traction Company, Washington, D. C., for the year ended Dec. 31, 1915, follows:

Passenger revenue	$2,191,492
Mail revenue	443
Total revenue from transportation	$2,191,935
Revenue from operation, other than transportation	14,558
Railway operating revenue	$2,206,493
Operating expenses:	
Way and structures	$102,631
Equipment	119,817
Power	167,515
Conducting transportation	571,614
Traffic	1,328
General and miscellaneous	189,378
Total	$1,152,283
Net operating revenue	$1,054,209
Taxes assignable to railway operation	135,799
Operating income	$918,410
Non-operating income	6,532
Gross income	$924,942
Deductions from gross income:	
Interest on funded debt	$277,640
Interest on unfunded debt	2,435
Miscellaneous debits	1,293
Total	$281,368
Net income	$643,574
Dividends	600,000
Surplus for year	$43,574
Debit—materials and supplies	49
Balance carried to profit and loss	$43,523
Profit and loss credit balance beginning of year	151,490
Profit and loss credit balance at end of year	$195,014

The railway operating revenue of this company decreased from $2,255,992 in 1914 to $2,206,493 in 1915, an amount of $49,499 or 2.1 per cent. This was caused by a decrease of $50,713 or 2.2 per cent in passenger revenue, the mail and other-than-transportation revenues showing small increases. The operating expenses, which in 1915 were 52.22 per cent of the gross operating revenue, increased slightly by $2,891 or 0.1 per cent, and the net operating revenue, therefore, decreased $51,591 or 4.6 per cent. The net income after all fixed charges was less by $53,553 or 7.6 per cent than the 1914 figures. The dividend payment of $600,000 was a decrease of $60,000, and after adjustment the profit and loss credit balance at the end of the year was $195,014, as compared to $151,490 at the end of 1914.

The decrease in operating revenues was caused by the falling off in passenger receipts during the first eight months of the year, on account of the unrestricted operation of jitneys, the more common use of private automobiles and the general business depression. Moreover, as later noted, the 4 1/6-cent and 5-cent passenger traffic showed small percentage losses while the commutation traffic jumped more than 16 per cent. The improvement in business conditions which began to be felt in the late summer, and the practical elimination of jitney competition which quickly followed the announcement of the Public Utilities Commission that it purposed to regulate such carriers, brought a change for the better. The last four months of 1915 registered material gains in passenger receipts over the same period of 1914.

In regard to the increase in operating expenses, it should be noted that this group included the addition of $15,098 to the depreciation reserve over the usual allotment of 2.5 per cent of operating revenues charged to expenses, and a further sum of $11,250 this year charged for the first time through expenses in monthly installments to the merit system reserve, to be used in payment of awards in July, 1916. These charges were heretofore met by the appropriation of a lump sum when due and payable. In explanation of the extra depreciation charge, it may be said that after the usual allotment to depreciation, insurance and other reserves, and after the payment of a 5 per cent dividend, it was found that $58,672 remained. Instead of carrying this amount to surplus, the directors decided to increase the allotment to the depreciation reserve, thereby reducing the amount of surplus for the year to $43,574.

During 1915 the company carried 68,184,656 passengers, as compared to 69,679,440 in 1914. The decrease was brought about by a decrease of 1,222,284 or 2.8 per cent in 4 1/6-cent passengers, a decrease of 134,015 or 1.3 per cent in 5-cent passengers and an increase of 132,964 or 16.7 per cent in commutation passengers. The car-mile totals in 1915 and 1914 were 7,812,728 and 8,180,797 respectively. Other operating statistics, in cents, are shown in the following table:

	Per Car-Mile		Per Passenger	
	1915	1914	1915	1914
Passenger revenue	28.05	27.41	3.21	3.22
Other revenue	0.27	0.38	0.03	0.04
Gross revenue	28.32	27.79	3.24	3.26
Operating expenses	14.75	14.06	1.69	1.65
Taxes	1.74	1.74	0.20	0.20
Interest	3.60	3.47	0.41	0.41
Net income	8.23	8.52	0.94	1.00

The capital expenditures for 1915 totaled $7,688, divided into $3,937 for track and line, $1,815 for car equipment and $1,935 for miscellaneous items. The receipts from the sale of car equipment and old cable amounted to $2,766, so that the net capital expenditures were $4,921.

HOW OHIO LINES FARED

The Ohio Public Utilities Commission reports that for the year ended June 30, 1915, the street railways of the State made a better showing than the interurban lines. The aggregate revenue of the street railways was $19,701,000, an increase of $169,000. The operating expenses totaled $13,204,000, a decrease of $46,000, while the net revenue was $6,496,000, an increase of $215,000. The number of paid passengers was 547,495,000, an increase of 45,797,000 over the previous year.

For the interurban lines, however, the passenger and freight revenues, the operating expenses, the number of passengers carried and the freight tonnage all showed decreases for the last fiscal year. The operating revenue aggregated $17,936,000, a decrease of $643,000; operating expenses, $11,442,000, a decrease of $140,000; net revenue, $6,493,000, decrease of $502,000, and passenger revenue, $15,320,000, a decrease of $547,000. The number of passengers was 181,563,000, a decrease of 11,709,000.

There was an increase of 64 miles in interurban single track during the year, bringing the total up to 2809 miles. An increase of 60 miles was shown in street railway track, making the total 625 miles.

SUPPLEMENTAL ORDER ISSUED

In a supplemental order the Railroad Commission of California has authorized the Oakland, Antioch & Eastern Railway to issue certain notes and bonds in pursuance of a plan to refinance the company. According to the plan, the company was to issue $1,095,000 of first mortgage bonds and $262,200 of promissory notes. The bonds were to be sold to bondholders or to stockholders for cash, or issued instead of bond interest earned, and used by the company for capital purposes at not less than 80. The proceeds of both bonds and notes were to be used solely for the company's debts or for capital expenditures, represented by notes or accounts payable. The $262,200 6 per cent notes were to be issued to the stockholders for cash at face value. Of the bonds, $328,000 were to be pledged as security for the $262,200 of notes, the stockholders being obligated in case of non-payment of principal or interest on notes to accept the pledged bonds in compensation at 80 per cent of face value. The original order provided that before any of the bonds or notes authorized were issued the company should furnish the commission with a list of its notes and accounts payable representing capital expenditures and a detailed statement explaining such expenditures.

In the supplemental order the commission finds that the reports are duly on file, and that it now appears that the company has collected the sum of $90,911 from its stockholders as a part of the loan of $262,200 and thus released from pledge $46,000 face value of its bonds. The company will need $68,000 additional bonds to be pledged as collateral security to carry into effect the previous order, the two amounts making $114,000 of bonds which the company proposes to pledge as collateral for the $90,911 of notes for the sums advanced. The $114,000 represents the ratio of 80 per cent face value specified, and the company is authorized to pledge this amount of bonds as security for its note indebtedness.

The road connects San Francisco, Sacramento, Oakland and Antioch with a system with more than 120 miles of line.

THREE MONTHS' COMPARISON OF NINETY-SEVEN ROADS

The information bureau of the American Electric Railway Association has continued the comparison of earnings commenced by the Bureau of Fare Rerearch and has just made public the figures for July, August and September. The roads are scattered throughout the United States, and the groupings followed are: Eastern District, east of the Mississippi River and north of the Ohio and Potomac Rivers; Southern District, east of the Mississippi River and south of the Ohio and Potomac Rivers; Western District, west of the Mississippi River. These groups contain forty-four, fourteen and thirty-nine companies respectively.

STATISTICAL RETURNS FROM NINETY-SEVEN ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

District	No. of Companies	Totals for Three Months		1915 in per Cent of 1914	July		1915 in per Cent of 1914	August		1915 in per Cent of 1914	September		1915 in per Cent of 1914
		1915 Dollars	1914 Dollars		1195 Dollars	1914 Dollars		1915 Dollars	1914 Dollars		1915 Dollars	1914 Dollars	
A.—OPERATING REVENUE													
United States	97	51,569,621	52,872,014	97.54	17,423,863	18,067,895	96.44	17,138,215	17,704,904	96.80	17,007,543	17,099,215	99.46
East	44	36,712,991	37,268,880	98.51	12,395,176	12,702,173	97.58	12,182,145	12,498,075	97.47	12,135,670	12,068,632	100.56
South	14	1,854,645	1,996,446	92.90	618,860	677,119	91.40	608,116	664,015	91.58	627,669	655,312	95.78
West	39	13,001,985	13,606,688	95.56	4,409,827	4,688,603	94.05	4,347,954	4,542,814	95.71	4,244,204	4,375,271	97.00
B.—OPERATING EXPENSES													
United States	97	29,856,149	30,035,794	99.40	10,103,122	10,345,756	97.65	9,939,999	10,068,469	98.72	9,813,028	9,621,569	101.99
East	44	20,563,295	20,650,272	99.58	6,984,229	7,089,761	98.51	6,820,438	6,958,601	98.01	6,758,628	6,601,910	102.37
South	14	1,009,987	1,177,647	85.76	341,178	408,440	83.53	338,124	391,379	86.39	330,685	377,828	87.52
West	39	8,282,867	8,207,875	100.91	2,777,715	2,847,555	97.55	2,781,437	2,718,489	102.32	2,723,715	2,641,831	103.10
C.—NET OPERATING REVENUE													
United States	97	21,713,472	22,836,220	95.08	7,320,741	7,722,139	94.80	7,198,216	7,636,435	94.26	7,194,515	7,477,646	96.21
East	44	16,149,696	16,618,608	97.18	5,410,947	5,612,412	96.41	5,361,707	5,539,472	96.79	5,377,042	5,466,722	98.36
South	14	844,658	818,799	103.16	277,682	268,679	103.35	269,992	272,636	99.03	296,984	277,484	107.03
West	39	4,719,118	5,398,813	87.41	1,632,112	1,841,048	88.65	1,566,517	1,824,325	85.87	1,520,489	1,733,440	87.72
D.—TAXES													
United States	97	3,493,430	3,382,621	103.28	1,135,074	1,146,503	99.00	1,220,716	1,122,389	108.76	1,137,729	1,113,729	102.15
East	44	2,497,848	2,376,919	105.09	800,569	809,665	98.88	890,950	786,549	113.27	806,329	780,705	103.28
South	14	136,748	131,209	104.22	46,767	43,244	108.15	43,762	43,879	99.73	46,219	44,086	104.84
West	39	858,834	874,493	98.21	287,738	293,594	98.01	286,004	291,961	97.96	285,092	288,938	98.67
E.—OPERATING RATIO													
United States	97	57.89	56.81	....	57.98	57.26	....	58.00	56.87	....	57.70	56.27	....
East	44	56.01	55.41	....	56.35	55.82	....	55.99	55.68	....	55.69	54.70	....
South	14	54.46	58.99	....	55.13	60.32	....	55.60	58.94	....	52.68	57.66	....
West	39	63.70	60.32	....	62.99	60.73	....	63.97	59.84	....	64.17	60.38	....

Buffalo & Wellsville Railroad Corporation, Buffalo, N. Y.—The New York Public Service Commission for the Second District approved the transfer of the property and rights of the old Buffalo & Susquehanna Railway to the new Buffalo & Wellsville Railroad Corporation, which bought the property from the receiver. The commission has also authorized the new corporation to exercise the franchises and to operate under the certificate of public convenience and necessity approved and granted to the old company by the Railroad Commission. The order of the commission made public on Feb. 17 recites that the new corporation is capitalized for $850,000 and that it as yet has no bonded indebtedness, though an application is pending before the commission for approval of an issue of bonds; that the property is subject to a mortgage of $440,000, which was part of the purchase price paid by the Susquehanna Finance Corporation to the old company and that the new company has made a mortgage of $360,000 as part of the purchase price which it paid to the Finance Corporation.

Cape Electric Tramways, Ltd., Cape Town, S. A.—The profit and loss account of the Cape Electric Tramways, Ltd., for the year ended June 30, 1915, showed a profit of £80,615. After providing for debenture interest, redemption of debentures, and after taking into account the balance brought forward from the preceding year, the company had remaining a net credit balance of £44,286. From this amount the reserve fund was credited with £12,000 and dividends of £24,561 were paid, leaving a balance of £7,724 to be carried forward. During the year the tramways carried 21,680,070 passengers earning £206,122, as compared to 20,886,146 passengers earning £200,409 in the preceding year. While the traffic thus showed some expansion, the company states that the war added considerably to the working costs on account of the additional cost of labor, the allowances granted to employees in the service, and the increase in the cost of all supplies.

Detroit (Mich.) United Railway.—Announcement is made that the $12,500,000 capital stock of Detroit United Railway has been listed on the Detroit Stock Exchange. The stock is also listed on the New York, Montreal and Cleveland exchanges.

Electrical Securities Corporation, New York, N. Y.—Kissel, Kinnicutt & Company, New York, are offering at 99 and interest, to yield more than 5 per cent, $1,000,000 of collateral trust sinking-fund gold 5 per cent bonds of the Electrical Securities Corporation, dated Feb. 1, 1916, and due on Feb. 1, 1846. These bonds are redeemable as a whole or in part at 103 and interest at any interest date upon twenty-one days' notice. The corporation is an investment company owning, among other public utility securities, the mortgage bonds of forty different electric railway, light and power companies. On Dec. 31, 1915, the assets, consisting exclusively of cash or securities at a conservatively appraised valuation, amounted to $8,642,892, or more than twice the obligations on that date. The relative position will remain practically unchanged after the issuance of this series.

Gary, Hobart & Eastern Traction Company, Hobart, Ind.—Application has been made by S. A. Smith to the Superior Court at Hammond for the appointment of a receiver for the Gary, Hobart & Eastern Traction Company.

Interborough Rapid Transit Company, New York, N. Y.—The syndicate of bond distributing houses which agreed in December to take $25,000,000 of the first and refunding 5 per cent bonds of the Interborough Rapid Transit Company, has been closed, and a new lot of $5,000,000 of the same issue has been taken from J. P. Morgan & Company, managers of the underwriting syndicate that agreed to provide $160,000,000 for subway construction in five years. When the smaller block has been disposed of it will bring the total placed by the distributing syndicate up to $80,000,000. The Manhattan Railway has sold $4,523,000 second mortgage 4 per cent gold bonds due 2013 to the Equitable Trust Company and E. H. Rollins & Sons, the two institutions acting jointly. The company asked for bids and twenty houses competed. It is understood that the high bid was an all-or-none bid for 87.15. The proceeds of the issue will be used for reimbursing the Interborough Rapid Transit Company, lessee, for third-track extension work on the elevated system. The new bonds are being offered at 89 and interest to net 4.5 per cent.

Kansas City, Mexico & Orient Railway, Kansas City, Mo.—The Kansas Public Utility Commission has declined to approve the application made in the interest of the Kansas City, Mexico & Orient Railway to issue $51,941,650 in stocks and bonds of a new company, in reorganization proceedings. It was proposed to issue $15,003,600 of first mortgage bonds, $27,573,383 of preferred stock and $9,364,667 of common stock. The time for the deposit of the fifty-year first mortgage 4 per cent bonds of the Kansas City, Mexico & Orient Railway of 1901 and the Kansas City, Outer Belt & Electric Railway first mortgage 4 per cent bonds of 1903 expired on Jan. 31.

Kansas City (Mo.) Railways.—A representative of the Kansas City Railways and the city counselor of Kansas City appeared before the Missouri State Public Service Commission at Jefferson City recently in reference to the issuance of securities by the Kansas City Railways, the successor company to the Metropolitan Street Railway. Under the first mortgage the company asks authority to issue a total not exceeding $22,364,200 of bonds. Under the second mortgage authority is asked to issue $3,560,700 Series A and $1,000,000 Series B bonds with another lot of $730,000, described in another agreement, making a total of $6,290,700 bonds under the second mortgage. Under the terms of the note agreement authority was asked to issue in principal amount not exceeding $7,922,000 three-year 5.5 per cent secured gold notes.

Lancaster & Southern Street Railway, Millersville, Pa.—Application has been made for a receiver for the Lancaster & Southern Street Railway.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—Application has been filed with California Railroad Commission by the Los Angeles & San Diego Beach Railway for authority to issue notes for $11,000 to the Southern Trust & Savings Bank, San Diego, a note for $21,000 to the Merchants National Bank, San Diego, and notes for $19,000 to the City National Bank, Los Angeles. These notes are to renew previous notes and are at 7 per cent interest. The company has $2,000,000 of stock authorized, of which $546,000 is outstanding fully paid up, $165,000 outstanding on which 10 per cent has been paid, and a mortgage upon the property securing bonds in the sum of $375,000. No dividends have been paid for five years.

New York (N. Y.) Railways.—Judge Lacombe on Feb. 15 signed the three final orders winding up the litigation connected with the dissolution of the old Metropolitan Street Railway and the New York City Railway, begun in September, 1907. The receivers were ordered to transfer to the New York Railways, on account of the claims held by it, all the property and assets of the two old companies under their control, except a sum sufficient to meet the claims of the general creditors allowed by the court, which must be handed over to the Guaranty Trust Company. The dividend allowed to all general creditors of the New York City Railway will be 42¼ per cent, and to all other creditors of the Metropolitan Street Railway 10 per cent. The judge also authorized the payment to the Third Avenue Railway by the Metropolitan of $4,442,745 for rent, interest on bonds, rolling stock, and so on, and the third order dealt with certain payments to be made by the New York City Railway to the Metropolitan.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—Negotiations for the purchase of the Michigan Central Railroad's single-track line from Fort Erie and Bridgeport, Ont., to Niagara-on-the-Lake have been entered into by the Niagara, St. Catharines & Toronto Railway. The latter company has a franchise for a road from Port Colburne to Fort Erie, Ont., and from Fort Erie to Niagara-on-the-Lake and from St. Catharines to Toronto, via Hamilton. Application has been made by the company to Parliament for an extension of time in which to build these lines. The Michigan Central's Niagara branch has been used almost exclusively for passenger service during the last few years and is said to be a losing venture. Recently Bridgeburg instead of Buffalo was made the eastern terminal for the line.

Pine Bluff (Ark.) Company.—Eastman, Dillon & Company, New York, are offering at 92 and accrued interest, to yield approximately 5.55 per cent, $700,000 of first mortgage, 5 per cent gold bonds of the Pine Bluff Company, dated March 22, 1912, and due on Jan. 1, 1942. The authorized amount of this issue is $2,000,000, of which $880,000 is outstanding. The company owns and operates the electric light and power, street railways and water supply properties in Pine Bluff, the street railway system comprising 9.5 miles of single track.

Schenectady (N. Y.) Railway.—The Schenectady Railway has applied to the New York Public Service Commission of the Second District for its approval of a new mortgage and bond issue of $2,256,000 with which it is to release 800 shares of the stock of the Schenectady Illuminating Company from the lien of the present first mortgage of the Schenectady Railway. To do this the company must pay the bonds under this older mortgage to the amount of $2,000,000 and as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, page 338, it has called these bonds for March 1, 1916, at 110. Harris Forbes & Company have agreed to take the proposed new issue at 97½. Bonds to be called will be paid with the proceeds. When, in 1905, the Schenectady Railway was sold to the Delaware & Hudson Company and the New York Central Railroad by the General Electric Company it owned all of the stock of the Illuminating Company, 800 shares, and all of the stock of the Mohawk Gas Company, 4400 shares. Under the sale these two stocks were retained by the General Electric Company. The Illuminating Company stock was subject to the first mortgage and a consolidated mortgage of the railway. The gas stock was subject to the consolidated mortgage alone. The General Electric Company assumed the consolidated mortgage and has satisfied it. The railway had agreed that when this was done it would release the Illuminating stock from the lien of the first mortgage, and in making the present petition it states that the only way this can be done is by paying the bonds, which it proposes to do by this new mortgage and bond issue.

Seattle, Renton & Southern Railway, Seattle, Wash.—The property of the Seattle, Renton & Southern Railway, now in the hands of Scott Calhoun and Joseph Parkin, receivers, have been ordered sold at public auction on May 1 by the King County Superior Court Judge A. W. Frater. The claims against the company are $1,240,000, and Judge Frater has fixed a minimum price of $1,200,000. It is estimated that this will cover the claims against the receivership and the preferred claims of the bondholders. The receivership case has been in the courts for nearly four years.

Texas Traction Company, Dallas, Tex.—The directors of the Texas Traction Company and the Southern Traction Company are planning to consolidate the two lines under the name of the Texas Traction Company. A committee has been appointed by both companies to work out details. These properties, generally known as the Strickland lines, have been operated under one management but as separate corporations.

United Railways & Electric Company, Baltimore, Md.—The Maryland Public Service Commission has approved the application of the United Railways & Electric Company to issue $2,750,000 of five-year 5 per cent notes for refunding and to provide funds for other financing noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, page 333. The commission has fixed upon 97.5 and interest as the price at which the notes are to be sold.

Winnipeg (Man.) Electric Railway.—The annual meeting of the Winnipeg Electric Railway, which was to have been held on Feb. 9, was postponed for two weeks. Jitney competition and the depression in the building trade following the war greatly affected in 1915 the earnings of the company. On Dec. 15, 1915, the dividend rate of the company was reduced to 8 per cent per annum. The earnings in the first eleven months of 1915 fell off 30 per cent as compared with 1914, due to some extent to jitney competition. In some months of the year the decrease was almost 50 per cent from the same month for 1914. The total earnings for the first eleven months of 1914 were $1,547,412, as against $1,086,528 for the first eleven months of 1915. In November, 1915, however, there was an actual increase in gross receipts of $10,000 over the same month of 1914.

DIVIDENDS DECLARED

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Northern Texas Electric Company, Fort Worth, Tex., 3 per cent, preferred; quarterly, 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE RAILWAY, KENNEBUNK, ME.						
1m., Jan.,	'16	$23,288	$19,306	$3,982	$610	$3,372
1 " "	'15	21,900	20,360	1,540	637	903
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.						
1m., Dec.,	'15	$73,106	*$78,318	†$5,212	$22,358	†‡$27,359
1 " "	'14	76,639	*67,046	†9,593	17,385	†‡7,696
6 " "	'15	498,746	*400,203	98,543	106,885	†‡7,299
6 " "	'14	524,025	*466,938	57,087	103,306	†‡45,303
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.						
1m., Dec.,	'15	$8,145	*$8,319	†$174	$1,112	†$1,286
1 " "	'14	8,071	*8,091	†20	1,145	†1,165
12 " "	'15	115,207	$96,433	18,774	13,492	5,282
12 " "	'14	121,756	*101,749	20,007	13,141	6,866
CONNECTICUT COMPANY, NEW HAVEN, CONN.						
1m., Dec.,	'15	$704,552	*$477,524	$227,028	$99,722	‡$150,413
1 " "	'14	630,642	*446,565	184,077	97,462	‡108,479
6 " "	'15	4,452,423	*2,974,355	1,478,068	592,736	‡1,024,591
6 " "	'14	4,192,386	*3,097,200	1,095,186	589,707	‡635,637
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.						
1m., Dec.,	'15	$69,454	*$35,374	$34,080	$9,171	$24,909
1 " "	'14	55,655	*31,444	24,211	8,773	15,438
12 " "	'15	723,091	*386,447	336,644	105,562	231,082
12 " "	'14	673,095	*401,932	271,163	101,638	169,525
EL PASO (TEX.) ELECTRIC COMPANY						
1m., Dec.,	'15	$101,469	*$46,507	$54,962	$4,181	$50,781
1 " "	'14	88,386	*42,956	45,430	4,191	41,239
12 " "	'15	981,888	*521,059	460,829	50,368	410,461
12 " "	'14	1,041,792	*575,471	466,321	51,356	414,965
KEOKUK (IOWA) ELECTRIC COMPANY						
1m., Dec.,	'15	$21,069	*$12,481	$8,588	$1,859	$6,729
1 " "	'14	20,432	*13,752	6,680	1,884	4,796
12 " "	'15	232,593	*151,156	81,437	22,400	59,037
12 " "	'14	249,062	*160,269	88,793	24,286	64,507
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.						
1m., Dec.,	'15	$23,650	*$24,168	†$518	$7,995	†‡$8,473
1 " "	'14	24,466	*23,590	876	7,876	†‡6,981
6 " "	'15	210,310	*159,499	50,811	47,998	‡3,166
6 " "	'14	214,808	*161,924	52,884	47,254	‡5,902
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.						
1m., Dec.,	'15	$42,795	*$46,228	†$3,433	§$5,541	†‡$7,641
1 " "	'14	38,043	*45,618	†7,575	§6,364	†‡12,406
6 " "	'15	257,135	*254,386	2,749	§36,001	†‡23,682
6 " "	'14	225,116	*261,352	†36,236	§36,886	†‡63,600
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.						
1m., Dec.,	'15	$156,941	*$93,912	$63,029	$29,250	$33,779
1 " "	'14	162,561	*87,543	75,018	28,698	46,320
12 " "	'15	1,713,213	*1,049,709	663,504	330,817	332,687
12 " "	'14	2,071,098	*1,151,237	919,861	317,503	602,358
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO.						
1m., Dec.,	'15	$379,817	$217,965	$161,852	$53,040	$108,812
1 " "	'14	316,381	197,415	118,966	50,533	68,433
12 " "	'15	3,890,751	2,373,010	1,517,741	628,309	889,432
12 " "	'14	3,636,085	2,237,429	1,398,656	606,898	791,758
RHODE ISLAND COMPANY, PROVIDENCE, R. I.						
1m., Dec.,	'15	$440,663	*$350,340	$90,323	$120,150	†‡$28,149
1 " "	'14	411,510	*314,186	97,324	117,308	†‡18,337
6 " "	'15	2,756,262	*2,047,156	709,106	722,286	‡21,776
6 " "	'14	2,788,017	*2,038,481	749,536	709,108	‡78,440
SAVANNAH (GA.) ELECTRIC COMPANY						
1m., Dec.,	'15	$68,903	*$44,271	$24,632	$23,330	$1,302
1 " "	'14	71,678	*45,578	26,100	23,421	2,679
12 " "	'15	794,213	*518,488	275,725	278,492	†2,767
12 " "	'14	842,639	*552,987	289,652	275,333	14,319
TAMPA (FLA.) ELECTRIC COMPANY						
1m., Dec.,	'15	$85,770	*$44,326	$41,444	$4,344	$37,100
1 " "	'14	85,501	*42,327	43,174	4,423	38,751
12 " "	'15	981,049	*502,901	478,148	52,344	425,804
12 " "	'14	981,000	*520,078	460,922	54,488	406,434

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*Indicates taxes. †Deficit. ‡Includes non-operating income. §Excludes interest on bonds, charged income and paid by the N. Y., N. H. & H. R. R. under guarantee, also interest on notes held by the N. Y., N. H. & H. R. R. not credited to income of that company.

Traffic and Transportation

UNION TRACTION OF INDIANA ADVERTISES BRADY MEDAL AND SERVICE

In connection with a campaign of education which the Union Traction Company of Indiana, Anderson, Ind., is conducting to stimulate traffic in the cities touched by its lines, the fact that it has been awarded the Anthony N. Brady Memorial Association Medal for safe and efficient operation has received considerable prominence. After listing the principal points touched by its various lines and connections, the advantages these lines offer for the transportation of passengers and freight are set forth in an article which reads in part as follows:

"This interurban railway was a pioneer electric line in both passenger and freight transportation, and it is first and foremost in all things pertaining to these classes of service. It has been stated that the electric railways since their installation were responsible for 40 per cent of the growth of Indianapolis, and it is safe to say that every city, town and hamlet touched by the tracks of the Union Traction Company has been benefited in the same degree. The operation of electric railways is so closely allied to the business interests of the territory they serve that there exists a community feeling not found between these interests and the steam roads.

"When we look back over a period of fifteen years, it is difficult to realize that a trip from Fort Wayne to Indianapolis meant a loss of two days, particularly when at present there is through electric service in each direction every two hours. The business man living 50 miles or even 100 miles away from the capital is comparatively as close to it at present, as the man who lived at Zionsville fifteen years ago. This is true not only of the individual as a passenger, but of his merchandise as well.

"An investigation made some time ago demonstrated that only a small proportion of the vegetables and small fruits used in Indianapolis was raised in close proximity to that city. Most of these commodities are shipped from distances varying from 75 miles to 150 miles. This requires refrigeration, at an additional expense to the consumer. There seems to be no reason why intensified farming could not be carried on as profitably 10 miles from a big market like Indianapolis as it is at a distance of 100 miles. Certainly there are advantages to be gained in the lower freight rates and the opportunity for direct barter between the producer and the consumer such as could be arranged through a central market served by the interurban lines. Such a plan is worthy of the serious consideration of commercial bodies. This, however, is only one of the many prospects for the betterment of any city made possible by the interurban railway systems, with which Indiana is as well served as any other State in the Union."

WATERLOO TRIES TO STOP ONE-MAN CAR OPERATION

Early in December, 1915, the Waterloo, Cedar Falls & Northern Railway placed one-man cars in service on all but one of its lines and, at the same time, maintained the existing schedules. The old single-truck, double-end cars were remodeled for one-man operation by inclosing the platforms, providing door-operating mechanisms and fare boxes. On Jan. 26, after the one-man cars had proved more than sufficient to meet the service requirements, an ordinance requiring two-men crews on all local cars was passed, but acting upon the request of the railway company the City Council delayed putting it into effect until Feb. 1. In the meantime the company obtained a temporary injuction to restrain the newspapers from publishing the ordinance and thus prevented it from becoming law. Sentiment against one-man car operation was largely centered around the Mayor and the City Council, as several of the local newspapers and commercial and civic organizations of Waterloo had expressed themselves as satisfied with the service the one-man cars were furnishing. The petition requesting the temporary restraining order refutes the various objections to one-man cars, and states that a marked decrease in the gross receipts during 1915 made their adoption absolutely necessary in the interest of economy. The company hopes to have the temporary injunction made permanent.

One-Man Cars Authorized in Corpus Christi.—The Council of Corpus Christi, Tex., has passed an ordinance permitting the operation of one-man cars in the city.

Oakland Jitney Ordinance Enforced.—The city of Oakland, Cal., has put an end to the jitneys of the Oakland Pleasure Club, which sought to evade the provisions of the amended jitney ordinance in that city prohibiting the operaton of jitneys in downtown Oakland. On Feb. 16 sixteen drivers were arrested to constitute test cases. The following day no jitneys appeared in the forbidden district.

Copper Zone Fare System to Be Extended.—It is stated that the Shore Line Electric Railway, Norwich, Conn., proposes to apply to its division between New London and Willimantic and on the branch from Willimantic to Coventry the copper zone system of fares in use by the company between New London and New Haven since last fall. This system was described and illustrated in the ELECTRIC RAILWAY JOURNAL of Sept. 11, 1915, page 444.

Joint Operation Arranged in California.—An agreement providing for the joint operation of their lines has been announced by the Central California Traction Company, San Francisco, Cal., and the Tidewater Southern Railroad. President Byron Bearce of the Tidewater Southern Railroad is quoted as follows: "We have merely effected a sort of consolidation in order to operate the roads jointly, our purpose being to cut down expenses and increase efficiency."

Application for Fare Reduction Refused. — The Public Service Commission for the Second District of New York has refused to order the Warren & Jamestown Street Railway, Warren, Pa., to reduce its fare between Jamestown and Frewsburg from 10 cents to 5 cents. The commission held that because of the expensive construction of the line between the two towns, the comparatively limited number of passengers carried and the transfer privileges accorded, the rate was fair and reasonable for the ride of 6 miles.

Disorderly Night Hawks Arrested.—At the request of officials of the International Railway, Buffalo, N. Y., the police have detailed plain clothes specials to ride the "owl" cars on the city lines and arrest all passengers creating a disturbance. On the first night after the order had been issued seven roughs were arrested and when arraigned in court were fined $10 each. Others have been fined $25 and $50. Disorder has occurred almost entirely on the lines in the East side, which is populated largely by foreigners.

Decision in Rhode Island Against One-Man Cars.—The Public Utilities Commission of Rhode Island has dismissed the petition of the Newport & Providence Railway appealing from an ordinance of the Town Council of Middletown, which ordered that all street cars operated through the town must have a crew of two men. The company inaugurated the one-man system of operation between Washington Square, Newport, and the naval training station. Later the system was introduced on its main line from Newport to Bristol Ferry.

Petition Presented for Jitney Election.—A petition, signed by the required numbers of voters, has been presented the City Commission of Dallas, Tex., by the jitney drivers asking for an election on a new ordinance, in which the principal changes from the present ordinance are as follows: drivers' license is raised from $10 to $20 a year; license for the cars is reduced from $65 to $20 a year; number of passengers unlimited; no restrictions as to pasengers riding on running board or other parts of cars; clause stating jitneys are common carriers omitted.

Ohmer Prize Offer Renewed.—John F. Ohmer, president of the Ohmer Fare Register Company, Dayton, Ohio, believing that the employees of the Denver (Col.) Tramway are capable of attaining still a higher degree of efficiency in Ohmer register operation for 1916 than they did during the past year, has renewed his prize offer of $200 for the year 1916, to be distributed in three premiums as heretofore, Conditional that the general average for 1916 will exceed the general average of 98.08, which was made for 1915. He has also included in this offer his special prize of $25, to be awarded to the two conductors who make the best individual records for 1916.

Cars Making 'Em Old Maids.—The *United Railroads Magazine*, published by the United Railroads, San Francisco, Cal., published in its issue of February, 1916, the following item: "Does poor car service affect the matrimonial chances of young women living in the district poorly served? There is one man living out in the Potrero who believes it does. He is Michael Dunnigan, who is very sore at the United Railroads for discontinuing the '30' car which used to run from Eighth and Market. 'The girls out here are all becoming old maids,' he says. 'A young man comes out to see them—once. But he never comes again, the car service is that bad.' The only calamity that the company has not been charged with as yet is the European war. However, the war is not over."

Prohibition Affects "Owl" Service.—The effect of the dry law which went into operation on Jan. 1 has been felt by the traction companies in both Oregon and Washington, and the larger companies, among them the Portland Railway, Light & Power Company, the Puget Sound Traction, Light & Power Company, the Tacoma Railway & Power Company and the Washington Water Power Company, have or will put in operation new schedules reducing the "owl" service, which has been operated after midnight for the convenience of patrons. The average reduction in "owl" car patronage in Portland since Jan. 1 is reported as 25 per cent, based on a check of southbound "owl" traffic on four important lines. The Puget Sound Traction, Light & Power Company, Seattle, revised its "owl" schedules effective on Jan. 24.

Portland Jitneys Fair Weather Birds.—City Attorney La Roche, Portland, Ore., asserts that the jitney buses licensed to operate in Portland violated the provisions of the city ordinance during the recent storm by failing to attempt to operate and also by arbitrarily increasing their rates of fare. Mayor Albee, upon being notified, instructed police officers to arrest drivers who were operating without complying with the ordinance, which requires jitneys to operate during the morning and evening rush hours and to maintain 5-cent fares, unless a higher rate is posted on the windshield. During the storm many jitneys abandoned their regular service and operated as taxicabs. Others attempted to give no service of their own, but waited until the street railways cleared their tracks and then operated only in the cleared districts.

Electric Railway Officials Support Anti-Smoking Bill.—Clark V. Wood, president of the Springfield (Mass.) Street Railway, and David A. Belden, president of the Massachusetts Northeastern Street Railway, appeared before the legislative committee on street railways at Boston on Feb. 17 on behalf of the Stacy bill prohibiting the carriage of lighted pipes, cigars or cigarettes on closed passenger cars of street railways. The bill specifies that it shall be the duty of the conductor to call the act to the attention of observed violators, and provides a fine of $10 maximum for refusal to obey the statute. Special cars or compartments provided for smoking are exempted. Mr. Wood said that the presence of the bill on the statute books would be a strong deterrent against an evil which cannot be dealt with effectively at present. R. H. Holt, for the Boston Elevated Railway, also favored the bill.

Conference on Service in Toledo.—At a conference between a special committee of the City Council of Toledo, Ohio, and F. R. Coates, president of the Toledo Railways & Light Company, on Feb. 7, Mr. Coates told the city officials that the only way to prevent congestion and crowded cars was for the city to grant a new franchise or order the company not to accept 3-cent fares during the rush hours morning and evening. He assured them that the company could not secure money on a day-to-day franchise to purchase additional cars and that if an order were placed now for cars, deliveries could not be made until Jan. 1, 1917. The company desired to make improvements and grant an advance in wages to the men, but new construction could not be financed on a satisfactory basis with the franchise unsettled, and the receipts under the present fare did not justify an advance to the men.

Personal Mention

Mr. C. S. Reed, auditor of the Durham (N. C.) Traction Company, has been elected secretary of the company to succeed Mr. J. Martin Umstead.

Mr. G. A. Richardson, heretofore superintendent of railway of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has had his title changed to general superintendent of the railway department.

Mr. B. F. Boynton, claim agent of the Portland Railway, Light & Power Company, Portland, Ore., has been elected president of the Pacific Claim Agents' Index Bureau, which hereafter will be located permanently in Portland.

Mr. E. C. Johnston, formerly assistant purchasing agent of the Columbus Railway, Power & Light Company, Columbus, Ohio, has been appointed purchasing agent of the East St. Louis & Suburban Railway, East St. Louis, Ill., and will have charge of all storerooms.

Mr. Wilford Phillips, manager of the Winnipeg (Man.) Electric Railway, has been granted six months' leave of absence owing to ill health. He is at present in Los Angeles, Cal. Mr. Harry Hartwell is acting manager, as noted previously in the ELECTRIC RAILWAY JOURNAL.

Mr. John S. Bates has been appointed chief engineer of the Fresno (Cal.) Interurban Railway. This company is now having a 7-mile extension constructed between Barton Vineyard and Kutner Colony, and is planning the construction of other extensions this summer of about 15 miles.

Mr. E. B. Atchley, formerly connected editorially with various Western newspapers, and recently special editorial writer on the Kansas City *Post*, has been made head of the new publicity department of the Kansas City (Mo.) Railways, in charge of publicity, advertising, safety-first work and welfare.

Mr. D. B. Teagarden, who has resigned as chief dispatcher of the Los Angeles (Cal.) railway to accept a position with the Bloch Uniform Company, Cleveland, Ohio, was the guest of honor at a surprise banquet by more than 100 of his associates, at which he was presented a traveling case.

Mr. R. L. Lindsey, general manager of the Durham (N. C.) Traction Company, has in addition been elected vice-president of the company, in which capacity he succeeds the late H. A. Foushee, Mr. Lindsey has been connected with the Durham Traction Company for sixteen years.

Mr. James W. Samuel, chief clerk in the office of Mr. James Adkins, treasurer of the United Railways, St. Louis, Mo., has been promoted to assistant secretary and treasurer of the company. Mr. Samuel entered the employ of the company in 1895 and has been in the service continuously since that time.

Mr. Van Horn Ely has been elected president of the Chicago & Joliet Electric Railway, Joliet, Ill., to succeed Mr. J. J. Sullivan, Philadelphia. The Chicago & Joliet Electric Railway is controlled by the American Railways, which recently amalgamated with the National Properties Company, of which Mr. Ely is president.

Mr. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., and president of the Illinois Electric Railway Association, has been elected president of the Illinois Valley Way Association, which contemplates the construction of a hard road from Chicago to Peoria through Joliet, Morris, Ottawa and LaSalle.

Mr. George P. James has resigned as chief civil engineer of the Puget Sound Traction, Light & Power Company, Seattle division. Owing to the transfer of all railway construction work to the Stone & Webster Engineering Corporation and the necessary abandonment of practically all of the civil engineering work heretofore carried on by the company, the office of chief civil engineer has been abolished.

Mr. George S. Quinan has been appointed engineer of the Puget Sound Traction, Light & Power Company, Seattle division, in charge of the engineering department. Under the head of this new department will be grouped all engineering except that done by the Stone & Webster Engineering Corporation, and such minor engineering as may be found impracticable to separate from the operation.

Mr. R. J. Higgins, city counselor of Kansas City, Kan., is to be chief counsel for the Kansas City (Mo.) Railways in Kansas City, Kan. Mr. O. L. Miller will continue as associate counsel on the Kansas side. Mr. A. L. Berger, who has been special attorney for the receivers in matters pertaining to the Kansas side, will continue in that capacity. Mr. Higgins has been city counselor on the Kansas side since the adoption of commission government six years ago. He is thirty-two years old and has practised law nine years.

Mr. S. P. Broome has resigned as assistant purchasing agent of the East St. Louis & Suburban Railway, East St. Louis, Ill. Mr. Broome has been with the company for eight years, first in charge of meters and arc lamps, then as assistant to the master mechanic, then general storekeeper, then assistant to one of the former general superintendents, and for the last four years in charge of all purchases as assistant purchasing agent under the general superintendent. Mr. Broome has become connected with the A. M. Byers Company, Pittsburgh, Pa., to introduce their products into use with the steam railroads.

H. M. BRINCKERHOFF

Mr. Henry M. Brinckerhoff has been appointed chief engineer of the Chicago Traction & Subway Commission to have charge of the investigation of traffic conditions in Chicago to determine on a plan for consolidated operation of elevated, surface, and, possibly, subway systems for Chicago. Mr. Brinckerhoff was graduated in mechanical engineering from the Stevens Institute of Technology in the year 1890, and has been engaged for a great part of his professional career in electric traction work. He was engaged upon the original electrification of the horse car lines in Boston in 1890 and 1891, and in 1892 went to Chicago as assistant engineer for the intramural railway at the World's Fair. He was patentee of the third-rail system, devised and used for the first time on that railroad, and since generally applied on the elevated railroads of the country and on many interurban and steam railroad installations. During the World's Fair he was in charge of the electrical operation of the intramural railway and at the close of the fair was appointed electrical engineer of the Metropolitan West Side Elevated Railway, Chicago. As electrical engineer he designed and installed the electrical equipment for this company, and in succeeding years took charge of the equipment as superintendent of motive power, and later as assistant general manager, becoming in 1898 general manager of this company, in which capacity he remained until 1906. This was the first permanent commercial operating third-rail system. Mr. Brinckerhoff left railway work in Chicago to join the firm of Barclay Parsons & Klapp, of which he is a partner. During the past ten years, since leaving Chicago, he has been engaged upon a considerable variety of consulting engineer work with this firm, but has devoted a large part of his attention to traction problems. In this period he has investigated and reported upon many of the operating conditions of the largest companies in this country and has visited and studied the systems of Europe as well. The most recent piece of work on city traffic done under Mr. Brinckerhoff's immediate supervision and direction was the report to the Street Railway Commission of Detroit by his firm, which was retained to examine and report upon a plan for relieving the congested conditions of the street railways and to suggest a possible subway system. This report appeared in March, 1915, and was summarized in the ELECTRIC RAILWAY JOURNAL of April 3, 1915, page 664. Mr. Brinckerhoff has established headquarters in the Home Insurance Building, Chicago.

H. L. BROWNELL

Mr. H. L. Brownell, whose work as safety expert of the Chicago (Ill.) Surface Lines has been mentioned frequently in these columns, has resigned from that position to become a public safety engineer, in which capacity he will give safety lectures and organize safety campaigns for electric railways. Mr. Brownell was born in Saratoga County, N. Y., in 1865. He began electric railway work as a gripman with the Denver (Col.) Tramway Company in 1888 and left that company in 1893 to become a conductor on the Chicago City Railway. Later he entered the law and claim department of the Chicago City Railway under Mr. Mason B. Starring, then general counsel. From 1900 until 1909 he was not in railway work, but at the end of that time he accepted a position with the law department of the Boston (Mass.) Elevated Railway. In 1910 Mr. Brownell took charge of the claim clerk system of the Chicago Railways. Two years later he was relieved of that position in order to organize and conduct the safety bureau for the railway company. While at the head of this bureau Mr. Brownell supervised the taking of a number of safety moving-picture films which he has since shown more than 800 times in connection with lectures in Chicago and thirty other cities in the country. In 1913 he assisted the coroner of Cook County to organize a public safety commission and took an important part in the work of the Citizens' Traffic & Safety Commission, a body appointed by the Chicago City Council. Mr. Brownell is also identified with the Safety First Federation of America and the National Safety Council.

OBITUARY

G. J. A. Paul, manager of railways of the Mahoning & Shenango Railway & Light Company, died at his home in Youngstown, Ohio, on Feb. 19. Mr. Paul had been ill since December with heart trouble.

Alexander McRae, formerly superintendent of the Lowell, Lawrence & Haverhill Street Railway and of late connected with the Massachusetts Northeastern Street Railway, Haverhill, Mass., is dead.

James B. Robinson, consulting engineer, who was connected with the Southern Pacific Company for many years and later with the Northern Pacific Company, died at Portland, Ore., on Feb. 12. Mr. Robinson built the Butte County Railroad between Chico, Cal., and Stirling City, and also the present street railway in Chico.

Thomas C. Penington, who was secretary and treasurer of the American Street Railway Association from 1895 to the time of its reorganization in 1905, died at his home in Chicago, Ill., on Feb. 19. Mr. Penington succeeded William J. Richardson as secretary of the association. Up to the time of the reorganization in 1905, the office of secretary and treasurer of the association was filled by a man who was also active in railway work, and while he held office with the association Mr. Penington was also secretary and treasurer of the Chicago City Railway, with which he was connected altogether for about twenty-five years. In 1906, with a change in management of the Chicago City Railway, Mr. Penington retired from that company and since that time has engaged in general business in Chicago. Although not actively engaged in railway work Mr. Penington attended several conventions since 1905, the last one being that in Chicago in 1912. Mr. Penington was as large in heart as he was in frame, and although the duties of secretary and treasurer of the association in those early days were not arduous he performed them ably and thoroughly, and it was largely through his personal popularity and the energy which he put into his work as secretary that the association made the progress which it did between 1895 and 1905.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

East San Diego, Cal.—Application has been made to the Council of East San Diego for a franchise to construct and operate an electric railway for a period ending Sept. 1, 1952. Bids will be received until March 6 for the proposed franchise.

Naugatuck, Conn.—The Connecticut Company has asked the Council for a franchise to double track its line on North Main Street, Naugatuck, from a point in the vicinity of Maple Street to Weber's Switch in Union City.

Newport, Ky.—Officials of the South Covington & Cincinnati Street Railway and the Union Light, Heat & Power Company met with the City Commissioners on Feb. 14 to discuss proposed new franchises. The company officials stated that they could pay no rent for the use of the streets, but that if franchises are granted both companies, a first-class street railway service will be given and a superior light system will be installed. The ownership of the companies is almost identical.

Buffalo, N. Y.—The Public Service Commission for the Second District of New York has approved the franchise granted by the city to the International Railway for tracks in Bailey Avenue, Buffalo, between Kensington Avenue and East Delevan Avenue and between East Ferry Street and Seneca Street. These tracks will complete the International's trackage in Bailey Avenue, and the order of the commission recites the need of the service to be supplied to the rapidly growing section near the city line and the transfer facilities which will be afforded with the various other lines of the company crossing Bailey Avenue. The new franchises from the city include lines provided for but never built, in franchises granted many years ago to the Buffalo Traction Company, which old franchises were taken over by the International Railway at the time of the consolidation.

Terrell, Tex.—The City Commission of Terrell has extended the limit of the franchise granted Stone & Webster for use of certain streets in Terrell until April 20, 1917, in which to begin construction of the Dallas-Terrell Interurban Railway.

TRACK AND ROADWAY

Pacific Electric Company, Los Angeles, Cal.—At a recent meeting of the Thomas Jefferson Club plans were discussed for a new short line transportation service between Pasadena and Los Angeles and will be presented to the Pacific Electric Company for its consideration. It is proposed to extend the North Loop track from its present terminus at East Orange Grove and Allen Avenues, Pasadena, to connect with the Sirra Madre line to Los Angeles.

Martinez & Concord Interurban Railway, Martinez, Cal.—The routeing of this company's proposed line has been changed by the city trustees of Martinez so that cars will operate along Main Street instead of Estobar Street. The company made an application to the Board of Supervisors for a franchise to construct its line along the county road. The franchise was not granted, but will be further considered at a special meeting. [Feb. 12, '16.]

Lordship Park Association, Bridgeport, Conn.—Plans are now being made by this company for direct trolley service to Lordship Park from the center of the city. It is expected that the Public Utilities Commission of Connecticut will soon grant a petition to permit the operation of the Lordship Park Association's cars over the Connecticut Company's tracks from Hollister and Stratford Avenues down Stratford Avenue to Main and Fairfield Streets, thence around the loop of Main, Golden Hill and Water Streets and return to Lordship Park, where the tracks will be extended to the Casino. The present terminus of the Lordship Park Association is at Hollister and Stratford Avenues. If permission is granted and suitable trackage terms are made with the Connecticut Company through service will probably begin June 1.

Miami (Fla.) Traction Company.—This company has received an amendment to its charter permitting it to build a street railway system covering approximately 350 miles and extending from West Palm Beach to Cape Sable, to Miami Beach and across the State to Tampa. Through this amendment the company is authorized to do business in the counties of Dade, Broward, Palm Beach, Lee, DeSoto, Polk, Manatee, Hillsboro and Monroe.

Covington & Oxford Street Railway, Covington, Ga.—Work has been begun by this company preparing its line for electric railway service, heavier rails being used. Horse-cars are being used at present on the line.

Kankakee & Urbana Traction Company, Urbana, Ill.—The bridge which this company purchased last fall from the Central States Bridge Company of Indianapolis has arrived and has been hauled to the site of its installation. With favorable weather, cars will be running from Urbana to Paxton within two months.

Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.—There is indication that this company's line, which at present operates only as far as Rushville will be extended 62 miles to Cincinnati, within a short time. The city of Cincinnati in April will vote on a proposed $6,000,000 bond issue for the construction of a 15-mile terminal loop. The Cincinnati rapid transit commission has recommended a certain routeing. The Indianapolis & Cincinnati Traction Company is very desirous of extending its line and has acquired the Cincinnati & Westwood Railroad, a suburban line, which will be used as a connecting link.

Fort Scott, Kan.—L. A. Wells Construction Company, 34 Wade Building, Cleveland, Ohio, will receive figures on approximately 250,000 cu. yd. of grading for the construction of an electric railway from Fort Scott to Mulberry, work to be begun as soon as the weather will permit. The company is also in the market for steel rails and connections, ties, poles, trolleys and high-tension wires, special work, copper bonds, cars and electrical apparatus for power house and substation. The desire of this company to receive bids for this material was referred to on page 376 of the ELECTRIC RAILWAY JOURNAL for Feb. 19.

Wichita Railroad & Light Company, Wichita, Kan.—Plans are being made by this company to construct a bridge over the Arkansas River at Douglas Avenue to cost about $50,000.

***Boston, Mass.**—A petition has been presented to the City Council for a new car line and wider traffic artery to extend from Franklin Park near Egleston Square to the Jamaicaway. The matter was referred by the Council to the Board of Street Commissioners for a report on the need and practicability of the proposition, as well as an estimate of the probable cost.

Detroit (Mich.) United Railway.—This company plans to build 18 miles of extensions to the Detroit city lines, and will double track approximately 9 miles of its interurban lines at points on the different divisions of its system. This double tracking will consist largely of lengthening existing sidings so that they will form a part of an ultimate double tracking for an entire division.

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—It is reported that a contract has been awarded to Willard E. Winner for the construction of this company's proposed line from Kansas City to Tiffany Springs, 15 miles. H. G. Pert, president. [Jan. 29, '16.]

Metropolitan Street Railway, Kansas City, Mo. — This company's tracks on Swope Parkway will be reconstructed from Forty-ninth Street to Swope Park. There will be a 26-ft. roadway on each side, with 40 ft. on the east and west sides for sidewalks and parking. The tracks will be paved with bituminous macadam.

United Railways, St. Louis, Mo.—A committee of five has been appointed by President Haller of the Board of Aldermen to confer with officials of the United Railways regarding a car line from the proposed North Market Street docks to Suburban Park. The route for the proposed line is from the North Market Street docks to Broadway, north to St. Louis Avenue, west to Belt Avenue, to Maffitt Avenue and out to Suburban Park.

Butte (Mont.) Electric Railway.—A report from this company states that material has been ordered for the construction of about 1 mile of track through Wilson Park Addition and the double-tracking of 2 miles on its Englewood line.

Albany Southern Railroad, Albany, N. Y.—It is reported that plans are being considered by this company to extend its road to the Massachusetts State line, there to connect with an extension that it is proposed to have the Berkshire Street Railway make. The Albany Southern Railroad is negotiating to procure an extension of its road to the Rutland Railroad and use a part of that road to carry out its plan of operating to Pittsfield. It is said that part of the Chatham division of the Rutland Railroad would be electrified between Brainard Station and Lebanon Springs.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has denied the application of the Newman & Carey Subway Construction Company, Inc., for permission to prosecute work on Section No. 1 of Route No. 29, the Nostrand Avenue subway in Brooklyn, by the open cut method on the east side of Nostrand Avenue between Malbone Street and Lefferts Avenue. The contract allows open trench work in certain parts of Nostrand Avenue, but not in the section mentioned between Malbone Street and Lefferts Avenue.

Interborough Rapid Transit Company, New York City.—Upon the report of Alfred Craven, chief engineer, the Public Service Commission for the First District of New York has declared a part of the Queensboro subway extension ready for operation, and has authorized the Interborough Rapid Transit Company to begin the early operation of the line. The portion declared ready for operation extends from the Jackson Avenue station to the Hunters Point Avenue station. The opening of this extension will have an important effect upon operation, as the Long Island Railroad has a station at Hunters Point Avenue adjoining the new subway station, and it will be possible for commuters using the Long Island Railroad to get off at Hunters Point Avenue and take the new subway into Manhattan. Operation of the Queensboro subway, formerly called the Steinway Tunnel, now extends from the station in Manhattan, located under Forty-second Street between Lexington and Third Avenues, under Forty-second Street, the East River and to Jackson and Van Alst Avenues, Long Island City. An extension of the line is under construction from that point through Davis Street and Ely Avenue to the Queensboro Bridge, where it will connect with the new rapid transit lines running to Astoria and to Corona.

Durham (N. C.) Traction Company.—At the annual meeting of the stockholders of this company it was decided to expend $100,000 for improvements to its system during this year.

Northern Ohio Traction & Light Company, Akron, Ohio.—During the coming spring this company plans a complete renewal of its tracks in Market Avenue, Canton, from Sixth Street North to Sixth Street South.

Cleveland & Sharon Rapid Transit Company, Cleveland, Ohio.—This company has applied to the Public Utilities Commission of Ohio for permission to sell $195,000 worth of bonds and $75,000 worth of stock for constructing an electric railway between Middlefield and Lockwood, 12 miles. The cost is estimated at $261,000. Extensions to the north and south are planned. C. A. Black, president, and C. H. Felton, secretary. [Aug. 7, '15.]

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio.—In addition to other improvements to be made during the spring, this company will go over its entire roadbed between Findlay and Toledo and place it in the best possible condition, removing all the old ties and replacing the worn rails.

Morrisburg & Ottawa Electric Railway, Ottawa, Ont.—It is reported that work will be begun next May on the construction of this company's line from Morrisburg to Ottawa. J. G. Kilt, Ottawa, president.

Toronto, Ont.—The hydro-radial by-laws have been passed by the ratepayers of Toronto and Etobicoke Townships. A hydro-radial by-law will be resubmitted to the electors of Blanchard Township on March 13. This by-law was defeated last January.

Toronto, Barrie & Orillia Electric Railway, Toronto, Ont.—The application of the Toronto, Barrie & Orillia Railway to be allowed to proceed with the construction of its proposed line was heard by the Cabinet Council of the Ontario government on Feb. 17. The company received authority some years ago to build the line and last year an application was made for a five-year extension of time which was granted on the condition that it would not come in force until a proclamation had been made by the Lieutenant-Governor. It was then agreed by the company that the gage and construction of the line be approved by the Hydro-Electric Power Commission and that the commission would have the right to acquire the line at any time at the actual cost thereof. On Feb. 17 the company, through its solicitors, asked that the act now be proclaimed by the Lieutenant-Governor, claiming to have already spent $55,000 in preliminary work and in grading, and to be allowed to proceed with the construction of the road. [Dec. 11, '15.]

Southern Pacific Company, Portland, Ore.—It is reported that this company will begin work this spring on the construction of the Holgate Street steel viaduct. It is estimated that the cost will be about $30,000.

***Lancaster, Pa.**—It is reported that surveys have been begun for an electric railway between Lancaster and Holtwood. Construction will begin this spring.

Pittsburgh, Harmony, Butler & Newcastle Railway, Pittsburgh, Pa.—Two routes across eastern Ohio territory are being sought by engineers of this company. One route would cross the State line into Columbiana County and, after touching East Palestine and New Waterford, connect with the Youngstown & Southern Railway at Columbiana. The other would pass through the county further south and form a connection with the Youngstown & Ohio River Railroad at Lisbon. The main line of this road lies between Pittsburgh and Newcastle.

Reading (Pa.) Transit Company.—This company has signed a contract with the Counties Gas & Electric Company, Morristown, to supply the electric power for operating its cars, commencing May 1, 1916. At present power is transmitted from stations in Collegeville and Shawmont, Pa. These two plants will be discontinued.

Cleburne (Tex.) Traction Company.—Work has been begun by this company rehabilitating its line in Cleburne.

Corpus Christi Railway & Light Company, Corpus Christi, Tex.—This company reports that it plans to construct about ½ mile of permanent track.

***Huntsville, Tex.**—Plans for an interurban railway from Huntsville to Brenham are being formulated by the Huntsville Business League through its president, S. S. Felder.

Ogden, Logan & Idaho Railway, Ogden, Utah.—It is reported that this company is contemplating the extension of its line from Preston north through Pocatello, Blackfoot, Idaho Falls and into Yellowstone Park.

Chester & City Point Railway, Chester, Va.—The contract for the construction of this company's line from Chester to City Point and Hopewell has been awarded to the Vaughan Construction Company, Inc., of Roanoke. A 60-ft. drawbridge will be constructed across the Appomattox River in connection with the construction of the line. H. D. Eichelberger, Chester, president. [Sept. 18, '15.]

Petersburg & Appomattox Electric Railway, Petersburg, Va.—It is reported that this company has begun the extension of its line from Hopewell to City Point, about 1 mile. T. M. Wortham, Richmond, president.

Virginia Railway & Power Company, Richmond, Va.—This company will construct a bridge across the Appomattox River to replace the present structure.

Seattle Municipal Street Railway, Seattle, Wash.—The city utilities committee of the Council has recommended the operation of cars on Division "A" of the municipal line from Pine Street over Fourth Avenue to Jefferson Street, instead of to Second Avenue and Washington Street, previously proposed. The city utilities committee recommends the change in routeing to be made because of the refusal of the receivers of the Seattle, Renton & Southern line, from whom common user rights will be obtained, to construct crossovers for cars of the municipal line. It is stated by operating to Jefferson Street only the existing turning wye will be used.

Spokane (Wash.) Traction Company.—Residents of the northeast section of Spokane have asked the Spokane Traction Company to build an extension on Madelia Street from Boone Avenue to Broadway. Plans are now under consideration by the company.

Monongahela Valley Traction Company, Fairmont, W. Va.—Plans are being made by this company to construct a 4-mile loop in East Side, Fairmont. It is reported that work on a new interurban trolley line from the mouth of Limestone Creek to Wilsonburg will be begun at once by this company and that when it is completed Wilsonburg cars will be operated by way of the Clarksburg-Fairmont line and the Adamston-Wilsonburg one abandoned.

SHOPS AND BUILDINGS

Detroit (Mich.) United Railway.—This company has contracted for the steel for its new erecting and woodworking shop at Highland Park. This is the third building in the general repair shop group, two of which have been constructed. The new building will be 238 ft. x 287½ ft. and a part of it will be two stories high. The same type of construction will be followed as was employed in the machine shop described on page 1314 of the ELECTRIC RAILWAY JOURNAL for June 13, 1914. This structure was built with a steel frame, brick curtain walls, metal sashes and concrete floors and roof.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York is advertising for bids, to be opened March 9 at 12.15 p. m., for the completion of construction of station finish at the Hunters Point Avenue station on the Queensboro subway in Queens. The Interborough Rapid Transit Company is now operating trains through the Queensboro subway (Steinway Tunnel) as far as this station, but the finish work upon it has not been completed.

Monongahela Valley Traction Company, Fairmont, W. Va.—Bids will be opened by this company about April 1 for the construction of a passenger and express station at Fourth Street, Clarksburg. The structure will be 70 ft. x 80 ft., three stories high, and will be of reinforced concrete and brick construction. The estimated cost is about $50,000.

POWER HOUSES AND SUBSTATIONS

Shore Line Electric Railway, Norwich, Conn.—Work has been begun by this company on the construction of a new power house to supply power for the company's line between New London and Norwich.

Rome Railway & Light Company, Rome, Ga.—This company has recently completed the erection of a 2300-volt transmission line to various parts of the city and suburbs.

Bloomington & Normal Railway & Light Company, Bloomington, Ill.—The Public Utilities Commission of Illinois has approved this company's application to extend a transmission line from Chenoa to Lexington.

Kankakee & Urbana Traction Company, Urbana, Ill.—This company is erecting a switch and transformer tower at Paxton, to be used in connection with the purchase of power from the Paxton plant of the Central Illinois Utilities Company. No substation will be built by the company in Paxton. As soon as the present construction work is completed into Paxton the Kankakee & Urbana Traction Company will feed current into the north end of its line, which is purchased from the Central Illinois Utilities Company, in addition to the power which it is now receiving from the Illinois Traction System at Urbana.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—Plans are being made by this company to extend its transmission line from Vinton to Shellsburg and to Reinbeck.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—This company will construct a high-tension power line to connect its plant at Lowellville, Ohio, with the plant at Ellwood City, Pa.

Manufactures and Supplies

ROLLING STOCK

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala., has purchased a large steel car.

Toronto (Ont.) Civic Railway will receive until March 14 bids on one single-truck double-end city car for its Bloor Street division.

Evanston (Ill.) Railway has purchased three double-truck, fully-inclosed, semi-steel city cars from the St. Louis Car Company. These cars will be equipped with Westinghouse 534-Y3 motors.

Waterbury & Milldale Tramway, Waterbury, Conn., has ordered two semi-convertible double-truck cars from the Wason Manufacturing Company, with a seating capacity for forty-four passengers.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, has ordered two steel, 55-ft. freight cars for the Toledo-Findlay division. A larger car will be placed in operation between Findlay and Mortimer.

Detroit (Mich.) United Railways has ordered fifty more trail cars, of the same type as those recently ordered from the G. C. Kuhlman Car Company. The railway company has also ordered twenty-four interurban passenger cars.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., expects probably to purchase three double-truck closed cars and a number of open double-truck and single-truck cars to replace those destroyed in its recent carhouse fire.

La Crosse (Wis.) City Railway has purchased seven double-truck, fully-inclosed, semi-steel city cars from the St. Louis Car Company. These will be equipped with Westinghouse 534-Y3 motors and St. Louis trucks. C. F. Speed, general manager Evanston (Ill.) Railway, will supervise the construction of these cars.

Wisconsin Railway, Light & Power Company, Winona, Minn., has purchased four single-truck, 31-ft. body, semi-steel cars from the St. Louis Car Company. These will be equipped with General Electric motors and control. C. F. Speed, general manager of the Evanston (Ill.) Railway, will supervise the construction of this equipment.

Northern Ohio Traction & Light Company, Akron, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Jan. 22 as having ordered fifteen all-steel city and ten semi-steel interurban cars from the St. Louis Car Company, has specified the following details for this equipment:

	City Cars	Interurban Cars
Seating capacity	....	56
Weight of car body only	16 tons	13 tons
Length of body	....	42 ft.
Length over vestibule	....	53 ft.
Width over sills	8 ft.	8 ft. 6 in.
Width over all	8 ft. 6 in.	8 ft. 8 in.
Height, rail to sill	36 in.	41½ in.
Body	Semi-steel	All steel
Interior trim	Mahogany	Steel
Headlining	Agasote	Agasote
Roof	Arched	Monitor deck
Airbrakes	West.	West.
Axles	Carnegie	Carnegie
Car trimmings	Dayton	....
Control	Type K	G. E. Type M.
Couplers	Tomlinson	Tomlinson
Curtain fixtures	Acme	Cur. Sup. Co.
Curtain material	Pantasote	Pantasote
Destination signs	Elec. Ser. Sup. Co.	Ry. design
Fareboxes	Cleveland	Cleveland
Gears and pinions	Tool steel	Tool steel
Gongs	Dedenda	Dedenda
Hand brakes	Peacock	Peacock
Headlights	Crouse-Hinds	Crouse-Hinds
Journal boxes	Symington	Symington
Motors	4-West.-307, outside hung	GE-240, inside hung
Paint	Sherwin-Williams	Sherwin-Williams
Seats	St. Louis, rattan	H. & K. plush and leather
Trolley base	O. B.	O. B.
Trucks	Brill 27 FE 1	Brill 27 MCB 2
Ventilators	Scullin	Automatic

TRADE NOTE

Elwell Trolley Frog Company, Los Angeles, Cal., reports that the Pacific Electric Railway, Los Angeles, Cal., has more than 1500 high-speed Elwell trolley frogs in service, and during the past five years fewer than ten have required renewal. This type of frog was described in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 19, page 374.

ADVERTISING LITERATURE

Carlisle & Company, New York, N. Y., have issued a booklet entitled "Tungsten, Its Properties and Uses."

Railway Storage Battery Car Company, New York City, has issued a catalog which contains operating data showing the low cost of operation on a number of railways which are using self-propelled passenger cars equipped with the Edison non-acid storage battery for motive power.

Thew Automatic Shovel Company, Lorain, Ohio, has issued a number of circulars describing its automatic shovels. One bulletin is devoted in particular to electric railway shovels. It describes the advantages and operating principles of electric shovels and contains data of their performance.

Sherwin-Williams Company, Cleveland, Ohio, has issued a catalog which contains useful samples of its various types of Old Dutch railway enamel shades, generally used for car painting. The catalog also contains helpful instructions for the application of its railway enamel with regard to new or burned off work, or for old work, or reshopping.

National Tube Company, Pittsburgh, Pa., has issued a seventy-two page booklet, printed in three colors, which embraces a list of the "Kewanee" specialties manufactured by this company. The bulletin contains a complete list of these specialties and shows instances of their satisfactory use. It also gives a list of the various types of literature issued by this company and descriptive of its different products.

Western Electric Company, New York, N. Y., has issued the sixth edition of its complete little handbook "How to Figure Illumination." This booklet lists complete tables and full illuminating data and illustrates and describes with complete characteristics all the various sizes and styles of "Sunbeam" Mazda lamps. The information contained in this booklet, together with curves and illustrative matter, is sufficiently complete to enable one to lay out any illumination plan.

Whiting Foundry Equipment Company, Harvey, Ill., has issued a catalog describing and illustrating its cupola for melting scrap iron, such as car wheels, cast-iron rail joints, etc. One of the chief advantages claimed for this cupola is that of fuel economy, resulting from a diffused blast arrangement. Softened blast tuyeres are used. The air, introduced in large volume at a moderate pressure, enters around the entire inner circumference of the cupola, and thus effects a large saving in fuel. Owing to the unequal distribution of the blast the uneven burning of the coke is avoided, and a softer, smoother texture of iron, desirable for machine castings is produced. Quick melting is another feature of this cupola construction. This company has also issued Catalog No. 119, describing its air hoists.

Bureau of Labor, Government of Porto Rico, San Juan, P. R., has issued a circular letter for merchants in the United States interested in the South American trade, which announces that this bureau has enrolled on its lists a great number of young men qualified as stenographers, bookkeepers, translators, salesmen, etc., who speak both English and Spanish and are equipped by their training in American high schools, and also in other private schools of commerce, to render an efficient service in these lines. The circular urges American merchants to start a vigorous campaign in Latin America by printing not only their correspondence, but catalogs, advertising, etc., in Spanish and Portuguese, and by selecting from the Portuguese and Spanish-American people a reliable, capable and intelligent personnel, which possess a thorough knowledge of business methods of both the United States and Latin America.

Auger Bit Company, Lebanon, N. H., has issued a catalog and sheet describing the Caldwell high-speed "Z" twist auger bit, useful for linemen and in repair shops. The twist in this auger bit is strong, as the edges are made to carry the strain. The center is light to allow chip passage. The screw is coarse and made double, giving double speed. The construction of the twist keeps the chip constantly close to the center and away from the edges. In this way the chip passes out in an orderly manner without crowding and choking. The side lips insure a smooth hole. A rib is provided in the inner edge of the twist so that one corner of the chip, which usually travels in half sections, is kept from coming in contact with the wall of the hole. The other edge of the chip rests on the inclined plane, which acts directly against the chip as a conveyor. Were it not for the provision of the rib, one end of the chip would strike the wall of the hole, become retarded in its progrss and prevent the passage of the following chips, creating excessive heat.

D. & W. Fuse Company, Providence, R. I., has issued a 4¼-in. x 7-in. booklet which shows that the company is fully alive to the needs for high-grade fireproof wiring. The modern developments described and accompanied, where necessary, by a wire table, are as follows: Round magnet wire; flat and square magnet wire; stove wire for wiring of electric stoves and ovens and in boiler rooms or other places where excessive moisture is not present; stranded conductor fixture wire, an asbestos wire superior to rubber for high temperatures, as in car fixtures; stranded conductor fixture wire with silk covering for exposed work; stranded conductor heater cord with rubber insulation; solid conductor switchboard wire; stranded conductor moving picture machine cable, available for railway controllers, searchlights and other high temperature conditions; stranded conductor duplex cable, also for the last mentioned purposes; solid conductor lead-sheathed cable for salt moisture conditions especially. The booklet also contains a supplement on Deltatape, Delta sheeting, Delta insulating varnish and Delta plastic compound and a price list of Deltabeston magnet wire.

Alexander Milburn Company, Baltimore, Md., has issued a catalog describing and illustrating its portable acetylene light. One of these types, especially adapted for use by emergency and line crews of electric railways, burns with a strong flame, concentrated by a deep 10-in. polished aluminum reflector, to give 4000 cp. and throw light 500 ft. Two swing joints on the burner pipe permit this light to be directed instantly at any angle without tipping the lamp. The flame may be regulated by a cock and is kept smokeless by an air-mixing reflector holder. A letter reproduced in the catalog reports satisfactory service from these lights on the Hudson Valley Railway, Glens Falls, N. Y., where they are used mostly for repair work on high-tension lines. In locating trouble the patrolman carries the light as he patrols the line. When making repairs this company uses two lights, setting them on the ground about 75 ft. on either side of the work. This gives ample light to work on top of the highest pole, practically as well as in broad daylight.

NEW PUBLICATION

Railway Regulation. By I. Leo Sharfman. La Salle Extension University, Chicago. 230 pages. Limp leather, $2, postpaid.

This book is a very readable digest of the leading problems in railway economics from the point of view of government regulation in the United States. While the author has confined his attention to the steam railroad aspects of regulation, most of the bigger principles discussed are equally applicable to electric railways. Mr. Sharfman's discussion of valuation is simply a summary of existing theories, with the statement that the present steam railroad valuation will doubtless result in a substantial contribution to the proper solution of the many railroad valuation problems. It is interesting to note that in the matter of state *versus* federal regulation for steam railroads, the author believes that the prevailing national character of American commerce and industry obviously necessitates a single unified control in the hands of the federal government, and that it is not unlikely that the chief future uses of the state commissions will be found in connection with the local utilities, for whose control such bodies are tending to dominate, if not to replace entirely, municipal regulatory bodies. The book as a whole is particularly designed to be useful to railroad men and shippers, but it should also appeal to anyone desiring a general résumé of the relations between government and transportation.

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.

Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVII NEW YORK SATURDAY, MARCH 4, 1916 No. 10

COST OF SUPPLIES INCREASING

The municipalities which are finding that electric railway companies are not increasing their service with the growth of traffic should hesitate before holding the companies at fault. The jitney of last year inflicted a double injury on the companies. It not only cut down their gross receipts during the spring, summer and early fall, but in so doing it discouraged the purchase of new equipment when prices were low. Now that the jitney seems to be passing as a factor in city transportation, the railway companies find that the demand in the munitions field has not only caused an increase in the cost of most railway supplies, but it has made them difficult to obtain at any price. We have published several articles on this situation as regards the cost of new cars. In the Financial and Corporate department of this issue we are publishing some other data obtained from several purchasing agents which show an equally marked increase for general railway supplies. For this condition the manufacturers are not to blame. Their predicament is about the same as that of the railway companies because of the higher cost of their raw materials. We are not prophets and cannot say how long this condition will continue. The subject deserves the most careful study, however, as well as full publicity, so that the public will understand the new burdens in the way of cost which have been put on utility operation.

ELECTRIC ENGINES IN SWITCHING SERVICE

The coincidence of publication in this issue of two brief articles on electric locomotives in switching service on widely separated railroads gives occasion for comment on the fact that yard work seems to offer in many cases a much more attractive field for electricity than main-line operation. This is mainly due to the peculiar character of the motive power that is required. Primarily, a switch engine is a machine requiring neither great speed nor energy output, but in their place it must have in the highest degree an ability to give rapid acceleration to loads of varying character. To meet this requirement the steam switch engine is invariably under-boilered and under-cylindered, the former because but little steam is needed and the latter because there must be no tendency to start slipping, a time-losing and therefore costly occurrence. Tractive effort is of vital importance. This is the feature that gives the electric switching locomotive its greatest advantage. The steam machine is usually designed to exert a maximum effort of not more than 20 per cent of the weight on drivers; the electric machine 25 per cent, giving the latter a pulling power nearly one and one-quarter times as great as the former under maximum loads. With the lighter loads which really constitute the bulk of switching work this increased tractive effort per ton of locomotive weight appears as increased acceleration. With one or two cars, for example, more effort is expended in accelerating the locomotive than in getting its load up to speed, and this, in part, accounts for the experience on the New Haven—the one railroad that has electrified really large yards. Here the thorough success that has been registered by electric switching is credited to the greater "smartness" of the electric locomotive, which has been estimated to give it an increase in daily capacity of some 60 per cent.

COMPANY SECTION NO. 9

The American Electric Railway Association company section just organized by the Cumberland County Power & Light Company begins its work under unusually favorable circumstances. The property is of moderate size, and a very democratic spirit prevails among the employees. The management insisted that if a section was organized it must be an employees' organization. At first a certain skepticism was manifested by some of the men as to the benefits which would come to them from its activities. This was dispelled after the purposes and plans had been explained and the work of other sections had been described. It is evident from the start that the transportation department is to play an important part in the section work, as indeed it should do in that of all sections by virtue of the proportionately large number of employees in this department. But in the older sections, formed in the days of the $5 membership fee, the proportion of platform men in the original membership was necessarily smaller than in the new section. In Portland a conductor was the temporary chairman chosen by representatives of the several divisions of the transportation department. The first president, although now track superintendent, was formerly a conductor; the vice-president is a conductor, while one director is a motorman and another is a conductor. This situation in regard to section leadership is characteristic of a change which must come over the older sections as their membership grows under the stimulus of the lower dues. The rank and file of the sections will be platform men. These are "the company" to the mass of patrons of the railway, and the thoughtful ones among them wish fitly to represent the company to the public. The company section affords an excellent training ground for this purpose. Future section programs and activities must be planned largely for the platform men, and the organization plan of Section No. 9 is conducive to this end.

ONE-MAN CAR IN LARGE CITIES

Elsewhere in this issue is published a series of statements covering experiences with one-man cars in a number of cities whose population is in excess of 25,000. The most interesting feature is the definite unanimity of opinion that one-man cars, instead of increasing accidents as has been sometimes charged in the past, actually tend to reduce them. In addition to this it is evident that in the dozen or more of communities whose experiences are cited, one-man operation has been thoroughly satisfactory, both to the public and to the railway company. The alleged difficulty at railroad crossings appears in practice to be really no difficulty at all, and the possibility of making each car take a reasonable share of the day's work is demonstrated by the fact that the daily earnings can reach the perfectly normal figure of $35. Summed up, the published statements show that the one-man car is a thoroughly practical operating unit and that, on any line where it is really required, its adoption may be considered without fear of unexpected and disastrous complications. Of course one-man operation is not a cure-all. The question of platform expense is not an all-important one, as demonstrated (from a diametrically opposite situation) by experience with train operation, and there are limits in regard to frequency and extent of passenger interchange beyond which the one-man car ceases to be economical. When a car has to remain stationary while a platform-full of passengers have change made, an extra platform man is by no means a useless appendage. This is going to keep the one-man car out of downtown New York and the Chicago loop district no matter what results it may show in cities with lighter traffic, and that fact may well be borne in mind at all times in considering its possibilities.

AN UNUSUAL BRITISH ELECTRIFICATION

The latest electrification of the Lancashire & Yorkshire Railway, which is described in the leading article in this issue, is the result of an unusually extended experience with electric operation in general. For years the railway company has been operating a 600-volt, third-rail line between Liverpool and Southport, which was changed from steam to electric operation to increase suburban passenger receipts, these having fallen off owing to severe competition with parallel surface railways. In 1913, the company, recognizing the inherent limitations of this low voltage, equipped a 4-mile experimental line between the towns of Bury and Holcombe Brook with a 3500-volt direct-current, overhead-contact system and motor cars having four motors permanently coupled in series. This line, like the company's most recent electrification, was located in the suburban district of the manufacturing city of Manchester, and it was operated with self-propelled steam-motor cars prior to the introduction of electric operation. It was considered to be an excellent piece of track for tests because it had relatively frequent and fast service over grades of 2.5 per cent.

In general, the tests appeared to be satisfactory, but apparently the great increase in voltage was considered to be too radical a step to be undertaken for permanent construction. Even during the early operations of the Bury-Holcombe Brook line, a commission of three officials of the railway company came to the United States for the purpose of studying operating conditions on high-tension electric railways in this country, and at about the same time preliminary work was undertaken in connection with the 1200-volt third-rail line between Manchester and Bury, which has just been completed.

The new electrification is strictly a suburban proposition, including some 10 route-miles and about 22 miles of single track. Electrification of the rolling stock is confined to passenger cars that are operated in multiple-unit trains. Prior to the electrification, the line suffered severely from tramway competition, but it is fully expected that greatly increased traffic will follow the improvement in the service as soon as normal conditions are restored in Great Britain, experience with the Liverpool-Southport installation having demonstrated the practicability of electric operation as a traffic stimulant. This was, in fact, the immediate reason for the change in motive power, no tunnel or congested terminal conditions having made it imperative. The installation, judged by American standards, is therefore unique, since the principle of filling up the valleys in the suburban load curve by frequent midday service has not been put in practice in any of our steam railroad electrifications, although it has been recognized by a few of our engineers.

From the standpoint of American technical practice, also, there are a number of features in the installation whose novelty makes them especially noticeable. Storage batteries with booster sets have been installed, these being plainly designed for flattening out the effects of swings in the load. Such equipments have become more than unusual in this country ever since the first cost of power generating and distributing apparatus reached relatively low figures, although it should be remarked in this connection that the extremely short length of the route and the necessarily small number of trains in operation at ony one time, present conditions that are not directly paralleled anywhere in America. The contact voltage, too, 1200 volts, is at least uncommon for electrified steam railroad service in this country, the Piedmont & Northern and the Fort Dodge, Des Moines & Southern installations being the only prominent ones. With this voltage, and the heavy multiple-unit trains that the Lancashire & Yorkshire has to handle, the use of a third-rail contact system is easily understandable, although the recent tendency in American practice has been away from it, especially when the higher voltages are involved, because of the inductive surges, the relatively short arcing distance between the live rail and the grounded car trucks, and the difficulty of protecting persons against an accidental contact, which are its inherent characteristics. With regard to the latter consideration, however, it must be said that the officials of the Lancashire & Yorkshire Railway have succeeded in working out a novel scheme of third-rail protection for exposed track which should be exceptionally effective.

THE ZONE SYSTEM AGAIN

The question of the zone system versus the uniform fare system was brought up at the New York State meeting by W. J. Harvie, but unfortunately there was little discussion upon the chief suggestions made in the paper, namely, the basis upon which a zone system for city fares can be established, the methods of collecting the fares and the general desirability of the plan. There are undoubtedly a great many arguments in favor of the zone system on account of the decreasing purchasing power of the 5-cent piece. We are rather inclined to favor the usual form of zone system with overlaps in city service than a strict proportioning of fare to distance, as recommended by Mr. Harvie, and would word his three fundamental principles somewhat differently, say as follows:

1. The passenger is willing to pay a reasonable amount for being transported a desired distance.
2. The carrier desires to furnish transportation on a basis which will yield him a fair profit.
3. The basis of charge for the distance traveled should be as equitable to both the passenger and the carrier as the convenience of both and the practical conditions of fare collection will permit.

And we would add another, as follows:

4. The interests of the community at large demand a fairly large minimum fare zone and high minimum fare to prevent congestion in urban living conditions.

It was undoubtedly the convenience of the nickel fare in the early days of city transportation which led to its general adoption in this country, coupled with its compliance with the first two principles mentioned. An indirect advantage was the fourth principle, but that was probably not considered at the time.

With the growth of the urban systems, however, and with operating conditions and taxes as high as at present, the 5-cent fare no longer in many cases fulfills the requirements of Principle 2, and some change is necessary. If the zone system is adopted, the needs of Principles 3 and 4 would seem to dictate the retention of the 5-cent fare as the minimum charge, and that for it the company should give as long a ride as its financial conditions permit, and the minimum fare zone should be at the center of the city so as to serve the convenience of as many passengers as possible.

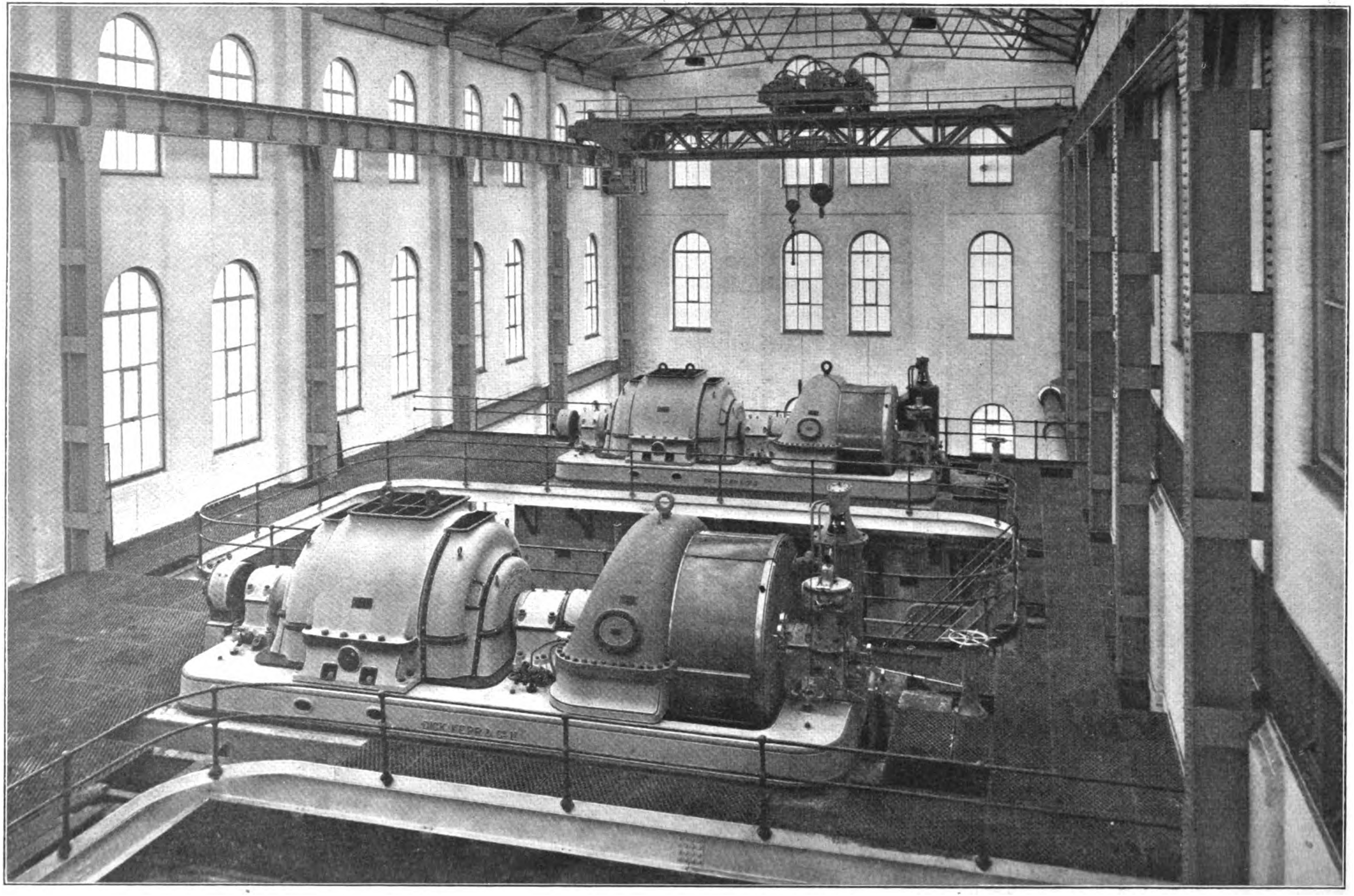
The four principles which we have cited apply just as strongly to the determination of the extent of the second zone and the fare to be charged therein as to the size and fare charge in the first zone. In other words, both should be fairly large so as to reduce the complications of fare collection to both passengers and company. We do not believe that in the second zone, any more than in the first zone, it is of any real importance to proportion the fare exactly to the distance traveled. Theoretically, there may be some injustice to the passenger in a charge of 5 cents for a ride of a few blocks, but the plan is no more unfair to the passenger than that of requiring the company to provide its long-distance riders with a ride longer than that for which 5 cents is a fair charge. We are not prepared to say that the charge in the second zone should be another 5 cents, but it should certainly be not less than 2 cents.

The problems of fare collection in any zone system seem tremendous to one used only to the simplicity of the uniform fare. But the European zone system, with the attention which the conductor and inspector must give to individual passengers is not essential to the successful operation of the plan, as shown in Milwaukee and Cleveland. In fact, with modern types of cars in which there can be pay-enter entrances and pay-leave exits the difficulties in the use of the zone system, while not eliminated, are greatly reduced.

TENTH BIRTHDAY OF C. E. R. A.

Slightly more than a decade ago the Central Electric Railway Association was formed by the amalgamation of the Ohio Interurban Railway and the Indiana Electric Railway Associations. The achievements of this association during the ten years of its existence are emblematical of the real worth of an organization of this kind when full advantage is taken of the opportunities it offers. At the banquet held at the annual meeting of this association at Dayton, Ohio, President Henry pointed with pride to the fact that it now embraced more than 4000 miles of interurban road and had more than 142 supply men members. The mileage mentioned includes practically all of the important interurban lines in four states. Although this organization was intended primarily as a clearing house for the solution of operating problems, it has not only fulfilled that purpose admirably but has afforded a means of united action in other directions. In their relations with the regulatory bodies of Indiana, Ohio, Michigan and Kentucky, the various railway members, manifestly, must deal with the commissions having jurisdiction over them. The experiences and counsel of all the member companies, however, are at the disposal of anyone in solving regulatory problems.

In many ways the Central Electric Railway Association has blazed the way in adopting and trying out standards. In this particular the Traffic and Accountants' Associations, subsidiary organizations, have accomplished much. These two subordinate bodies have co-ordinated many operating differences to the great benefit of the parent body. The former has provided traffic interchange agreements, interchangeable mileage and harmonized schedules, and the latter has prepared standard methods of accounting which have also been adopted by the American Electric Railway Accountants' Association. Undoubtedly the large measure of success atttained by this association is due to the fact that throughout the period of its existence it has had the hearty support and active co-operation of practically every member company. Moreover, the membership among the representatives of manufacturers, in many instances, has been an important factor in solving difficult operating and legislative problems. We congratulate the Central Electric Railway Association upon its enviable record, and if the experiences of the decade just passed may be taken as an index, this organization will be of great benefit in solving future problems.



LANCASHIRE & YORKSHIRE ELECTRIFICATION—INTERIOR VIEW OF TURBINE ROOM

New Suburban Electrification in England

Lancashire and Yorkshire Railway Installs 1200-Volt, Third-Rail, Direct-Current System for Passenger Service Between Manchester and Bury—All Steel Multiple-Unit Cars and a New Power Station with Storage Batteries Are Features of the Installation

THE latest electrification of the Lancashire & Yorkshire Railway, which covers approximately 22 track-miles on the line between the city of Manchester, England, and the suburban town of Bury, has special interest because it marks the first step of an important electrification scheme for the entire Manchester area. In this installation, the use of the third-rail, direct-current system, as used on the company's Liverpool and Southport line, has been adhered to but the voltage has been raised from 600 to 1200. The railway has been led to adopt this higher voltage because of the satisfactory results gained on its electrified line between Bury and Holcombe Brook, where direct current is used at 3500 volts, but with overhead construction.

In consequence of the war the full service of electric trains has not been put into force, but 27 per cent of the existing steam trains will be replaced by electric trains, and further electric trains will eventually be added which will augment the present service by 25 per cent. When the full electric service is established there will be ninety trains in each direction per day.

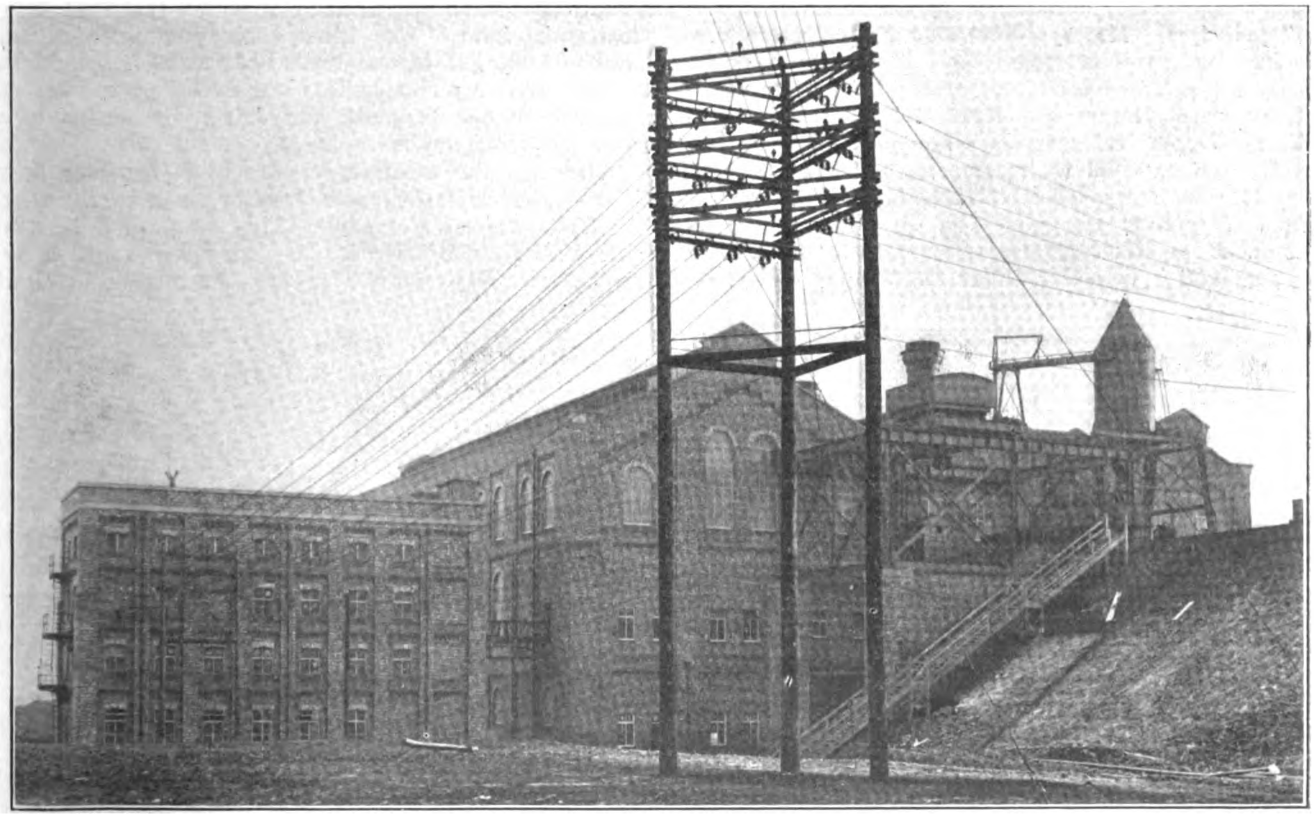
POWER STATION

The power station for the installation has been built on the main line near Manchester adjacent to extensive coal fields and to a good supply of water from a canal owned by the railway company. The ground level at the power station is 37 ft. below the main line, which at this point is carried on an embankment, thus enabling coal cars to be run directly over the tops of the coal bunkers and obviating the necessity of installing coal conveying appliances. Although the canal furnishes the normal supply of cooling water, a spray cooling pond is also provided to supplement the flow from the canal when necessary.

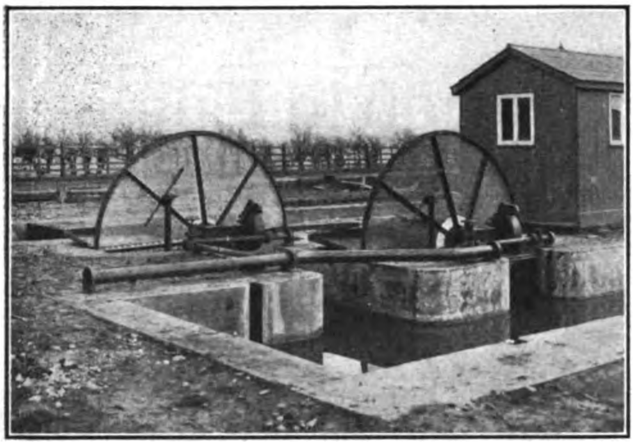
In the power house the boiler room is parallel with the turbine room, and at present contains three Babcock & Wilcox water-tube boilers, each having a normal evaporation of 32,000 lb. of water per hour, the steam being at 200-lb. pressure per square inch, superheated to 700 deg. Fahr. Eventually the boilers will be arranged in pairs, each pair making up a steam unit and being provided with its own induced-draft plant and chimney.

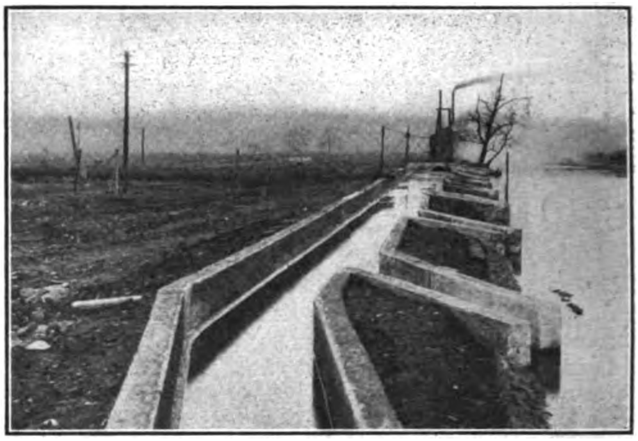
The boilers are fitted with B. & W. chain-grate, motor-driven stokers having variable-speed gear boxes allowing a speed variation to the grate of from 6¼ ft. to 25 ft. per hour. The grate area of each boiler is 144 sq. ft., the heating surface 7135 sq. ft., and the superheating surface 2635 sq. ft. Green economizers are placed above the boilers, each fitted with 256 tubes, 4 9/16 in. in diameter and 9 ft. long, and induced-draft motor-driven fans are installed to remove the products of combustion from each pair of boilers when working together.

The chimneys are made up of mild-steel plates varying from 5/16 in. to ½ in. in thickness. They are 6 ft. in internal diameter and brick lined, the tops being 87 ft. 6 in. above the firing floor. The ash from the back ends of the grates is taken periodically by means



LANCASHIRE & YORKSHIRE ELECTRIFICATION—GENERAL VIEW OF POWER STATION AND SWITCH HOUSE





LANCASHIRE & YORKSHIRE ELECTRIFICATION—CONDENSING WATER SCREENS AT INTAKE; DISTRIBUTING OUTLETS FOR DISCHARGE INTO CANAL

of a B. & W. suction ash-handling system to a large receiver from which it is loaded periodically into cars at the main-line level. Provision is made so that soot from the economizers can be dealt with in the same way. Electrically-driven ash breakers are provided between the ash hoppers under the grates and the suction ash pipe. The ash receiver has a capacity of 30 tons. Its air exhauster is motor-driven, and is of the Root blower type made by the B. F. Sturtevant Company, having a capacity of 3250 cu. ft. of air per minute at a pressure of about 2½ lb. per square inch.

For checking the coal supply, a 30-ton weighing machine is provided on the approach track to the coal bunkers and no weighing apparatus has been installed on the bunkers themselves.

POWER-HOUSE EQUIPMENT

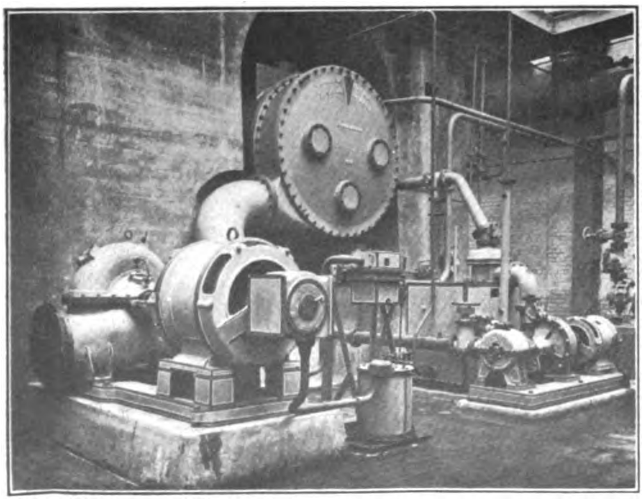
Two main generator sets, each having a normal capacity of 5000 kw., are installed. The turbines were manufactured by Dick, Kerr & Company, and they are of the impulse type, having a Curtis wheel at the high-pressure end, the remainder being bladed on the "Rateau" principle. The speed is 1500 r.p.m. Each turbine has two rows of "Wolfram" steel blades on the velocity wheel, and ten rows of brass blades on the low-pressure wheel, the axial and radial clearances being 5 mm. and 7 mm. respectively. The governor gear of each turbine is fitted with a small electric motor, enabling it to be controlled from the main switchboard.

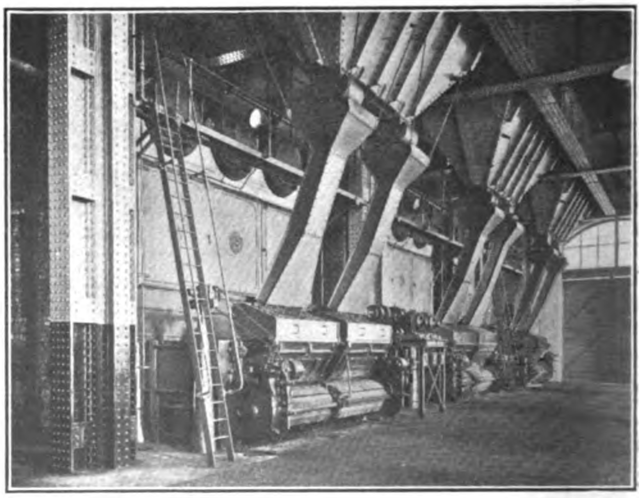
Each alternator consists of a Dick-Kerr two-pole three-phase machine, generating current at 6600 volts, 25 cycles, and is capable of carrying 25 per cent overload for two hours and 50 per cent overload for five minutes. The alternators are self-ventilated, and the air for ventilation passes through Heenan & Froude wet-air filters, each of which can deal with 30,000 cu. ft. of air per minute, the air passing through the filter at an approximate velocity of 1500 ft. per minute.

Each turbo-alternator is complete with its own surface-condensing plant, which consists of condenser, steam jet ejector, circulating water pump, kinetic air pump, and extraction and delivery pumps. The condensers can deal with 82,000 lb. of steam per hour, maintaining a vacuum of 28.1 in. at full load when supplied with cooling water at the rate of 6700 gal. per minute at a temperature of 75 deg. Fahr. The total cooling surface is 9500 sq. ft. obtained from 3464 ¾-in. tubes.

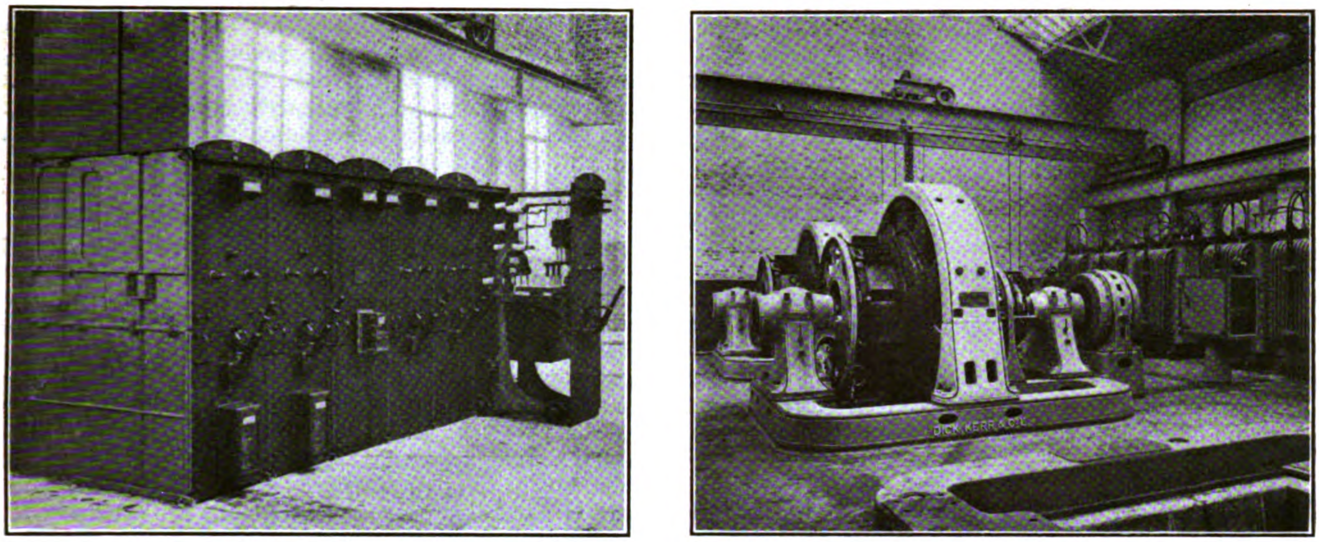
The circulating water pumps are of the centrifugal self-regulating type, directly driven by slip ring induction motors of 110 hp. The steam-jet ejector is supplied by a 1¼-in. steam pipe, and the estimated steam consumption is 0.75 per cent of the turbine steam consumption. When on full load, this will take 465 lb. of steam per hour. The kinetic air pump, which can handle 45,000 gal. of water per hour at 90-ft. head, and the extraction pump and the delivery pump are all mounted on one bedplate and driven by means of a 45-hp. slip-ring motor.

Power for the auxiliary apparatus is provided by a 500-kw. gear-driven turbo-alternator, built by the British Westinghouse Company. This set, which is complete with a Le Blanc surface-condensing plant, generates power at 440 volts, 25 cycles, the turbine being of





LANCASHIRE & YORKSHIRE ELECTRIFICATION—CONDENSER AND PUMPS BELOW MAIN TURBINE; STOKERS AND COAL HOPPERS



LANCASHIRE & YORKSHIRE ELECTRIFICATION—A.C. SWITCHBOARD OF CUBICLE TYPE IN SUBSTATION, ONE PANEL BEING WITHDRAWN FOR INSPECTION OF APPARATUS; ROTARY AND TRANSFORMERS

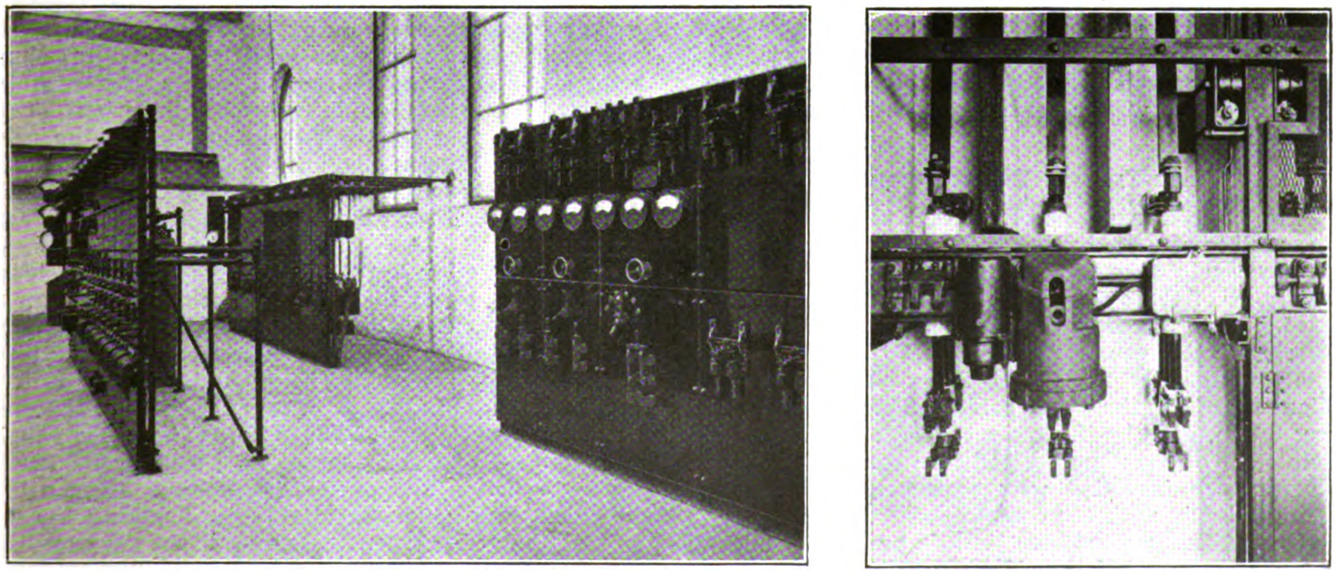
the high-pressure impulse type running at 3600 r.p.m. The gearing gives a speed reduction of 3600/750 r.p.m.

A 1460-gal. hot well is arranged centrally between the main generators. It is divided into two compartments, so that the valves may be examined, and the tanks cleaned and painted, without putting it out of commission. The water is heated by means of four 3-in. exhaust steam ejectors, the exhaust steam being taken from the turbine-driven feed pump. Two test tanks, mounted on weighing machines, are carried on the top of the hot well and arranged to work alternately and independently of each other. The condensates from all the sets are so conveyed to the hot well that the condensate from any one set can be passed through the test tanks, while the others are delivered directly to the hot well. Each test tank has a total capacity of 3800 lb. of water, discharging through a 6-in. quick-acting valve directly into the hot well below.

At present the station is equipped with two boiler feed pumps, one turbine-driven and the other a reciprocating pump, both capable of delivering 10,000 gal. of feed water per hour against a head of 217 lb. per square inch. The latter is the only reciprocating machine in the station. It is intended that the turbine pump should be used in service, and the reciprocator as a standby. Both pumps are situated near the hot well, and at such a level that they are always flooded. The turbine pump is of the high-lift, multiple-chamber type, absorbing 40 hp. It is driven by a horizontal Curtis turbine and runs at 3000 r.p.m.

Condensing water is obtained from the canal, and it passes first through a bar screen, which stops the entrance of the larger pieces of floating matter, and then through rotary screens, which check the smaller weeds, etc., before reaching the cooling pond. The rotary screens are two in number, each 10 ft. in diameter, and rotate at 1 r.p.m. They are driven by Pelton wheels through worm gearing. The water for driving them is obtained from the spray pump discharge and is under a head of 18 ft. The screens are cleaned by means of rotating jets, which spray on the exposed portion of the screens on the side away from the incoming supply of cooling water.

Connections are taken from the discharge main to the spray pumps, which are similar to the main circulating pumps, so that the hot circulating water can be pumped back to the cooling pond through the spray nozzles. Thus, two methods of cooling are available, or a combination of both methods can be used at the same time. The cooling pond is 408 ft. long, 109 ft. wide and 2 ft. 6 in. deep. The spraying arrangement is capable of cooling 402,000 gal. of water per hour from



LANCASHIRE & YORKSHIRE ELECTRIFICATION—SWITCHBOARDS ON CONTROL PLATFORM; OIL SWITCHES WITH OIL RECEPTACLES REMOVED

95 deg. Fahr. to 75 deg. Fahr. under normal atmospheric conditions, being so arranged that slight extension to the pipe work will double the capacity. A total of 288 nozzles are provided for the present plant, each nozzle orifice having an area of 0.39 sq. in. and being capable of passing 1396 gal. of water per hour at a head of 18 ft.

At the end of the station are arranged the storeroom, offices, and switchboard platform. The stores are alongside the main entrance on the basement floor, and immediately above them on the turbine-room floor are arranged the offices for the operating staff. The control switchboards are placed on a gallery above the offices, overlooking the turbine room, and the control wiring is accommodated in the cable room between the ceiling of the offices and the switchboard gallery.

SWITCH GEAR

There are three separate switchboards, namely: the main control board for operating the main units and feeders; a 440-volt a.c. board operating the station auxiliaries, and a d.c. board controlling the control circuits, lighting, cranes, and standby battery for the control circuits.

The switch gear, manufactured by the British Thomson Houston Company, is of the solenoid-operated, remote-control type. The main switch gear is housed in a separate four-story building, access to which is obtained by a foot bridge from the turbine-room floor.

The main switch gear in the switch house is contained in cells built up of molded stone, each phase being separated throughout with barriers of the same material. Duplicate busbars with the busbar isolating switches are placed on the floor above the switchroom, the cell construction being of a similar character to the above. The fronts of the cells are covered by expanded metal sliding screens, these being interlocked with isolating switches so that it is impossible to open out any cell until the isolating switches controlling the apparatus in that cell have been opened. The cells containing the oil switches have metal doors which are not interlocked.

In normal running, the station auxiliaries will be worked through two 6600-440-volt transformers of 250 kw. each, enabling the 500-kw. auxiliary set to be shut down. During periods of very light load, such as lighting of stations during the night time, the auxiliary set can be run alone and the voltage raised through the same transformers to 6600 for transmission to the various stations or freight yards.

The direct current at 125 volts is obtained by means of two 50-kw. rotary converters operating through transformers from the 440-volt supply. These are used in conjunction with a seventy-cell battery and a small booster.

HIGH-TENSION TRANSMISSION LINE

Two main transmission lines each about 4 miles long are used to convey the power from the power station to the two substations. Both consist of three overhead cables, or of three-core cables, paper insulated, lead covered, and armored with steel galvanized wires. The overhead cable consists of 7/10 S.W.G. per phase, and the three-core of 19/14 S.W.G. per phase. The outer diameter of the three-core cable is 2.293 in., the armoring 0.1 in. and the thickness of the lead 0.14 in. The joints are of the plumbed lead-sleeve type, and the conductors are insulated with paper sleeves, the boxes being filled in with compound.

One of the transmission lines is practically all overhead, cable only being used when passing under public bridges. The other consists of 1¼ miles of overhead and 3½ miles of cable. The overhead is carried throughout on "H" poles, the conductors being arranged three on each side of one pole, the other being left for future extensions. The standard span used is 210 ft. The three-core cable is carried on posts and, where convenient, on wall brackets. Both lines are in duplicate, and under ordinary working conditions will both be in use.

The "H" poles consist of two fir poles of an average diameter of 10 in. 6 ft. from the butt. The cross-arms supporting the insulators are of channel iron, 4 in. x 2 in. x ½ in., clipped on to the pole. The pole is also braced with wooden struts and bolts, but no anchor stays are used except at points where the line makes an angle. The whole of the armoring and the iron work on the poles are earthed to copper earthing plates at quarter-mile intervals. No lightning arresters are used, but at the points where the cables enter the power station and substations, choking coils are provided.

SUBSTATIONS

Each substation is equipped with three 1000-kw., ten-pole rotary converters, manufactured by Dick, Kerr & Company, operating six-phase, 25 cycles, 300 r.p.m. The overload capacity of each is 100 per cent momentarily, and they can be run continuously at 25 per cent overload. They are arranged with an induction motor on the end of the main shaft for starting and self-synchronizing. No arrangements for starting from the d.c. side are provided.

The transformers are of the oil-cooled type, and are inclosed in sheet-steel cases fitted with external tubes for radiating the heat and circulating the oil. The tubes are welded into position and this gives a perfectly oil-tight case.

BOOSTER SYSTEM

An Entz booster of the automatic reversible type with carbon regulator, made by Mather & Platt for the Chloride Electrical Storage Company, is installed in the rotary room. This consists of three continuous current machines—booster, motor and exciter—all coupled together and mounted on one bedplate. The outfit gives an output of 900 amp. at 185 volts continuously, or will give 2000 amp. at 190 volts for fifteen seconds. Its output for charging the battery is 300 amp. at 300 volts continuously, and the voltage can be raised to 400 for overcharging. These latter ratings are obtained by hand regulation.

The booster is shunt wound and is excited from the exciter for automatic working, or from a portion of the battery for hand regulation. The exciter also is shunt wound, and is separately excited from a portion of the battery. Its excitation is controlled by means of an automatic carbon regulator connected up on the principle of the Wheatstone bridge and operated by the main generator output. The exciter is capable of fully exciting the booster when the latter is doing its regulating work.

To prevent a lag in reversing, the exciter is designed to give three times the excitation voltage necessary to give the required boost, and the carbon regulator automatically throttles the excess current when the correct boost has been reached. The motor is capable of driving the booster at all loads, when running off a 1200-volt circuit, at the speed of 520 r.p.m. The speed can be raised to 650 r.p.m. by means of a shunt regulator in order to obtain the overcharge voltage. The set is provided with a device suitable for breaking the circuit of the motor when the speed of the set exceeds a definite amount.

The battery, which is housed in a separate building outside the substation, consists of 580 Plantide cells, manufactured by the Chloride Electrical Storage Company. The capacity is 500 amp.-hr. on the one-hour rating, and the charging current can be raised up to 1500 amp. for fifteen seconds.

Each cell is contained in a pitch-pine box lined with sheet lead, and this box is of such a size that the capacity of the battery can be increased ultimately to 800 amp.-hr. by the addition of more plates. The positive plates are of the formed type and the negative plates are of the box or cage type, each plate consisting of an antimonial lead cage in halves, riveted together.

Each battery is divided into two portions, high-voltage and low-voltage, which are connected through an isolating switch, and when it is desired to carry out work on the 600-1200-volt portion of the battery, the isolating switches are opened, which reduces it to the same condition as the low-voltage half.

A combined charging and milking booster for the battery is installed in the rotary room, this consisting of two continuous current machines—one motor and one generator—coupled together. The set is capable of charging the cells, fifty in number, which are connected to the Entz booster, in two hours a day, charging twenty-five cells at a time, and giving 45 amp. at 40-70 volts. The motor is suitable for working on a 1200-volt circuit, and the booster is arranged for exciting from the cells to which the Entz regulator is connected. The set is also capable of milking the cells with an output of 200 amp. at from 2 volts to 14 volts.

The switch gear for each substation is in two parts, one of the "cubicle" type controlling the high-tension feeder and transformer leads, and the other of the flat-board type controlling the d.c. rotaries, battery, booster and live rail. The feeder and high-tension cubicles each contain a hand-operated oil switch, the connections to the busbars being made through switch clips at the back. The arrangement is such that the whole of the apparatus can be withdrawn from the cubicle for inspection purposes, interlocking devices being used to prevent the apparatus being withdrawn or replaced when the oil switch is closed.

THIRD-RAIL SYSTEM

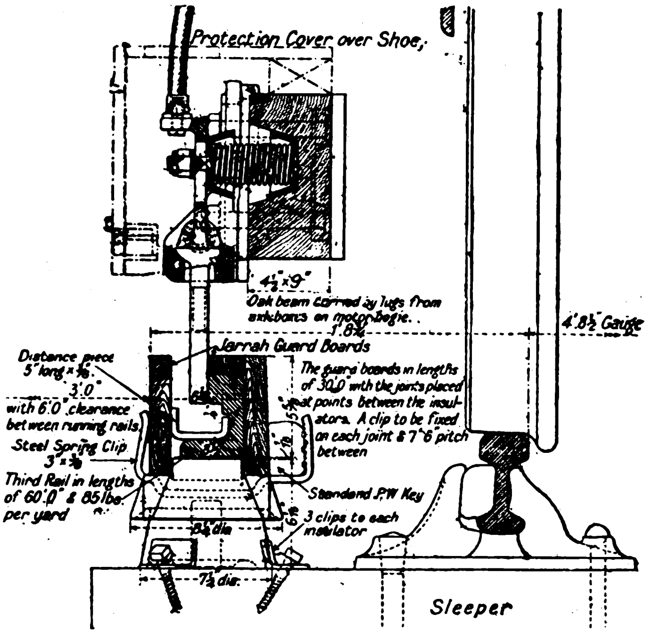
Although the contact system adopted is of the well-known third-rail type with track return augmented by a fourth rail, a considerable departure has been made from the previous practice in that a side-running contact has been provided instead of over-running or under-running. This has been brought about by the fact that 1200 volts, which is the maximum voltage allowed on third-rails, necessitates more adequate protection against shock, and the form of rail adopted is admirably adapted for being protected. This, of course, also applies to the under-running type, but here the objection was the small clearance available.

The third-rail and its protection, also its relative position to the track rails which was shown in the ELECTRIC RAILWAY JOURNAL for July 24, 1915, is the invention of J. A. F. Aspinall, general manager Lancashire & Yorkshire Railway. It is very compact, lies close to the running rail, and gives the maximum space for platelayers and other workmen in the 6 ft. where the rails are normally fixed.

The third-rail guards are made of jarrah wood, which was adopted for its non-combustible qualities, and are held in position by clips secured by ordinary rail-chair keys, no screws or nails being used. The arrangement is such that a projection on the upper portion of the insulator acts in conjunction with the guarding as a key which keeps the rail in position. The insulator itself is kept in position by three small brackets. The rail, however, does not rest directly on the porcelain insulator, but a wooden packing is inserted between to act as a buffer.

The normal spacing of the insulators is approximately 12 ft. The live rail is anchored every 100 yd. by a specially-designed anchor insulator. The third-rail insulators are of white porcelain completely vitrified throughout and glazed all over, and are 6½ in. high. The actual creeping surface is 8 in. from metal to earth.

The cross-sectional area of the rail is 8.35 sq. in., and the weight 85 lb. per yard, its resistance ranging between six and a half and seven times that of copper of equal area and length. The normal length of the rail is 60 ft. and each joint is bonded with two flexible strip copper bonds, each bond having an effective cross-sectional area of 0.4 sq. in. The chemical composition of the rail is:


Protection Cover over Shoe
4½"x9"
Oak beam carried by lugs from axleboxes on motor bogie.
1'8¼
4'8½" Gauge
Jarrah Guard Boards
Distance piece 5" long x ⅜
3'0"
with 6'0" clearance between running rails
Steel Spring Clip 3"x⅜
Third Rail in lengths of 60'0" & 85lbs. per yard
The guard boards in lengths of 30'0" with the joints placed at points between the insulators. A clip to be fixed on each joint & 7'6" pitch between
Standard P.W. Key
3 clips to each insulator
8¾ dia
7½ dia.
Sleeper

LANCASHIRE & YORKSHIRE ELECTRIFICATION—SECTION SHOWING THIRD-RAIL SHOE AND GUARD

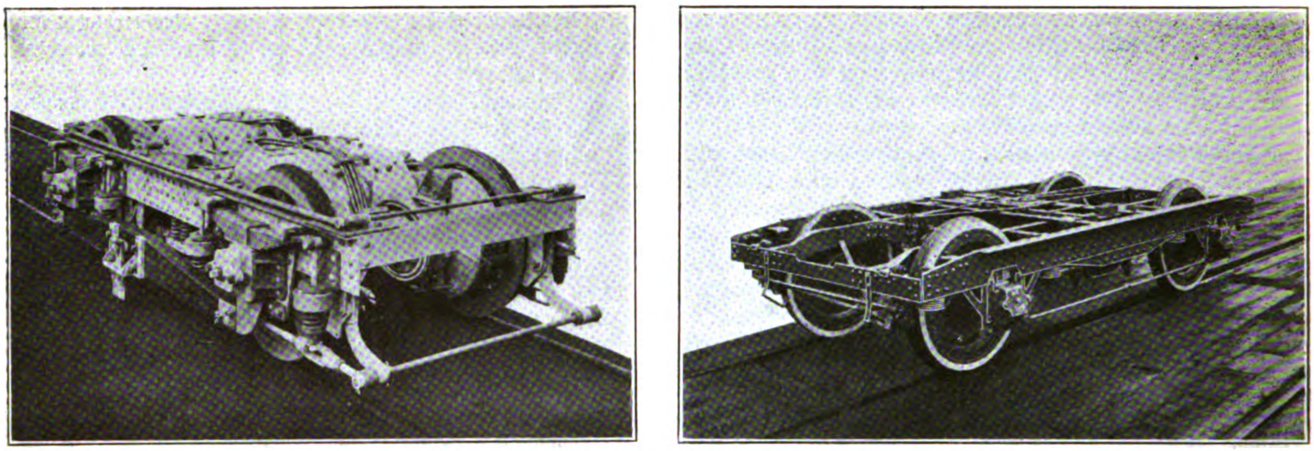
Carbon	0.08 per cent
Phosphorus	0.034 per cent
Manganese	0.22 per cent
Sulphur	0.026 per cent
Silicon	0.022 per cent
Iron	99.618 per cent

The fourth or return rail is of square section with rounded corners, and weighs 88.5 lb. per yard with a cross-sectional area of 8.84 sq. in., the chemical composition and electrical conductivity being the same as the live rail. This section has been adopted on account of the small surface exposed over a given volume of rail, and therefore involves small maintenance in painting, etc.

The fourth rail is cut in lengths of 60 ft. and is placed between the running rails. It rests on wooden pads 1 in. thick, which are secured to the sleeper by iron dogs, and is anchored at intervals of 100 yd. There are two bonds per joint and the effective cross-sectional area is 0.325 sq. in. per bond. The fourth rail is also cross-bonded every 100 yd. to the track rails with cable bonds of 37/15 S.W.G. copper. The track rails are also bonded by cable bonds.

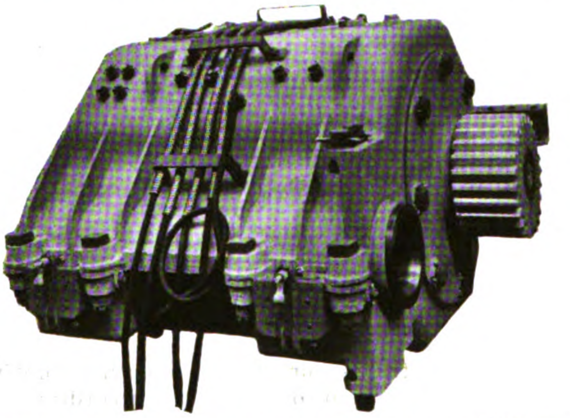
CAR EQUIPMENT

The rolling stock for electric operation includes both motor cars and trailers. The motor trucks, which were designed and built by the railway company, carry two



LANCASHIRE & YORKSHIRE ELECTRIFICATION—TRUCKS FOR MOTOR CAR AND TRAIL CAR

200-hp. motors mounted and geared to the axle through spur gearing, the ratio being 25:59. On either side of the truck is mounted a shoe beam carrying the controlling shoe. Each motor car is provided with two of these trucks, making a total of four motors, or 800-hp. per car, the gradients on the line being somewhat severe. The wheelbase is 9 ft., and the diameter of the wheels 3 ft. 7 in., the wheels being of standard locomotive pattern. Clasp brakes are used.



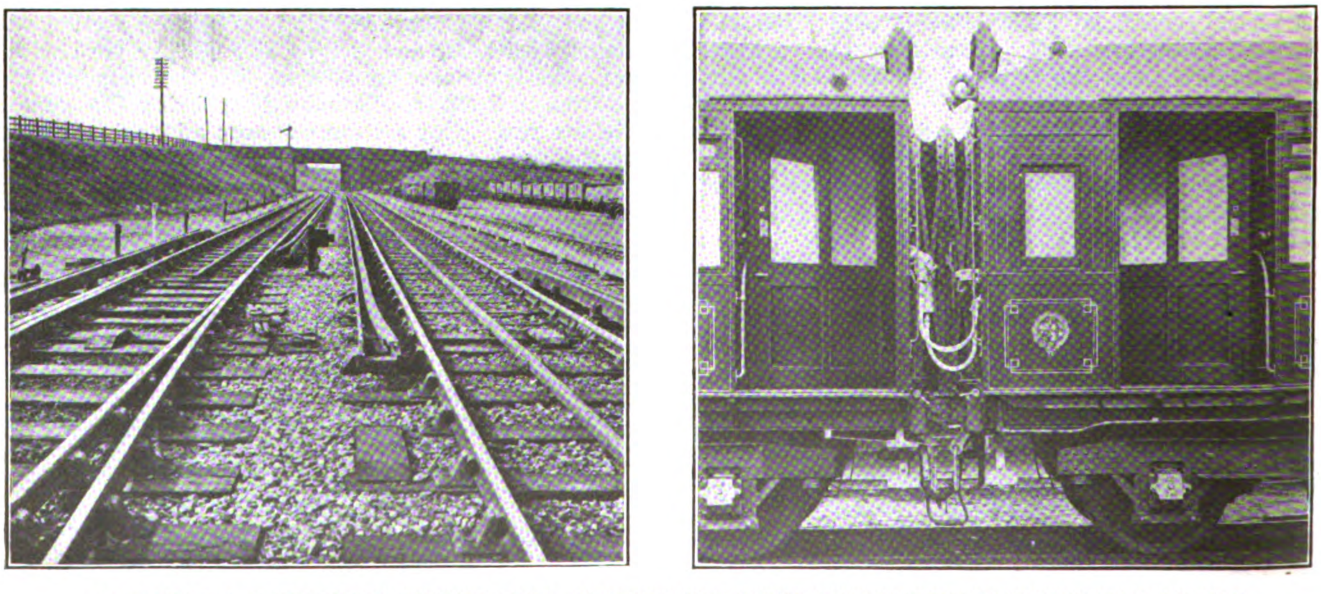
LANCASHIRE & YORKSHIRE ELECTRIFICATION—1200-VOLT MOTOR OF 200 HP.

The motors, which are designed for 1200 volts, are series wound with commutating poles and are totally inclosed. The field frame is of the box type, the main poles being arranged vertically and horizontally, this arrangement having been found to give the best space efficiency in the limited room available. Ventilation for the motors has been carefully considered, and as the armature laminations are carried on a hollow spider which also carries the commutator, there is a free passage of air through the spider and through the ventilating gaps in the armature which are continued through the main poles to the outside atmosphere.

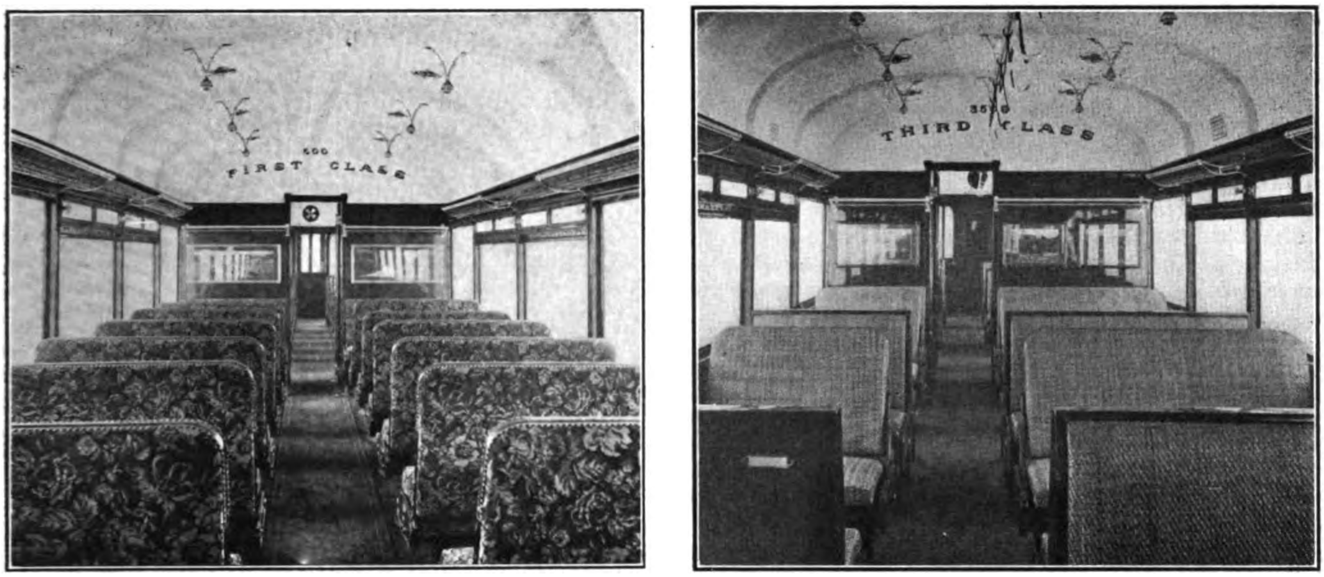
The armature coils are all insulated with solid mica insulation, and the field coils are inclosed in brass cases to keep them from contact of oil. Ring lubrication is used for the armature shaft, the oil wells being of ample proportions, and oil lubrication with pads is adopted for the suspension bearings. The brush gear is carried on a solid steel yoke bolted to the frame. This is insulated with solid mica and forms a very rigid construction.

The control equipment on the cars is of the multiple-unit system and is arranged for automatic acceleration, although it can also be operated by hand by simply moving the reversing lever to a certain position. The whole of the equipment is operated by 100-volt current, which is transformed from the line voltage of 1200 by means of a rotary transformer mounted under the car.

All the 1200-volt equipment is housed in a special high-tension chamber, the door of which is interlocked so that the isolating switch connecting the control leads



LANCASHIRE & YORKSHIRE ELECTRIFICATION—VIEW SHOWING FOURTH-RAIL RETURN; VESTIBULE DOORS ON CARS



LANCASHIRE & YORKSHIRE ELECTRIFICATION—INTERIOR VIEWS OF FIRST-CLASS AND THIRD-CLASS CARS

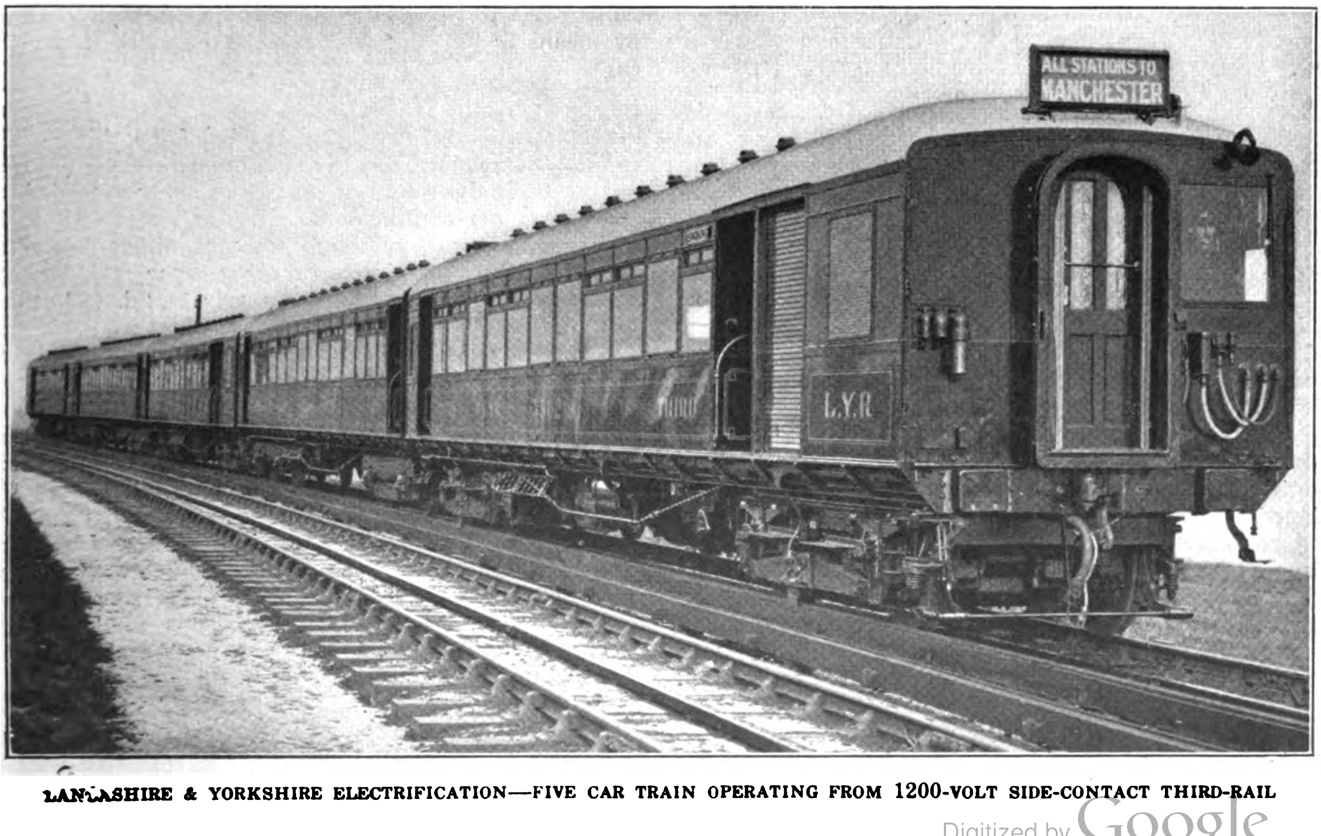
from the shoes must be opened before the entrance can be effected. All the contactors, the reverser and the motor cut-out are mounted on the inner wall of the high-tension compartment opposite the window, and above these are mounted the isolating switch, main fuse and main circuit breaker, and in an auxiliary high-tension chamber is the starting gear for the rotary transformer with its isolating switch. The high-tension wiring is carried in flexible steel tubing.

The reverser handle on the master controller has four positions, reading from right to left, "Reverse," "Off," "Ahead Automatic Control" and "Ahead Manual Control." The last position is used in case of emergency due to failure of the automatic control, but normally this is a stop which is sealed and which prevents the reverser handle from being placed in the manual position. There are four series points on the controller, three intermediate and three parallel, with an additional two positions by which the field of the motors is shunted when higher speed is required for express traffic.

The brake is the automatic vacuum type, so that, if necessary, ordinary steam trail cars can be coupled to electric trains, the brake still being effective. The vacuum is produced by means of a twin cylinder exhauster, driven through gearing by a Mather & Platt 5-hp. 100-volt motor. Current for heating is taken from the 1200-volt circuit, and for the lighting, pump motor and control, from the 100-volt circuit. The trolley cables, of which there are two, one on each side of the car, are continuous throughout the trains.

ALL-STEEL CARS

The electric trains for the new service consist of either two, three, four or five cars, according to the requirements of traffic, but the standard trains will



LANCASHIRE & YORKSHIRE ELECTRIFICATION—FIVE CAR TRAIN OPERATING FROM 1200-VOLT SIDE-CONTACT THIRD-RAIL have five cars, the front, center and rear vehicles being third-class motor cars, and the intermediate vehicles first-class and third-class trail cars. A feature of the design is that the compartment for the accommodation of the driver is at each end of all cars, which enables the trains to be made up to any length required with the minimum of switching operations, time being of the utmost importance on an electric service.

The framework is of steel and the roof and the paneling of the sides are of aluminum sheets, the interior work being finished with moldings of drawn steel and aluminum sections. The parcel racks, air extractors and electrical fittings, together with all inside furniture of the cars, are made in polished aluminum, and the doors are made of steel.

Particulars of the motor and trail cars follow:

Length over body	63 ft. 7 in.
Length over couplers	65 ft. 3 in.
Height from rail to top of roof	12 ft. 4½ in.
Center to center of trucks	45 ft. 0 in.
Wheelbase of motor-car trucks	9 ft. 0 in.
Wheelbase of trail-car trucks	10 ft. 0 in.
Weight of motor car	54 tons
Weight of trail car	29 tons
Seating capacity, first-class	72
Seating capacity, third-class	79

The vehicles have been designed with a slight taper on the sides of the bodies and with elliptical roofs, the cars having large side lights and fan lights. The flooring has been built up of Keystone or Chanarch galvanized sheets, which are riveted to the steel underframe, and on these sheets is laid Flexolith or Decolite composition.

The cars are entered at the extreme ends of each vehicle, through vestibules, and gangways are provided throughout the trains so that passengers can pass from one car to another to secure a seat. Each car is divided into main passenger compartments with a center aisle, fixed and reversible seats being arranged alternately on either side; the first-class seats being upholstered in tapestry and the third-class seats in rattan. The first-class cars have the floors carpeted. The cars are equipped with electric heaters and electric fans, and by means of a two-way switch the latter can either supply fresh air from the outside or extract foul air from the inside of the car. Sanitary strap hangers, for rush periods, are provided in the third-class cars, these being secured to the roof by aluminum brackets.

The painting of the car interiors is finished in self-colors, the lower part in dark brown, from the waist panels to the cornice in a restful shade of green, and the roof in white. Large panorama photographs of places of interest complete the artistic effect of the inside decoration of the cars.

Classification of Electric Locomotives

In a paper on the "Electric Locomotive," read by F. W. Carter before the British Institution of Civil Engineers, it was brought out that the classification of locomotives according to wheel arrangement has been adopted from steam practice, but hardly affords the same insight as to type as in the case of the steam locomotives. Electric locomotives have not always been designed with due regard to the question of stability of the rolling motion of the wheels, and some run less smoothly than is desirable on this account. The tilting of the rails and the coning of the wheels causes the progression by pure rolling to assume a sinuous nature, and on the stability or instability of this motion depends the question whether the nosing effect tends to die down or to increase to the limits permitted by the wheel flanges. It can be readily shown, the paper asserted, that a locomotive carried on a rigid wheelbase is in some circumstances unstable, and accordingly may be expected to develop a nosing tendency if run at high speed; the same is true when the locomotive is divided into units, each carried on a rigid wheelbase; guiding wheels elastically centered to align with the main wheels tend, however, to stabilize the motion.

Trackless Trolley vs. Motor Omnibus

Comparative Operating Costs on Keighley (England) Corporation Tramways Show Considerable Saving in Favor of Trackless Trolley

A RECENT issue of the *Tramway and Railway World* contains an article by Harry Webber, general manager Keighley (England) Corporation Tramways, which compares the results obtained by this company with electrically-driven trolley and gasoline motor omnibuses. The comparison is an unusually fair one since all the data on both systems were obtained on exactly the same route and deal with the same population and class traffic. The author believes this comparison to be of importance in England, owing to the belief that after the war has terminated most tramway managers will hesitate before embarking on any of the expensive systems of tramway track construction, such as the conduit system, and that only the cheaper forms of overhead construction will be considered.

The Keighley Corporation Tramways, after having operated gasoline motor omnibuses for five years, found it more economical to give them up in favor of trolley vehicles with the necessary overhead equipment. One factor which largely decided the question was that the gasoline-driven conveyance was costing 2d. (4 cents) per mile in gasoline, whereas the trolley omnibuses operate over the same route, consisting of about 9 miles partly undulating and partly very hilly country, at a cost in electricity of under 1d. per omnibus-mile. On a mileage of 100,000 per annum, it was found that the difference in power costs alone would cover the interest and depreciation on the overhead equipment.

Owing to the much heavier weight and uneven torque of the gasoline bus the relative cost in tires was 4 to 1 for the same roads in favor of the trolley omnibuses. The cost of general repairs for the gasoline buses was much heavier than for the trolley omnibuses. Another interesting comparison demonstrated was the revenue per mile from the two types. The motor omnibuses were double-deck, and carried from thirty-eight to forty passengers, but the maximum revenue obtained during their five years of operation never exceeded 1s. (24 cents) per omnibus-mile. At the present time the trolley omnibuses, although only of single-deck construction with a maximum carrying capacity of twenty-eight, have a revenue equal to nearly 1s. 2d. (28 cents) per mile.

From the passengers' point of view, the author states, the electrically operated vehicle is infinitely superior as the running is smoother; the operation is odorless; the vehicles can be more attractively lighted; and, owing to the absence of oily material, the trolley omnibuses generally are cleaner throughout.

The installation at the present time consists of 8¾ miles of overhead equipment and nine trolley vehicles. The overhead construction is of the over-running type, latticed steel poles with bracket arms carrying two trolley wires of grooved sections being used.

The installation has been in complete service only since March, 1915, and the operating figures up to a recent date give a proof that instead of making a loss of approximately £1,000 ($4,866) a year, as was the case with the motor omnibuses, the profit will amount to about £1,000.

Track Maintenance in Streets*

The Author Discusses the Influence of the Street, as a Location, upon Street Railway Track Maintenance, His Purpose Being to Give in Detail the Reasons Why Such Maintenance Is Costly

By R. C. CRAM
Assistant Engineer Way and Structures Department, Brooklyn Rapid Transit Company

THE needs of modern surface transportation have developed the comparatively simple street railway track of the horse car days, which required little or no maintenance, into a structure requiring the best efforts of maintenance engineers. The importance of the work undertaken by such engineers becomes more evident when it is realized that there are now 1027 electric railway companies in the United States alone, operating more than 46,000 miles of track and almost 100,000 cars. The maintenance of this trackage at $900 per mile per year requires an annual expenditure of $41,000,000.

Street railways are in a period of reconstruction, which may be considered as extraordinary maintenance because comparatively little added capital is involved. New construction is almost at a standstill and comprises only occasional extensions to existing lines. This period of reconstruction began about eight years ago and the trackage which has undergone reconstruction has increased annually ever since.

Among the complications incidental to the maintenance of street railway track structures some of the principal factors are as follows: (1) Pavements, (2) street widths, (3) street and car traffic, (4) grades and drainage of streets, (5) street improvements, (6) subsurface structures, (7) special forms of switches and frogs and (8) regulatory bodies or civic authorities.

With respect to these factors it will be noted that generally they seldom occur in steam railroad work. The location of tracks in streets renders the railway subject to many complaints from the general public, and the entire operation continuously invites accidents of various kinds. Railroads located upon private right-of-way seldom come in contact with many of these conditions. Such roads can at least select their own rails and other features of track construction but the street railway can very seldom do so without consulting several municipal or state authorities, and it quite often happens that the types of rails are legislated upon the street railways with little consideration of the railway's interest in such matters.

PAVEMENT IN THE TRACKS

Probably the most important feature affecting street railway maintenance is the pavement in the tracks, which accounts for between 40 and 50 per cent of the construction costs and at least 30 per cent of the maintenance expenditures. Maintenance expenditures for pavements have generally been legislated upon the railways either through franchise requirements or by foolish agreements made by early operators and promoters. There may have been some justice in requiring a railway company operating horse cars to maintain track pavements, and it is generally agreed that the extraordinary pavement wear by the horses was the basis upon which this requirement was hinged. The electric street railways have inherited the obligation and although they put no wear upon the pavements they are still required to construct and maintain them. Such an obligation to-day greatly increases the burden because of the great improvement and cost in pavements over those existing when such obligations were imposed.

The width of the street in which tracks may be located, and its character as determined by its location have a marked influence upon the methods to be employed in carrying out maintenance work, as these factors determine the length of work which may be opened up and the distribution of materials to permit efficient handling. The latter is important because in narrow streets it is often found necessary to dispose of excavated material, with incidental handling under car traffic, at inopportune times, which in turn considerably increases the cost, in order to provide room for other classes of materials required in later operations.

In the work of reconstruction the street and car traffic has a considerable influence upon the manner in which the work shall be done, and a careful examination of the street is always necessary to determine the proper course to pursue in the regular program for the work. Such traffic conditions necessarily determine whether the work will be done under car traffic at all times, which is probably the most expensive, or by single tracking accomplished by means of temporary crossovers or by the installation of a third or temporary track. The selection of method of carrying out the work affects the labor costs materially because, under certain car and team traffic, conditions where tracks may not be put out of service for more than six or seven hours per day will often result in the loss of one-third of the effective labor due to time lost in avoiding cars and vehicles.

DRAINAGE AND TRACK MAINTENANCE

The drainage of streets has a peculiar influence upon the maintenance of track structures. Long, easy grades upon which surface water moves slowly or is retained for a considerable period, allow time for seepage of water into the pavements and sub-structures. The importance of correct street grades and contours which allow rapid drainage of surface water away from the track, and of surface drains placed in the tracks at low points cannot be emphasized too strongly. During reconstruction work much delay is experienced in wet weather because of the long retention of water in the subgrade of the trenches, which requires a period of waiting until the roadbed shall have dried sufficiently to warrant the continuation of the track installation.

The influence of the surrounding pavement in forming trenches of this character, where the pavement acts as a dam, is a feature which is not present in maintenance work upon private right-of-way. In the latter case, the roadbed is open and readily drained, so that comparatively little trouble is experienced from the retention of water in the roadbed, and consequently there is little delay to the progress of work as a result of inclement weather. These delays are reflected in the operating costs of the transportation department which are chargeable to the track work.

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*Abstract of a paper presented at a meeting of the Connecticut Society of Civil Engineers, held at New Haven on Feb. 15 and 16, 1916.

Street improvements, especially those requiring repavement or grade changes, are productive of much additional maintenance expense because the railways are often obliged to install new pavements jointly with the city improvement. This requires either a most thorough overhauling and regrading of the tracks, or their complete renewal. The greater part of such expense becomes a maintenance charge and must be deducted from income. Thus the maintenance for reconstruction or overhaul in connection with such improvements is advanced several years, adding greatly to the average annual maintenance expense, generally without much influence in decreasing later expense. Such improvements, therefore, require close co-operation with the municipal authorities, and it is now a general practice for the respective engineers to consult early in each year for the purpose of preparing programs and budgets which will work together as far as possible.

Sub-surface structures, such as sewer, water, gas, telephone and electric mains, have quite a direct bearing upon the surface track maintenance costs. City sewer and water departments have a habit of rebuilding, relocating or repairing their mains, and many of them are either directly under the tracks or very close to them and they all have connections at frequent intervals which pass under the track. There is always a question as to how long a new track will remain undisturbed by work required upon some one of these subsurface structures. The railway is often required to remove one or both tracks incidental to such work, and house connections are constantly being made which either require tunneling under or openings through the tracks. These features alone add greatly to the maintenance costs and additional maintenance may be expected later, even after the first restoration, due to subsidences following such work, which generally falls upon the railways.

STREET RAILWAY SPECIAL WORK

The special track work, such as switches, mates and frogs used in street work are quite different from the types used in roads located upon private right-of-way. In addition to being much more expensive in first cost they are subject to proportionately greater wear from car traffic and additional wear from vehicular traffic and, due to incidental disturbance of pavements, the installation and repairs are very costly. Owing to the street location the frogs and other pieces are usually provided with renewable parts at points undergoing excessive wear. Such parts are subject to peculiar troubles and require constant attention with special equipment for their proper upkeep. Noise, in operation, plays a large part in connection with the maintenance of such special work and much labor is expended in grinding joints, in arc welding and grinding hard centers and in replacing parts in order to satisfy complaints arising from this source.

Upon most systems in large cities there will be found a large number of such special-work layouts in proportion to the total track mileage and this proportion is much greater than that found in roads upon private right-of-way. Consequently the number of parts involved which will require the attention of maintenance forces is extraordinary, and most systems have one or more gangs almost constantly employed in repairing or replacing special track work. Further, in large cities, emergency crews are maintained for the prompt repair of switches, so as to minimize the effect of their failures upon the car service, and these gangs are often provided with automobiles so that they may reach the sources of trouble as quickly as possible.

The cost of such special track work is very high. This is due to the high standard of construction required, generally involving the use of large amounts of manganese steel. The cost is also increased by the great variety of locations, street angles, controlling street widths and the types of cars in operation. Many of the frogs will suit only one location and so far it has been deemed practically impossible to standardize them so as to permit a reduction in cost through the elimination of a multiplicity of special patterns. However, the subject is now receiving much study and it is possible that ultimately their number may be decreased.

REGULATORY BODIES

Within a very few years there has been a marked increase in the number and powers of regulatory bodies or civic authorities. In New York City, for instance, there are at least eight of these and each has much to say in controlling maintenance work, with considerable overlapping of authority. We have the Bureau of Highways, the Department of Water Supply, Gas and Electricity, the Bureau of Sewers, the Board of Health, the Board of Estimate and Apportionment, the Department of Street Cleaning, the Police Department and the Public Service Commission. They tell us under the provisions of laws and ordinances to repave streets; to take out tracks for sewers; to stop noise at joints and special work; to remove snow; to keep traffic open; to rebuild tracks, and many other things. Consequently it has been found necessary to maintain a regular force of inspectors who investigate such orders and complaints so that we may determine their reasonableness and properly plan our work in compliance therewith.

INSPECTION OF MAINTENANCE WORK

The regular maintenance work of a large system, as distinct from reconstruction work, requires careful planning. As an aid to this, many systems now make annual inspections of their modern or standard tracks, paying particular attention to the three features which contribute most of the troubles. These are pavement, rail joints and rail corrugation. The inspections are rendered quite easy by the use of special report forms upon which the items may be entered and located by house numbers, cross-streets and pole numbers, in order to facilitate their later location by the various working forces. The areas of defective pavement, number of defective joints, and lineal feet of corrugated rail are then tabulated from the inspection reports in percentages of the grand totals of each item in the territory inspected. These percentages render the task of making a program of work quite simple, as it is only necessary to select the territories having the greatest amount of defects for the first and most important work of each kind. By this means we are also able to tell, in comparison with previous years, whether we are keeping up with the work and where special effort is needed.

Such inspections are also simplified by the use of plans made on letter-size sheets, which give the details of the type of construction upon each particular street. Each street or section of street receives a section number which is also indicated on the plan, and all costs for work done are charged against the various sections in sufficient detail to cover the main items which are productive of maintenance expense, so that we may know how much we are spending upon our modern tracks for these features. Information drawn from a comparison of these expense items enables us to learn what the various modifications from standard construction are costing and serve to point out what to avoid in future work. It is quite safe to say that had such information been available in Brooklyn, seven or eight years ago, some of our most expensive maintenance items on certain tracks would be about one-half what they are at the present time. We have also been able to determine that approximately one-half of the total paving maintenance expense, upon our standard tracks, has been due to an unfortunate experimental repavement in the roadways which was undertaken by the city upon one street alone, while more than one-half of the joint maintenance costs was due to the type of joint on the same street and upon three others. It is hardly necessary to say that we have abandoned that type of joint and we would like to be able to avoid such costly city experiments in pavements.

RAIL JOINTS

Rail joints have been mentioned as an item which causes high expense for maintenance. The early types of joints, particularly of the bolted variety and many experimental forms of joint, have contributed an unreasonable share of the expense for track maintenance. However, the general adoption of 60-ft. rail lengths for modern tracks is rapidly tending to cut such expense in half. Furthermore there are now several kinds of welded joints, at least two types of riveted joints which provide head and base support, and at least one type of patented bolted joints which are showing marked decreases in costs for maintenance, and even the simple bolted joint has undergone such improvements in design as to render it much more serviceable.

PAVING DATA FROM BROOKLYN

Mention has been made of the importance of the pavement in street railway tracks and it may not be out of place to give some information, roughly compiled because of lack of close data, showing the amount of pavement involved in the maintenance of street railway tracks in Brooklyn. Out of the total trackage there are approximately 500 miles of single track in paved streets, requiring the maintenance of approximately 2,640,000 sq. yd. of pavement. This pavement would have a value, at an average cost of $2.50 per square yard, of $6,600,000. This yardage is equivalent to the average state highway 18 ft. in width and 250 miles long or of a street pavement 30 ft. in width and 150 miles long.

There are approximately 850 miles of paved streets in the Borough of Brooklyn, including streets upon which tracks are located, and from this it appears that the street railway maintains approximately 18 per cent of the total paved street mileage within the borough.

In addition to this, enough paving is installed or reconstructed in these tracks yearly to build a street pavement 30 ft. in width and from 7 miles to 9 miles long, and it has also been found that the street railway maintains an average of 50 per cent of the pavement in the streets in which it operates. This percentage will probably hold good for most street railways in the average city situated in the eastern part of the country. As the property owners in New York are assessed for the cost of all new pavement and the property on each side bears the cost to the middle of the street, upon all streets occupied by two tracks their assessments for pavement are cut in half and, further, the city is at all times relieved from the maintenance burden of half of the total paved area after its installation. In addition, in Brooklyn the present program of snow removal requires the clearing by the railway of 1,600,000 sq. yd. of surface.

All of these several branches of street railway track maintenance work require large investments in special tools and machinery designed for the purpose of reducing labor costs, and such investments will probably run from $125 to $150 per mile of single track.

While much has been published upon the subject of economical maintenance of street railway tracks, but little has been said concerning the economics of maintenance. On this subject there is room for much more careful consideration of the fundamental laws and principles involved than has so far been given. For instance, it may appear to be economical to open a track pavement at a joint only so much as is required to give the necessary working space, yet this procedure may not be in accordance with the true economy involved because, with certain types of pavement, it has been found that the better method is to open an area much larger which in the end can be repaved more quickly, more satisfactorily and at less cost for paving labor. Similarly it may appear economical to keep rails in service because they have not fully reached the ultimate wear life as indicated by the head measurements, and yet it may be necessary to spend so much on repairs of various kinds, such as joint repairs and grinding corrugated rails with the incidental paving expense, that the true economics of the situation will show the actual rail renewal to be required. These illustrations emphasize the statement previously made to the effect that there is room for more careful consideration of the fundamental laws and principles governing street railway maintenance.

Jitneys Fall Off in Kansas City

Records of the Metropolitan Street Railway Show a Constant Decrease in Jitney Operation Since Last May

THE transportation department of the Metropolitan Street Railway of Kansas City has prepared an interesting chart of the progress of jitney operation in that city. It shows the high point to have been early in May, 1915, and the low point to have been the last day the records were kept, Jan. 29, 1916.

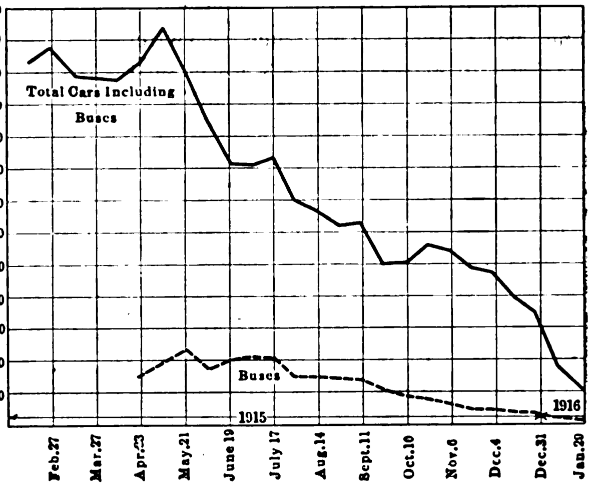


DIAGRAM SHOWING JITNEYS IN OPERATION IN KANSAS CITY

Jitneys began running in Kansas City in January, 1915. The railway company's record begins with Feb. 13, when 226 motor cars, including buses, were in use. A period of bad weather impeded growth of the numbers in March, but with spring the numbers rose rapidly, to 247 in May. This was about the time of the organization of the national association of jitney owners at Kansas City, and the public was fed with glowing stories of the success of the movement. Immediately thereafter the numbers began steadily to decline and with three slight exceptions continued to do so until the severe winter weather of last December, when the descent became sharp, and only twenty-one cars were in service on Jan. 29.

What the N. Y. E. R. A. Discussed

At Albany Meeting on Feb. 25 Delegates Took Up Topics of Shop Methods, Car Heating and Ventilation, and Fare Collection—Subject of Mutual vs. State Fund Insurance Called Forth Lively Comments

THE twenty-first quarterly meeting of the New York Electric Railway Association, which opened with a dinner at the Ten Eyck Hotel, Albany, N. Y., on the evening of Feb. 24, as described in the ELECTRIC RAILWAY JOURNAL of Feb. 26, page 404, was continued with a technical session on the morning of Feb. 25 at the same place. President John J. Dempsey, superintendent of transportation Brooklyn (N. Y.) Rapid Transit Company, was in the chair. The discussion during this meeting was focussed on four topics, as follows: shop methods, heating and ventilation of cars, fare collection, and mutual *vs.* State fund insurance under the New York compensation act.

DISCUSSION ON SHOP METHODS

The first paper was on "Modern Shop Methods," by P. V. See, superintendent of car equipment Hudson & Manhattan Railroad, New York. This was abstracted in the issue of Feb. 26, page 405. The discussion thereon was opened by C. F. Hewitt, general manager United Traction Company, Albany, N. Y., who asked what the Hudson & Manhattan Railroad did to enameled wrought-iron stanchions and grab-handles that were chipping and wearing out. Mr. See said that his company had met with no success in re-enameling them, and it used them until chipped and then bought more. These articles required a special enameling process, and the ordinary white enamel would darken and not look good. In reply to a query by J. P. Barnes, general manager Buffalo, Lockport & Rochester Railway, Rochester, N. Y., as to whether or not an artificial drying process is applicable to wooden cars to shorten the shop time, Mr. See said that his company did not use wooden cars, but utilized the same drying process for the wooden sashes as for the steel cars. Sometimes blisters resulted if the work was not done properly. The sashes must be thoroughly dried, and this was done by bringing them to a higher temperature than that required for drying the enamel.

W. G. Gove, superintendent of equipment Brooklyn (N. Y.) Rapid Transit Company, remarked that it was no longer possible or profitable to withhold rolling stock for the old-fashioned forms of painting, and that shorter methods were desirable from the point of view of economy. In his mind there was no question as to the value of baked-on enamel for steel cars; the only question was in regard to facilities for such work. Mr. Gove felt that car-cleaning was an essential part of operation, and that slack methods along this line did more to arouse public criticism than did poor car painting. He thought that some cheap but efficient cleaning method might be developed that would be better than any now used. Vacuum cleaners for interior work might be utilized, these in his opinion not being now used outside of San Francisco.

W. J. Harvie, engineer Allen & Peck, Inc., Syracuse, N. Y., raised the question as to whether or not there is any definite period before rust begins to appear around rivets and between plates on steel cars, and how long before this condition requires attention. Mr. See explained how under early conditions, when with no yards the cars were stored in tunnels just completed and not waterproof, and the painting and the shop facilities were poor, some cars had rusted through and required complete new roofs. Under better conditions, however, cars six or seven years old that were treated properly show no deterioration, and no sand blast has been used to clean them. Cars of the Pennsylvania Railroad used in joint operation on the Newark line have been out five or six years and the steel is not changed. Mr. See believed that when equipment is treated properly it takes ten or twelve years before a sand blast is needed. In reply to another question from Mr. Harvie, Mr. See said that the company has a six-car space in the paint shop and runs out one car a day, so that it ordinarily takes six days to put a car through the shops. In one special case for the management, however, a car was completely painted in forty-eight hours.

MR. MCELROY ON HEATING AND VENTILATION

The second paper was on "Heating and Ventilation of Urban Cars," by Horace A. Abell, assistant engineer Schenectady (N. Y.) Railway, as abstracted in the issue of Feb. 26, page 405. John H. McElroy, assistant engineer Consolidated Car-Heating Company, Albany, N. Y., said that Mr. Abell's paper showed the absolute uniformity of the temperatures in the different portions of a car heated by electricity, thermostatically controlled. For the seven days reported, the temperature at the floor varied from 52 deg. to 53 deg., while at a point between the breathing level and the ceiling it varied from 52 deg. to 54 deg. With the thermostat set to work between 53 deg. and 55 deg. the distribution and constancy of the heat, as shown in the test, was characteristic and worthy of attention. The temperatures with the stove-heated car showed the seat to be from 10 deg. to 27 deg. warmer than the floor. The saving in current was computed at 26 per cent on the coldest seven days of the month during which the test was made (the most disadvantageous time of the year from the standpoint of the thermostatically controlled car), and the result was remarkable when it is remembered that the big savings due to thermostats are had in the late fall and early spring.

Mr. McElroy expressed his regret that the time allowed for discussion did not permit the introduction of tests covering a wide enough range of temperatures to give the electrically heated cars an opportunity to show what they could do. Careful tests covering an entire heating season showed that the percentage of saving due to the thermostatic control of electric heat when the outside temperature was 28 deg. was double that at 20 deg.; at 34 deg. it was three times that at 20 deg., and at 38 deg. it was four times that at 20 deg. These percentages were based on an 18 per cent saving at 20 deg., and it is interesting to note that the mean temperature for the entire month of January, 1916, at Albany, which is the nearest weather bureau station to Schenectady, was 29.2 deg.

Mr. McElroy considered that the comparison between the different methods of heating cars given by Mr. Abell was fair only during a few days of the year, and then only in case the data and assumptions were correct, which in many cases he found not so. For instance, Mr. Abell gave the power consumed by the stove motor as 180 watts, costing 22.5 cents per 100 car-hours. He neglected, however, the fact that the resistance by means of which the trolley voltage was reduced to 220 dissipated nearly twice this power, raising the cost to 60 cents per 100 car-hours.

Moreover, Mr. Abell did not include any costs of the current, interest or depreciation, maintenance and repairs, or cost of hauling of six cab heaters consuming 3.3 kw., which even during the past week, with an outside temperature of 30 deg., were permanently connected by a jumper so as to help heat car No. 507, the test car heated by the stove. It should be noted that on cars No. 509 and No. 511 the cab heaters were so wired that only one platform could be heated at a time. Thus the stove-heated car used for heating purposes, in addition to the cumbersome stove, 44 per cent as much current as was required to heat the thermostatically controlled car. No reference was made by Mr. Abell to this fact.

Among other points Mr. McElroy also asserted that the weights of the equipment as given in the paper were seriously in error. The electric heater equipment exclusive of wiring weighed 296 lb. The difference between this and 475 lb. called for considerable wire, 179 lb. per equipment. If the cab heaters in the stove-heated car were assumed to counterbalance those in the other cars, the weight of the electric heaters and switch should be reduced to 209 lb. Moreover, Mr. Abell's costs were based on an average consumption per car-hour of 10.64 kw.-hr. for car No. 511, which was more than the heaters could possibly take with all three points of heat, although the system in force, for the non-observance of which there was no excuse on a car under test, called for a maximum consumption of 6.92 kw.-hr. on five of the seven days recorded. Another point was that the cost of the repair parts furnished for electric heater equipments to the road on which the tests were made averaged only 30.5 cents per car per year during the seventeen years' use of electric heaters. This was equivalent to less than 1 cent per 100 car-hours. The depreciation at 7 per cent was also excessive, as the heaters on the cars tested had already been in service for fourteen years and were then in first-class condition. Lastly, no account was taken of the fact that the use of the stove necessitated the removal of seats for two passengers.

In general, Mr. McElroy said that few of the computations could be checked from the data given, but the errors and omissions mentioned could not but cast serious doubts on the value of all. Referring to ventilation, he mentioned that the car heated by the ventilating heater actually showed 29.5 per cent more air exhausted through the ventilators with the blower inoperative than it did with the blower working, the blower being the only feature about a coal-burning, gas-producing stove that entitled it to be called a ventilating unit. It was obvious that the amount of air exhausted through the ventilators of cars No. 509 and No. 511 should be at least as great as that of car No. 507 with the motor stopped. It did not seem possible that ventilators which exhausted 85 per cent of the air with the motor stopped were able to handle only 59 per cent with the motor running. The estimated intake must be in error or considerable of the ventilation must be due to the car itself if 41 per cent of the air went out through openings around doors and windows with the blower working, when only 15 per cent was discharged from the same car without the blower, although there was but little difference in the total amount of air brought into the car and consequently slight difference in the pressure outward.

Finally, Mr. McElroy called attention to the fact that in the State of Massachusetts and the city of New York no coal is allowed to be burned in cars. This, he said, was doubtless due in large measure to the danger from a health standpoint, although the serious danger from fire, as instanced recently in the Chicago accident when a steel car ran off the track hurling burning coals about the car and seriously burning eleven passengers, might be a contributing influence.

OTHER DISCUSSION ON HEATING AND VENTILATION

Mr. Harvie complimented Mr. Abell on the thoroughness of the tests made in Schenectady and emphasized particularly the truthfulness of Mr. Abell's remarks that the majority of complaints in regard to ventilation and heating are due to a "psychic condition of mind." Mr. Harvie said that cars in city service were more easily regulated as regards heat than those in interurban service, for in the between-season period the heat on the city cars could be turned off. He had often seen passengers on interurban cars pick out the side opposite the heating apparatus. Double windows made it difficult to control the heating. In his experience more heat was frequently found in the front of the car even if the doors were kept reasonably closed, the difference in temperature between the two ends being very noticeable. Mr. Harvie felt that the whole problem of heating and ventilation had not been put up to the manufacturers as thoroughly as possible.

METHODS OF FARE COLLECTION

Mr. Harvie then read his paper on "Methods of Fare Collection," which is abstracted elsewhere. In commenting thereon, Robert M. Colt, general passenger agent Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., said that in the matter of collecting children's fares, which was often a point of difficulty to electric railways, his company had helped the conductors through putting up in the rear of the car a placard clearly stating the company's rules and rates of fare. Talks with conductors had disclosed the fact that this device had been of great benefit in obtaining without dispute the stipulated fares for young passengers. Mr. Colt also described a combination duplex hat check and fare record which had recently been sent to his company and was being considered. This check is split as the terminal or station is neared, the conductor taking up half, which must tally with the carbon presented to the auditor.

James F. Hamilton, general manager Schenectady Railway, said that several years ago his company, which has an all-cash fare, began to use a duplex showing the fare paid and the points between which the passenger traveled. Later, the conductors were compelled to collect the slips from the passengers when leaving the car. In regard to the point that the conductor might not issue a duplex to some passenger, Mr. Hamilton said that the conductors were very closely checked, and it was deemed thievery if it was found that no duplex was issued. If by chance the conductor missed a passenger the first time through, there would be no excuse for not discovering this on the later collection of the slips.

According to C. E. Holmes, general passenger agent Albany (N. Y.) Southern Railroad, his company is still looking for an ideal method of fare collection. To his mind the great trouble is to get the passengers sufficiently interested to see how much fare was paid and whether or not the amount was correct. During the winter the company tried an experiment with the duplex, on which the figures for the fare were printed in large type, but after the first show of interest the public soon became indifferent. Mr. Holmes believed that there was needed for interurban fares something that is in use in the cities, a pay-as-you-enter or a pay-as-you-leave fare, but no completely satisfactory system had yet been found.

STATE FUND INSURANCE

The last subject, mutual *vs.* State fund insurance, was treated at length from the State fund point of view by F. Spencer Baldwin, manager State Insurance Fund of New York. Mr. Baldwin briefly described the relative merits of the four possible methods of insurance, as follows: self-insurance, stock company insurance, mutual insurance and State fund insurance. In his opinion the first form is really not insurance at all. for under this form a company simply carries its own risks and gambles as to the necessity for compensation payments. This form is practically certain to grow less popular, for sooner or later a scandal will arise through the inability of some company to meet its payments in the face of a catastrophe, and then the State will put an end to the practice. As regards stock company insurance, this is needlessly expensive and wasteful, like the old discarded practice of farming out taxes. Modern progress demands that all superfluous overhead charges for agents' commissions and all stockholders' profits be eliminated in the interest of both the employee and the employer. The stock company rate for electric railways (not interurban) per $100 of payroll is $3.24, while the State fund rate is $2.50, a saving of 33 per cent in favor of the latter. Moreover, the State fund has paid to electric railways dividends averaging 15 per cent, making a total saving of 48 per cent, as compared to stock company insurance. If the State fund had maintained a large electric railway group from its beginning, it could have paid dividends amounting to 40 per cent.

Mr. Baldwin stated that mutual insurance as well as State fund insurance cut out the economic waste involved in the stock company form, for the premium in each case is not loaded for profits or for acquisition expenses. Mutual trade insurance enables the employees to obtain protection at the exact cost of the insurance risk in their particular business. If electric railways favor this form of insurance, they should organize their own mutual in order to secure the benefit of their own experiences, and not be burdened with the hazard of other industries with less care in accident prevention. But all the advantages of such a separate organization can be obtained through insurance in the State fund, however, for this already has its separate electric railway group which gets the benefit of the experience of all its members and of their efforts for accident prevention, and is insured at the actual net cost of carrying its own risk. A separate account is kept for the group, and at the end of the fiscal period any excess is credited to the members on the next premium due.

Moreover, said Mr. Baldwin, insurance in the State fund has certain advantages that are not obtainable in mutual insurance. In the first place, the insurance is offered at the lowest cost. Other things being equal, the loss ratio of the trade mutual and the State fund is the same, but the expense ratio in the State fund is lower. For the eighteen months ended Dec. 31, 1915, the expense ratio of the State fund was 14 per cent, and the fund is now operating at an expense ratio of 12 per cent. The expense ratio of the Brewers' Mutual Indemnity Insurance Company is almost as low as this, but no other ratio is anywhere near it. The expense ratio of the largest mutual company in the country is 25 per cent, while that of the third largest mutual is more than 25 per cent.

The second advantage of the State fund noted by Mr. Baldwin was the fact that the employer is relieved from all liability for injuries or death to employees, this exemption not being granted to mutual insurers. The Appellate Division of the New York Supreme Court has held that the State fund policy gives absolute protection to the insurer in every case. Cases started to test this were all withdrawn when the facts were understood. As a third advantage under State fund insurance, there is a release from assessment liability, while in mutual trade insurance the insurers have such a liability up to 100 per cent. The present law states that in the event of the withdrawal of an employer his liability for assessment shall continue for a year, but Mr. Baldwin explained this to be only a nugatory reference to another provision which the legislators decided not to adopt. In the absence of explicit statutory authorization of assessments, the Workmen's Compensation Commission and the Industrial Commission have both ruled against any assessment of insurers in the State fund, and the Attorney-General has formally ruled that the policyholders are not subject to assessment.

The last advantage of the State fund cited by Mr. Baldwin was that the electric railway group therein has the protection of the whole fund, while if the carriers constituted an outside mutual no similar condition would obtain. The fund now has 8500 policyholders with a semi-annual premium income of more than $700,000. In the first eighteen months the fund earned a surplus of nearly $600,000, after paying losses of $300,000, setting up reserves of $900,000 for future payments and also creating a catastrophe reserve of $150,000. The fund to-day, asserted Mr. Baldwin, is in the soundest possible condition.

MUTUAL INSURANCE

The spokesman for mutual trade insurance was E. L. McManus, Jr., general manager Brewers' Mutual Indemnity Insurance Company, New York, N. Y. Mr. McManus said that the brewers of Greater New York, because of their desire for economy and their great personal regard for their employees, decided after careful consideration to organize a trade mutual insurance company and limit its membership to brewers or allied trades. Accordingly, forty-eight brewers started the Brewers' Mutual Indemnity Insurance Company on July 1, 1914, with an annual premium of approximately $365,000. The company has been in existence now twenty months, using manual rates with credits for meritorious conditions in the plants. It has paid all the benefits required by law and in addition many not required, has set aside all necessary reserves and has made a saving of 32 per cent of the premiums, or approximately $190,000. This amount represents the sum that the brewers saved by operating their own company. As compared with a pure trade mutual insurance company properly managed, Mr. McManus asserted, no State fund or other company could hope to equal the cost or the service.

Mr. McManus said that subscribers to the State fund, while undoubtedly protected, could not expect the policy of the fund—admittedly a political creation—to remain year in and year out the same. Nor could they expect the same degree of diligent control to be exercised, as is the case in a trade mutual insurance company, the funds of which are at all times controlled by the men most interested, *i.e.,* those who have advanced the money.

In trade mutual insurance, according to Mr. McManus, there is no cause for worry over the rate charged, be it ever so high, because, after all is said and done, this form of insurance is nothing more or less than a strictly cash proposition. So much is put up, so much is spent in benefits, and, necessarily, so much is left to go back to the subscribers. In the State fund, however, no cash dividend is received. If a company is fortunate enough to have a dividend coming to it from the State fund, its policy must be extended in order to get a credit for that amount.

In conclusion, Mr. McManus called attention to the fact that much is being said and written regarding governmental ownership and control of public service corporations. For these corporations to participate in a movement as radical as the State fund, is only a step removed from indorsement of governmental control and ownership. What the brewers have done the electric railroad corporations can do. Mr. McManus said that the records, books and methods of the brewers' insurance company were at the disposal of the carriers. He hoped that the electric railways would start their own company, run it for themselves and reap the pleasure of personal supervision over the payments to employees, who, after all, are the men that should be looked out for and not left to outside companies not interested in their welfare.

DISCUSSION ON COMPENSATION INSURANCE

Mr. Barnes asked Mr. McManus to state the approximate cost of the Brewers' Mutual Indemnity Insurance Company as compared to the cost under the State fund plan and under stock company insurance. Mr. McManus replied that the total mutual premium of $365,000 for a year's business would also have been paid for stock company insurance, but that there would have been no return in the form of dividends to the policyholders under the latter plan. As for the State fund, this would have lost money on brewers' insurance. Mr. Baldwin, however, would not at all concede that any loss would have been suffered by the State fund, for it would have charged a sufficient premium to cover a special class of brewers and would have refunded the excess after making all proper reserves, without deducting anything for management expenses. Under this plan the brewers would properly have saved 20 per cent of their premiums.

With regard to the fact that dividend payments under the present law are credited to the next premium instead of being returned in cash, Mr. Baldwin said that the law was defective in that no provision was made for payment of cash dividends to any employers who withdrew from the fund. He stated, however, that he himself had introduced a bill into the Legislature this year to remedy this fault.

E. A. Maher, Jr., assistant general manager Third Avenue Railway, New York, N. Y., then mentioned the fact that until 1917 the expenses of the State fund are paid by the State, and asked whether the expenses after the beginning of 1917 would not be paid out of the premiums. Mr. Baldwin explained that out of every $1 of State fund premium 64 cents represent the insurance payments and reserves to carry payments to maturity, 5 cents the special catastrophe reserve, 12 cents the expenses, giving a total cost of insurance and overhead of 81 cents and leaving a margin of 19 cents for dividends. Mr. Baldwin thought that this margin was sufficient to allow the State fund to assume the management expenses and make the transition to a self-supporting basis without advancing the rates or curtailing the dividends. He believed that it should even be possible to cut the expenses to less than 10 per cent with increased business.

James E. Hewes, general manager Albany Southern Railroad, related how for ten years his company had been paying 1 per cent of the gross receipts for stock company protection and had suffered only $500 loss, but as a result of an application to the State fund management had secured a decrease of 50 per cent from the stock company rate. Mr. Hewes testified that his company had received good service from the State fund. Mr. Baldwin remarked that the State fund was rendering service comparable to that given under any other insurance plan, and he mentioned the fact that one industrial company in the State with eight plants had tried out stock company insurance in three, mutual insurance in two and State fund insurance in the remaining three, but that now all plants were insured in the State fund. In general, he believed that the State fund was better as regards cost, and also gave far more satisfactory service to the policyholders.

In regard to electric railways in particular, Mr. Baldwin stated that on Dec. 31, 1915, the earned premiums for the electric railway group in the State fund amounted to $68,162, while the losses and payment reserves totaled $34,816, giving a loss ratio of 51.1 per cent. From this he concluded that the rates now charged are absolutely adequate and yield substantial dividends.

Mr. Hewes said that there might be some question as to whether the State would eventually grow lax in its efforts to reduce cost, but that this danger was not so important as the danger in mutual insurance that adverse legislation might increase the cost of insurance. He felt that with the State as a partner, legislators would be more careful about having arbitrary and pernicious laws rushed through by labor organizations. He also emphasized the point that the State fund is well balanced as regards the different risks, and this factor of diversity is an important advantage in making the State fund safer than the mutual plan of insurance. Mr. McManus favored the mutual plan, because he believed that electric railway employers were better acquainted than State officials with the conditions and the needs of employees.

With this discussion the business of the session was completed, and after votes of thanks to the speakers and the hotel management the meeting was adjourned.

Methods of Fare Collection

BY WILLIAM J. HARVIE

Engineer Allen & Peck, Inc., Syracuse, N. Y.

Transportation as supplied by the common carrier is of two kinds: "long distance," such as is provided by the steam railroads, and "local," such as is now generally supplied by the city, suburban and interurban electric railways. These two kinds of service are distinct and separate and in many ways require widely different methods in the treatment of the problems presented in their operation. The differences between the two have become less pronounced with the more recent high-speed electric interurban systems, but the two kinds do not exactly coincide. It is to the second or "local" type that the subject of this paper applies.

Industrial progress often develops in cycles, and the collection of car fares on the various systems of street and interurban railway in this country is no exception. Since the original "pay box" installed on the center panel of the front bulkhead of the old horse car, the electric railway industry has been subject to all sorts of whims and fancies with regard to fare collection systems, both simple and complex. We have thus been experimenting and trying out all the devices offered, in the hope of at last finding the one "best one." We have been led up many blind alleys, of course, but we have already safely completed the first cycle, and have progressed so far as now to be face to face with a host of different devices and systems more or less perfect. In what direction shall we turn next? Probably another cycle awaits us. Let us, however, study the problem a little before we start on our new cycle.

In the past, much energy has been spent in perfecting devices for collecting fares, but infinitely less energy has been spent on the question of what the basis of the fare itself should be. Only recently has this question had the attention it deserves. In the writer's opinion the question of fare collection is inseparable from that of the basis of the fare itself. They must be considered together.

Looking back over the methods of the steam railroad or "long distance" group, we do not find that the energy spent upon devices for collecting fares has been greater than that spent upon the basis of the fare itself, but rather the reverse. We find also that the steam railroads have adhered as tenaciously to the basis of a charge dependent on the distance traveled, as we have to a charge of an unvaried sum for a varying distance dependent in many cases only on the location of the houses built along our line of road—a most absurd basis. In relatively few cases, mostly long interurban roads, is the basis that of the distance traveled.

The problem really is not as formidable as would at first appear and solution is possible if we approach the double problem in its broadest aspect. The fundamental principles which must be granted are: (1) The passenger is willing to pay a proper amount for being transported a desired distance; (2) the carrier desires to furnish transportation proportionate to the fare charged, and (3) the basis of charge shall be equitable and fair both to the passenger and to the carrier. These principles form the real basis of all transportation business. The first and second have to do more particularly with the collection system, the third with the amount of fare charged.

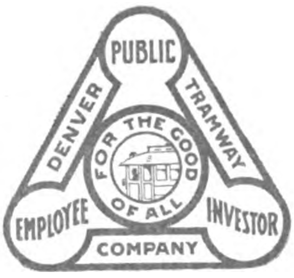
If we grant the third, we have at once a sliding scale of fares based on the cost of construction and expense of operation, while the first and second take into account the distance traveled over and above the initial charge. For example, assume a minimum charge of 5 cents and 2 cents per mile or fraction thereof. In the simplest case, that of a suburban or interurban road, the passenger may ride his first mile for the minimum fare and for each additional mile or fraction thereof he pays 2 cents and so on for other distances, so that a ride of 10 miles would cost him 23 cents and 20 miles 43 cents. In a city system the passenger would pay the minimum fare as above, as well as whatever charge per mile or fraction thereof was found to be warranted by the conditions. If it were 2 cents, then for 2 miles he would pay 7 cents; if 3 miles, 9 cents, and so on. The difference—the excess over 2 cents per mile—would constitute a "ready to serve" charge. The amounts taken as a basis above are of course arbitrary and should in each case be fixed according to the cost of service.

Such a "distance system" properly worked out as to unit rate and distances would eliminate entirely the troublesome overlapping fare zone and its accompanying ills, and would insure a return to the carrier based only on service rendered, which would be eminently fair to both passenger and carrier. The collection of fares would necessitate dividing the line into sections by means of markers of some sort, in order that both passenger and conductor might know the distance traveled. This would be accomplished in the case of the simple suburban line, by marking with numbered signs the quarter miles, say, or if stops were infrequent, the half miles. In the city system, the markers might be multiples of the city blocks. The collection might be on either the pay-as-you-enter or the pay-as-you-leave system, as the conditions warranted. In any case the passenger would enter and leave the rear end of the car, passing the conductor both in and out. A device installed in place of the present fare box and operated by the conductor would produce a passenger hat check on which would be recorded merely the points between which the passenger was riding, and a duplicate of which would be automatically turned into the machine. Coupon books of suitable form and denomination would assist the passenger and conductor in making change.

The foregoing outline covers the essential points of such a collection system based on a "distance" charge, the details of which should not be more difficult to work out than many of the best systems in present use. The successful operation of such a system would, of course, depend to a large extent upon the co-operation of the traveling public, as is the case with any of the present systems. This co-operation should be readily obtained by publicity, provided the third fundamental principle were properly carried out. The writer is firmly convinced that once a reasonable and equitable basis is established, upon which to build a collection system, the need for continued experiments will have passed.

Denver Tramway Adopts New Trademark

The three great partners of every public utility, the public, the employee and the investor, an idea aptly put into concrete form by F. W. Hild, general manager Denver (Col.) Tramways, in a recent address before the Denver Chamber of Commerce, has found expression in a design or trademark, shown herewith, which has been accepted and adopted by the Tramway Company.



DENVER TRAMWAY'S NEW TRADEMARK

"If any one of the partners suffers," said Mr. Hild, "the other two will sooner or later suffer also. The public is entitled to good service, the employee is entitled to good wages, and the investor is entitled to fair returns on the money which makes possible the enterprise."

To bring out the best ideas expressing his thought in a trademark, Mr. Hild inaugurated a prize contest. More than 1000 designs were submitted by aspirants in Denver and surrounding towns. A combination of the ideas of the first and second prize winners was finally adopted by the company.

Electric Locomotive with Smokestack

What is said to be the only electric locomotive equipped with a smokestack recently completed a transcontinental tour from San Francisco to New York, where it is used by the Pennsylvania Railroad in hauling trains under the Hudson River between its New York Terminal and Manhattan Transfer. The locomotive is being returned from San Francisco, where it was exhibited by the Westinghouse Electric & Manufacturing Company, which furnished the electrical equipment for it. The reason for the smokestack is that the Pennsylvania and Westinghouse companies, wishing to insure its safe and prompt return from San Francisco, have sent with it a personal tracer, and in order to give him comfort during storms, a cab containing a small coal stove and smokestack was erected.

C. E. R. A. Banquet and Final Session

Association Celebrates Tenth Anniversary with a Banquet at Which an Ivory and Gold-Mounted Gavel Was Presented to President Henry—Proceedings of Final Session and Remainder of Papers at the Dayton Meeting

ONLY one paper, that by J. Rowland Brown on "Gas Weld Rail Bonding," was presented at the final session of the Central Electric Railway Association held on Friday morning, Feb. 25. Essentially this paper was the same as the one Mr. Brown delivered before the Illinois Electric Railway Association meeting held in Chicago on Nov. 6, 1915, an abstract of which appeared on page 1087 of the Nov. 27, 1915, issue of ELECTRIC RAILWAY JOURNAL. Immediately following the presentation of this paper the report of the nominating committee was requested, and the following officers were duly nominated and unanimously elected:

President, A. Benham, general manager Ohio Electric Railway.

First vice-president, C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway.

Second vice-president, F. W. Coen, vice-president and general manager Lake Shore Electric Railway.

Secretary and Treasurer A. L. Neereamer was re-elected.

The executive committee appointed for the ensuing year is composed of the following members: C. L. Henry, president Indianapolis & Cincinnati Traction Company; F. D. Carpenter, president Western Ohio Railway; H. A. Nicholl, general manager Union Traction Company of Indiana; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; John F. Collins, general manager Michigan Railway; W. A. Carson, general manager Evansville Railways; R. A. Crume, general manager Dayton & Troy Electric Railway; John F. Keys, general passenger agent Detroit United Railway; E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company; S. D. Hutchins, representative Westinghouse Traction Brake Company; W. H. Bloss, representative Ohio Brass Company, and L. T. Loftus, auditor Indianapolis & Cincinnati Traction Company.

Immediately following the election of officers, Mr. Benham, the new president, was conducted to the chair. Invitations were received from the Chamber of Commerce of Cincinnati, Ohio, and from F. R. Coates, president of the Toledo Railways & Light Company, to hold the November meeting of the association in their respective cities. W. A. Carson, Evansville Railways, read the report of the committee on resolutions. President Henry was congratulated upon his election as president of the American Electric Railway Association and thanked for the able manner in which he had handled the affairs of the Central Electric Railway Association as its president. The thanks of the association were also extended to the Terre Haute, Indianapolis & Eastern Traction Company for furnishing a special car to convey a party to Detroit and Jackson, Mich., which resulted in the complete interurban mileage of the Detroit United Railway and that of the Michigan Railway coming into association membership. The Interstate Public Service Company and the Indianapolis & Louisville Traction companies were also thanked by the association for furnishing an interurban car to the special party which was successful in bringing the Louisville & Interurban Railroad into the association. The association thanked the Ohmer Fare Register Company and the Peoples' Railway for their entertainment during the Dayton meeting. Resolutions thanking the nonmembers of the association who took part in the regular program were also reported, as well as resolutions condoling the families of C. M. Witt, storekeeper of the Union Traction Company of Indiana, and George Parker, general freight agent of the Detroit United Railway, members of the association, who had died re-

BANQUET AT ANNUAL CONVENTION OF C. E. R. A. AT DAYTON, FEB. 24

cently. An abstract of the paper read at the meeting on Thursday by H. M. Waite, city manager of Dayton, discussing the commission manager form of government in Dayton and its relations to public utilities, is included below. An abstract is also published of the paper by Q. W. Hershey on "Induction Motor Operation on the Norfolk & Western."

ASSOCIATION BANQUET

At the banquet on Thursday evening, President Henry acted as toastmaster and 237 members and guests attended. President Henry proudly announced the fact that the association now had 142 supplymen members and embraced more than 4000 miles of interurban railway lines. He emphasized particularly the cordial relations existing between the railway and supply members of this association, and urged the association's hearty support in bringing about a similar relationship in the American Electric Railway Association. A report of President Henry's remarks was published in the issue of last week. Judge Baggot of the Dayton Municipal Court gave an address of welcome in the absence of George W. Shroyer, Mayor of Dayton. Following this, S. D. Hutchins, representative Westinghouse Traction Brake Company, addressed the banqueters on the relation between the manufacturer's representatives and the railway members, and closed by presenting President Henry with an ivory gavel mounted in gold and jewels. Mr. Hutchins' address and a photograph of the gavel are shown elsewhere in this issue. On the gold band around the head of the gavel is the following inscription: "Presented to Mr. Charles L. Henry, president of the American Electric Railway Association, Central Electric Railway Association and dean of electric railway development, by the supply men members of the Central Electric Railway Association as a slight token of esteem. Feb. 24, 1916." An interurban car, with a diamond for a headlight, is also engraved on the gold band.

President Henry gracefully acknowledged this evidence of appreciation on the part of the supply men members of the association, following which a letter from the Hon. James M. Cox, ex-Governor of Ohio, was read, stating that he regretted that he was unable to be present at the banquet. In his stead, B. S. Josselyn, formerly president of the Portland (Ore.) Railway, Light & Power Company, addressed the association. Among other things he said that he was a strong advocate of applying the golden rule to railway operation. In his experience at Portland he had found the claim department expense was the heaviest carried by the company, and represented between 6 per cent to 8 per cent of the gross income. To change this condition Mr. Josselyn adopted the policy that the company would in no case of damage attempt to evade responsibility. He said that he felt that the majority of claims could be settled outside of court, and that if suits were filed they would be from one of three causes. Either the railway company denied its responsibility, or the demands of the claimant were exorbitant, or there was some doubt concerning the responsibility.

As a result of the adoption of this policy, nineteen out of every twenty cases were non-suited. Later this result became a political issue, and in several instances judges were forced to run for office on a platform opposed to the non-suiting of damage cases. Ending July 1, 1915, this policy had been in effect eight years, and for the entire period the money paid out for claims never exceeded 3 per cent of the gross income. Mr. Josselyn considered this an excellent record when the fact was taken into account that the cars operate on narrow streets, over steep grades, where blocks average 200 ft. long and where the headway of the cars during the rush hours was as great as seventy-five cars per hour.

F. H. Rike, president of the Greater Dayton Association, then addressed the banqueters on the "Functions of the Modern Civic Commercial Organization." Following this address, John Benham, of the International Register Company, announced the schedule of the proposed boat trip to be held at the time of the June meeting of the association. Arthur W. Brady, president of the Union Traction Company of Indiana, concluded the program with a brief description of the early days of the Indiana and Ohio associations, which later formed the original Central Electric Railway Association, and then discussed the development of the commission idea from its beginning to the present time.

Commission-Manager Government and Its Relation to Utilities

BY H. M. WAITE

City Manager, Dayton, Ohio

In general, a form of government for American cities modeled after that of the federal government has been found to be entirely too cumbersome, and a substitute form of government by commissions has been widely adopted by a large number of municipalities in this country. The adherents of a straight commission form of government, however, have found through experience that this plan has many defects, such as a lack of centralized authority, a confusion of legislative and administrative functions, and an ineffectiveness of attempting through the ballot to select trained officials for particular functions of government. On account of these conditions there has developed a sentiment for what is known as the commission-manager form of government, which is now in operation in at least seventy-three cities in the country.

When the charter commission of Dayton set out to formulate a new charter, it applied business experience in order to overcome the foregoing defects of the straight commission plan. The form adopted calls for a commission of five elected at large on a non-partisan short ballot, this commission having the power to employ a city manager at any salary deemed advisable. The manager can select five directors and administer the government as directed by the commission. The manager acts with his commission just as any executive acts with his board of directors. The directors cover the departments of law, welfare, finance, safety and service. The service director occupies a most important position, for this official has charge of enforcing all the obligations of privately-owned or operated public utilities.

The section of the new charter relating to franchises and public utilities is unique, practical and enforceable. The commission is authorized to make public utility grants subject to petition and referendum and to renew the same, with the restrictions that no exclusive franchise or renewal shall ever be granted and no franchise shall be renewed before one year prior to its expiration. In the grant the commission must prescribe the kind and quality of service, the rates, the use of public property and other terms of public interest. In all grants the right must be reserved for the city to purchase the property at a price fixed in the ordinance or to be fixed as provided by the ordinance. The value of the original franchise grant or renewal cannot be included in the purchase price. Other provisions cover the control of the commission over extensions and the location of tracks, etc., in the public streets.

The possibilities under this section of the charter are indeed great, for instead of the usual bickerings and political plays which characterize old utility grants, the city of Dayton now presents the sight of the city officials working with the utilities in the drawing of franchises fair to both sides. Under the present plan, men of experience and expert knowledge prepare details for the commission, and there are no committees of council, no politics and no premature or demagogic publicity. This does not mean, however, that the city of Dayton has no publicity, for the charter was in reality founded on pitiless publicity and co-operation with the press in trying to give the public what is right and what it ought to have.

The old day of utilities in politics is over. In the past the government, to some extent, was debauched by representatives of public utilities simply because these concerns were forced to play the game. It is also not to be forgotten that not so long ago the dominant political party in the large city usually was guided in its inspirations and activities by the suggestions coming from the representatives of public utilities. In some instances, the heads of public utilities were chairmen of their respective political parties. Happily this day is past. As the cities progress and conduct their affairs upon a business basis, the necessity for the judgment of public utility men in the guidance of political policies is very unnecessary.

Induction Motors on Norfolk & Western

BY Q. W. HERSHEY
Westinghouse Electric & Manufacturing Company

The use of the induction motor on the Norfolk & Western electrification has brought out a number of valuable features in connection with its operation in railway service. Since only slip rings are used, commutation troubles are not present; constant speed operation is secured; automatic regenerative braking is instituted; and the simplest, hardiest character of electrical equipment is made available.

In the successful handling of a long, heavy train, one of the features requiring special care is to avoid any tendency toward sudden changes in speed. This applies especially in taking up slack in starting, in down grade operation, or in reducing train tension. Through the use of the liquid rheostat this may be ideally accomplished. The resistance of the rheostat is varied through the amount by which the plates, or electrodes, are immersed in the liquid of the rheostat. Actually the plates themselves are immovable, while the liquid is made to change its level. This change is relatively regular. There are no fixed "notch to notch" operations, yet the level of the liquid may be changed either by an infinitely small amount or through the greatest variation possible. This practically gives an infinite number of positions of change, with the consequent proportionate tendency in the equipment to change its operating conditions. Thereby abrupt changes in speed, or tendency to change, may be avoided and there is eliminated all sudden bunching of the train, breaking of the drawheads, etc.

With the steam locomotive, with its drivers rigidly connected through the side rods, the matter of slippage is ever troublesome. However, with the Norfolk & Western electric locomotives, the drivers are divided into four groups, or sets, each set being driven by a pair of motors which have a constant turning effort. Meters for the observation of the current that is taken by each pair of motors are installed, and by these the engineman can observe at all times the draft of current and the consequent tractive effort put forth by each of the four sets as its share in the effort of the engine. Each pair of motors has its individual liquid rheostat which, independently or collectively with all rheostats in all motor groups, may be raised or lowered by the manipulation of small, conveniently-located levers that form part of the control system.

By this means the engineman is not only constantly advised as to the functioning condition of the several sets of drivers under his engine, but he has at his command a means for their control. If for any reason one set of drivers should slip, he knows instantly which one it is and immediately corrects the defect by reducing the amount of current actuating those drivers so that they may come again into normal functioning condition. This is done without reducing power to the other sets that are properly functioning. Also, in case it should occur that, because of wear of tires, all drivers are not of exactly the same diameter, with a consequent shifting of energy and effort, the engineman, merely by shifting his rheostats slightly, brings such drivers into proper functioning.

From the subdivision of drivers and their separate control, and the constant-speed characteristic of the motors, several important results may be observed: It is within the power of the engineman to reduce the tractive effort of any pair of drivers that has a tendency to slip. Since each engine has its drivers divided into four sets, the loss of adhesion of one set amounts to a maximum loss of but 25 per cent of the total adhesion of the engine. Also, where a set of drivers on one truck slips, only a very slight decrease in the speed of the train is enough to make the motors of the three properly functioning sets of drivers automatically take more current and to make up for the effort lost by the slipping drivers. The consequent avoidance of change in the train speed eliminates the effects of lost train inertia with resulting bunching and probable restarting. If drivers do slip, they do not "run away" to an excessive speed, but revolve at practically the same speed as before. The motors operate, with respect to speed, practically independently of voltage conditions, so that a slipping driver does not have, as it does in the series operation of direct-current motors, the characteristic of generating a high counter electromotive force thereby reducing greatly the current taken, with consequent complete loss of tractive effort.

In general, the operation of the electric engines has proved to be so simple that the regular Mallet locomotive crews have experienced no trouble in taking over the electric operation. In the single-track Elkhorn Tunnel, which forms part of the electric zone, the relieving of congestion has been especially notable in its effect on general movements over the system. It is interesting to note here that combined steam and electric operation has been maintained at times through the tunnel, thus demonstrating the sufficiency of the scheme of 11,000-volt trolley insulation that has been installed.

Under electric operation weather conditions do not necessitate reductions in train tonnage as was the case with steam. On the grade, 3250 tons is always the normal load. This is handled with two electric engines operating at 14 m.p.h., as against three Mallets which were formerly required and which made average speeds of about 7 m.p.h. Light time freights and passenger trains are handled on the heavy grades by the electric engines at 28 m.p.h. as against approximately 10 m.p.h. and 20 m.p.h., respectively, under steam operation. Frequently a passenger train coming into North Fork twenty minutes late will be taken from there by an electric engine and delivered on time at Bluestone Junction. It has been found advantageous and thoroughly practicable for two electric engines to take a "filled out" train of 4700 tons from Flat Top to Bluefield. The dispatching of trains under electric operation has been found to be the most convenient from the ease of determining definite movements secured from known fixed speeds and the lack of uncertainty by the elimination of necessity for taking coal and water.

These electric locomotives have now demonstrated their reliability in the severest service in the winter months, as attested by records of nearly 45,000 engine-miles with no delay due to failure of engines in service. The electric engine-mileage per day has been increased 100 per cent over that of steam, with its consequent greater crew-mileage, and the nominal train tonnages over certain sections have been increased over former operation by approximately 50 per cent. All train speeds on the grades have been increased—tonnage train speeds have been increased more than 100 per cent on the heavy grades, and the average over the entire zone from the coal fields to Bluefield has been increased over 50 per cent. Congestion at the gathering points and at former coaling and watering stations and at the long tunnel has been eliminated, and, finally, because of more certain movement, longer time on the road between inspections, greater flexibility in dispatching, higher train speeds and greater train tonnages, nine electric engines are handling a traffic which, it is estimater, would require thirty-three locomotives of the Mallet type.

[The above reference to nine electric engines on the Norfolk & Western electric zone, instead of the twelve machines generally understood to have been purchased, may be explained by the fact that of the original twelve engines, one is normally held out of service for inspection, one was in a collision and is now being repaired, and one was only recently turned over to the railroad by the manufacturer. This leaves nine engines in actual service.—EDS.]

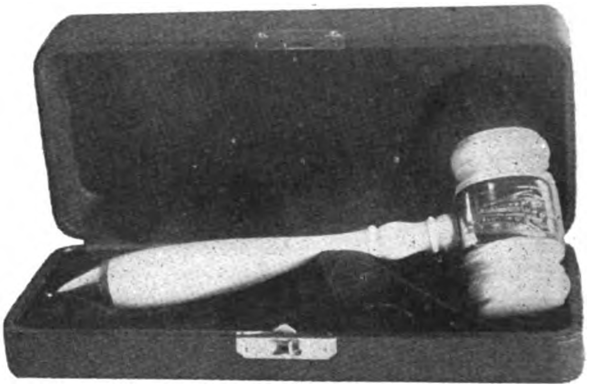
Gift of Gavel to President Henry

Presented by Supply Members of C. E. R. A. After an Address Outlining Relations Between Manufacturers and Railway Men

A VERY pleasant feature of the banquet on Feb. 24 of the Central Electric Railway Association was the presentation to President Henry by the supply members of the association of an ivory and gold-mounted gavel mentioned on page 452. The presentation speech was made by S. D. Hutchins, Columbus representative of the Westinghouse Air Brake Company and chairman of the supplymen members of the Central Electric Railway Association, and discussed the dependence on each other of the manufacturers and railway men and the need of the most harmonious relations between them. His remarks follow:

"It might be said that our activity in association matters is prompted by a selfish motive—that of obtaining a closer acquaintance and relationship with those with whom we do business, and, judging from this gathering here to-night, from this viewpoint our social relationships are eminently successful. However, we maintain (and feel from the attitude of the railwaymen members) that we have their concurrence that our relationship is of a broader significance, in fact, it assumes that of mutual concern and benefit from the standpoint of our being considerable of a factor in the development and successful operation of the public utilities, and not—as might appear—in the position of 'everything to get and nothing to give.' While our names may not appear on your monthly payroll, a large portion of the recompense we receive for service figures in the expense side of the ledger of your operating expenses, and, while it is probably charged into cost of different items of material or improvements, it could be consistently charged to that of 'consulting specialists.'

"I am convinced, from my own experience of many years as a representative of one of the largest manufacturing companies and through perhaps unusual opportunities for observation during that period, that there is no single factor which can be made of greater practical value and material assistance to railway mechanical, operating and executive officers than the co-operation and active interest of the representatives of railway supply manufacturing concerns in connection with the numberless important and far-reaching problems that are incident to railroad operations. This co-operation and assistance is of greater value to the railroad companies to-day than it ever has been before, largely by reason of the specialization and highly scientific and technical development taking place in every art and industry. The reasons for this relationship and interdependence are both sound and substantial: First, the business of the railroads is primarily transportation; that is, the handling of passenger and freight traffic, which business has now assumed stupendous proportions. Second, the business of the 'supplyman' so called, is to study railroad conditions as they exist, to originate products or devices to meet real needs as they develop, and to show the railroad man how and why a particular product, apparatus or equipment meets a real need, not only to the profit or betterment of the railroad but contributing to convenience and comfort, and providing additional factors of safety to which the traveling public is entitled.



GAVEL GIVEN TO PRESIDENT HENRY AT DAYTON

"While there are exceptions, of course, the fact of the matter is that the representatives of practically all reliable railway supply houses are not merely salesmen, in the narrow sense of that term, but experts, educated in their respective lines far beyond what would be possible for any busy railroad official. In other words, the supplyman is able to bring to the railroad official not only a different angle of view but a wealth of data and experience along the line of the specific railroad problem in which he is particularly interested. Whether it happens that apparatus is purchased from such supplyman or otherwise, the opportunity is afforded the railroad man to acquire pertinent and valuable information which, in the nature of things, he cannot originate for himself through such imperfect media as correspondence or individual research.

"This, however, may be somewhat superficial, but with a brief time-saving interview with the supplyman you have a detail analysis and clear understanding of all the functions and advantages of the device, as well as the reasons for its production.

"It may well be said in this connection, however, that the technical journals, especially those serving this organization, bring to your notice in their well-designed and comprehensive advertisements what has and is being done by the manufacturers in the development of product or devices not only to increase the factors of safety of operation but the improved methods of doing things, so that tne great procession can move forward in full step with the development and advancement of the times.

"I think what I have said fully concurs with what Arthur W. Brady, president Union Traction Company of Indiana, stated in a recent communication in the ELECTRIC RAILWAY JOURNAL, 'that the time has arrived for full recognition of the fact that the fundamental interest of those owning or operating electric railway properties and those engaged in manufacturing or selling the apparatus and other things essential to electric railway existence and operation are identical, that the protection and advancement of those interests require the harmonious efforts of owners, operators, manufacturers and dealers through and as one organization, and that the prosperity of electric railway properties and the prosperity of electric railway manufacturers and supplymen rise or fall together.'

"In this Mr. Brady has expressed clearly the principles that the supplymen, whose names appear on our roster, have always subscribed to, and which has distinguished the C. E. R. A. as a great big happy family, full of the spirit of co-operation, standing as it does to-day in the full bloom of strength and usefulness. I trust that you will accept this brief interpretation of our relationship and that we are in fact allied with you, not only in continually improving and enlarging the transportation facilities but also a factor in the molding of opinion to a calm, judicious and fair consideration of railroad problems by the public and by the legislators.

"The Central Electric Railway Association has always been exceedingly fortunate in its selection of the executive staff, especially the presidents who have presided over its deliberations and shaped its destiny, which is evidenced in its present flourishing condition. And we feel, Mr. President, that you—during the past year—have been particularly active and have accomplished much, notwithstanding you were in the meantime signally honored with the presidency of the American Electric Railway Association, which carried with it the additional burdens and responsibilities incident thereto.

"We, therefore, deem it fitting that the supplymen members of the C. E. R. A. express their appreciation, not only for what you have done during your incumbency in office but as dean of the promotion, development and advancement of electrically operated utilities in this country. And the very pleasant duty devolves on me, as chairman of the supplymen, to present to you this gavel of solid ivory mounted with solid gold and studded with jewels. This is the emblem of that authority which you have so judiciously exercised. I am, therefore, delighted to hand you this slight token of our esteem with the sincere and hearty wish that you will live many years to enjoy the fruits of your work so well done."

Old times were recalled at Evansville, Ind., recently when Eli ("Brick") Broshears entertained friends at a party to celebrate the thirty-eighth anniversary of the birth of his mule, "Jack B." Many friends of master and mule assembled, bearing carrots and other similar delicacies, at the home of the master, 514 Locust Street. Most of them in former days had ridden behind the mule, which pulled a street car on the Evansville system until 1891.

Cost of Operation in Cleveland

L. R. Nash Computes Fare Needed by Cleveland Railway to Cover Full Cost of Operation

THE Stone & Webster *Journal* for February, 1916, contains a general review by L. R. Nash of the operation of the Cleveland Railway under the Tayler franchise. Inasmuch as the ELECTRIC RAILWAY JOURNAL in the issue of Feb. 19 published the main details of this subject as reviewed by F. W. Doolittle, the following abstract of Mr. Nash's article will be confined to his comments upon the central question involved, the real cost of a ride in Cleveland and the fare needed to cover such cost.

In reaching the cost of transportation on a per car-mile basis, Mr. Nash would allow 6.7 cents for maintenance and replacements, this being 15 per cent of the actual average gross, or about 12 per cent of a normal gross per car-mile for maintenance plus 3.1 cents per ordinance car-mile for replacements on a sinking fund basis. This total is also nearly equal to the average actual annual cost of maintenance and renewals plus the annual proportion of actual cost of abandoned property to date. For operation he would allow 12.6 cents, the present actual allowance, and for taxes, interest and dividends, 7.25 cents, making total current expenses and charges of 26.55 cents. To this should be added 0.85 cent for increased expense for standard service, covering the $300,000 needed to eliminate overcrowding; 0.74 cent for standard stop and speed practice, covering the $250,000 needed to restore the usual approved arrangement of convenient stops and normal schedule speed, and 1.86 cents for return on the $10,530,000 of confiscated investment. The cumulative total cost of operation for "test" service would thus be 30 cents per car-mile, to which should be added 2.6 cents for an 8 per cent return on the investment, making a final total of 32.6 cents.

The unweighted average of gross earnings per revenue passenger from 1910 to 1915 inclusive was 3.39 cents. On the basis of an actual cost of 30 cents, Mr. Nash calculates that the fare should be increased to 4.26 cents. The yield from the maximum or "a" rate of fare would be 3.97 cents, with supplementary income bringing a total slightly less than the 4.26 cents. Without additional stops, better service and other conveniences assumed, the cost might be reduced so as to require a fare per revenue passenger of about 3.85 cents. This, which may be called the actual cost per passenger of the present Cleveland service, is somewhat higher than the yield from the fare schedule "b" just below the maximum. This rate is 4 cents, seven tickets for 25 cents, 1 cent for transfers, and 1 cent rebate, the "a" rate providing for no rebate.

In conclusion, Mr. Nash states that the rates of fare so far charged have not fully paid for the cost of service, and that a 3-cent fare cannot pay for good service and properly maintain the property. The rate needed to make good past deficits and cover fully the future total cost of service will be approximately the maximum permissible under the franchise. To his mind there is no fundamental difference between the future fare necessary to pay the full cost of service in Cleveland and that necessary in other similar cities under equally favorable conditions. The confiscation by the city of 30 per cent of the legitimate investment in the Cleveland property more than accounts for any essential differences in cost of service between this and other cities. The co-operative spirit and economies in service successfully practised in Cleveland, however, would result in a substantial reduction in cost if applied in other cities.

Unevaluated Factors in Electrification

Operation of Electric Engines Reduces Maintenance Cost of Track and Equipment and Effects Improved Service Generally—Other Advantages Over Steam Locomotives

IN the current issue of the *Electric Journal*, Q. W. Hershey, heavy traction department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., outlines what he calls the "unevaluated factors of electrified railroad operation." In these he includes the items, favorable to electrification, which are not usually included in financial considerations, and which are in addition to the elimination of noise, dirt and smoke, limitations as to roadways in tunnels, etc., which were important factors in early electrifications. He states that it is possible now to calculate accurately whether or not electrification will be justified in any case by the resulting economy, but he also directs attention to the following matters which have an indirect economic bearing on the problem.

As compared with the steam locomotive, the easier riding qualities of the electric engines, the more uniform distribution of driver weight, and the less nosing and track pounding, all result in lower track maintenance costs. These qualities result from the flexibility of truck and cab arrangement, the less weight of side rods, the uniform wheel effort, etc.

Due to the uniform propulsive effort, the electric engine will deliver greater drawbar pull per driver weight than the steam locomotive, and if one truck slips, the other trucks can absorb the lost effort. The nicely graduated tractive effort within the control of the engineman in the electric engine contributes to lower maintenance costs of trailing equipment.

Regenerative braking has proved to be one of the most important features of the electric engine. It removes the strain from the cars of trailing equipment and eliminates the dissipation of energy through friction, resulting in a decrease in tire wear; it eliminates troubles from hot tires, and decreases the maintenance cost of air equipment. In addition, the jarring of trains due to letting down air on long grades, with all of its consequent troubles and cost, is eliminated. Further, the engineman has at his command for emergency purposes a fully-charged train line. There is also less necessity for outside riding on the part of brakemen for the purpose of setting up retainers on long, light trains descending grades, and finally, the return of power to the line effects a very considerable economy.

Double-end operation of the locomotive, eliminating all turning, lessens congestion and facilitates dispatching due to the increased flexibility.

With the higher speed usually resulting from electrification, block signals can be set farther apart, with resulting decreased maintenance cost, and freer operating conditions along the line.

In tunnels there are better operating conditions, making higher speed possible, due to the absence of moisture which, combining with the gases of the steam locomotive, usually produces bad trackage.

The operating efficiency of the electric engine is high due to several factors. As the generation of power is transferred to the power station, where the factors are constant, the irregularities of the locomotive as a power generating plant are eliminated, as the engineman deals only with the manipulation of levers. Having at his command an unlimited amount of power, he is under no strain to keep the equipment in condition to give high efficiency. The amount of inspection necessary with the electric engine is less than with the steam engine, and the engines may be on the tracks longer, thus decreasing the necessary amount of equipment. Double-end operation makes the electric engine more adaptable for switching operation.

The release of the engineman from the strain of maintaining the mechanism, and the physical comfort of the engineman and his fireman during winter and summer, are conducive to safe operation.

The possibility of indicating the power drawn in the motor circuit by means of meters mounted in plain view along with the air gages, facilitates intelligent operation of the engine. At the same time, the generally better tractive conditions render fewer extra starts necessary.

From the standpoint of safety, the engineer's position in the electric locomotive, combined with the absence of steam and smoke, which might obstruct his view of signals and roadway, conduce to the reduction of accidents. Thus not only does additional security result, but the necessity for slow-downs to see signals is eliminated.

Finally, there is a general upbuilding of the community in which an electrified road operates, due to the better service.

Mr. Hershey points out that there have never been any very serious troubles in starting an electric system, and the railroad organization has always been able to meet the new problems resulting. The financial results of electrification have always exceeded the expectations, and this is attributable to the "unevaluated factors" outlined above.

Railway Companies to Distribute Safety-First Primers

Considerable interest is being manifested by the street railway companies in the children's illustrated safety-first primer, which was recently prepared by the Safety First Federation of America, New York, and which contains appropriate stories, rhymes and colored illustrations for vividly featuring to children the dangers of trolley cars, automobiles and fires. A number of operating companies are seriously contemplating distribution of large quantities of the primers and the safety society has lately received orders for 1000 copies from the Elmira Water, Light & Railroad Company, Elmira, N. Y., and for 500 copies from the Union Traction Company of Indiana, Anderson, Ind. The title covers of these primers when distributed will bear the name of the railway company instigating the campaign. Plans are also being made by the Federation, which have been approved by the New York Board of Education, for the distribution of 500,000 copies of these primers in the city of New York.

F. H. Elliott, executive secretary of the Safety First Federation, strongly urges the co-operation of local chambers of commerce, public safety committees and other organizations and individuals interested, with the street railways, in subscribing for the primers, because the books contain general safety rules that the whole public would naturally feel a vital interest in enforcing. Mr. Elliott, furthermore, favors the distribution of the primers by an organization which is outside of the railway companies, because the public then will not be inclined to be skeptical of the sincerity of the motives underlying the campaign.

The New York *Commercial* of Feb. 16 had a three-column article describing H. M. Byllesby & Company and the Standard Gas & Electric Company and the Northern States Power Company. In connection with the latter two organizations, the growth of the properties was shown in earnings and connected load figures.

One-Man Cars in Cities of Large Size

Experiences Are Outlined in Several Cities Having More Than 25,000 Population, Special Attention Being Given to the Question of Safety, the Operating Practice at Railroad Crossings and the Attitude of the Public

AN elaborate investigation of the subject of one-man car operation has recently been carried out by C. D. Cass, general manager Waterloo, Cedar Falls & Northern Railway, and through his courtesy the ELECTRIC RAILWAY JOURNAL is enabled to publish the results that were obtained. The data thus given provide an unusually valuable outline of the present status of the subject, in so far as it applies to cities of more than 25,000 inhabitants. The information was collected in the form of legally attested replies from various railways, city officials and others to a circular letter, the answers being in part as follows:

In Everett, Wash., a city of about 35,000 people, the Puget Sound International Railway & Power Company operates eleven cars in city service, of which four are of the one-man type, and it is the intention of the company to increase this number in the future. The one-man cars have been in operation for several months without having any accidents that were chargeable to the new method of operation, and the results have been absolutely satisfactory from the operating standpoint. The reason for introducing these cars developed from a decrease in revenue due to competition with jitney buses and private automobiles.

PLANS COMPLETE ONE-MAN SERVICE FOR SPOKANE

In Spokane, Wash., a city of 104,000 inhabitants, the Washington Water Power Company operates seventy cars, of which forty-one are of the one-man type. The latter have been entirely satisfactory from the standpoint of operation and safety and meet with favor from the general public. It is the intention of the company to increase the number in service so that, eventually, the entire city system will be operated with this type of car. Experience has shown that the number of alighting and boarding accidents have been decreased by the operation of the one-man cars, and the number of collision accidents have also been greatly reduced. It is not considered that the hazard at railroad crossings has been increased in any way. At such points the motorman brings the car to a standstill before reaching the danger zone, looks in both directions, and then proceeds. In this way the responsibility is placed entirely in the hands of one man, and thus there is eliminated the possibility of a mistake in signals given by a conductor in flagging a car across railroad tracks. In Spokane the majority of steam railroad crossings are protected by gates, which are operated by a tower man in the employ of the steam railroad company. In other places the steam railroad companies have placed gates at each side of the crossing which must be opened by a member of the train crew before the train passes, and at other points flagmen are provided.

In the city of Little Rock, Ark., the Little Rock Railway & Light Company has been operating one-man cars since November, 1915, and at the present time five such cars are in service. It is the intention eventually to put eleven additional one-man cars in service in the city, which has a population of 60,000. These cars are 30 ft. in length and have single trucks, the weight being about 22,000 lb. They operate just as safely, and in some respects more safely, than the cars upon which two men are regularly employed, being much more free from boarding and alighting accidents and having practically eliminated step accidents. At railroad crossings, it is the practice for the motorman to stop the car, get off and go forward, look up and down the railroad track, go back to the car, and proceed over the crossing. This method of operation is carried out to comply with a State law, but if it were not for the statute, the company would not require flagging. The one-man cars have saved the company considerable money and have not interfered with the efficiency, reliability or safety of the passengers. The city is taking no action to prevent the operation of these cars, and there have been no complaints on the part of the patrons regarding the one-man service. The earnings of each car range from $22.50 to $25 per day.

Until two years ago, in the city of Waco, Tex., 35,000 population, one-man cars were operated exclusively ever since the beginning of street railway service, eight cars of this type being in operation at the present time. These cars were between 32 ft. and 38 ft. in length, weighing between 16,000 lb. and 22,000 lb., and had single trucks. About two years ago the company purchased some large double-truck cars, which were about 44 ft. long and weighed about 28,000 lb., and on account of the large size it was considered necessary to place an additional man on some of them. It has been found that the large double-truck cars are unprofitable, because the excessive cost of operating them with two men makes it impossible to give a sufficiently frequent service at a reasonable rate. The company, therefore, is planning to discontinue the use of the large cars operated with two men and to return to the use of the small single-truck one-man cars, thereby making it possible to increase the frequency of the service without increasing the operating costs.

With the one-man cars it has been the practice at steam railroad crossings for the motormen to bring the car to a stop at the track and then, without getting off the car, look up and down the track, proceeding over the crossing if it could be made in safety. The company's experience has proved conclusively that this method of operation at steam railroad crossings is just as safe as, if not safer than, where the conductor of a car goes forward upon the crossings and flags the car across. With regard to safe operation in general, the one-man cars are as free from accidents of any kind as any two-man cars that are run in the city. No complaints have been received with regard to these cars, and no action has ever been taken to compel the railway to cease operating them or to put more than one man upon them.

ACCIDENTS GREATLY REDUCED IN SAN ANTONIO

One-man cars have been operated in San Antonio, Tex., a city of about 115,000 population, for a number of years, thirteen being in operation at the present time. These cars are about 27 ft. long and have single trucks, weighing about 22,000 lb. each. That the one-man cars have reduced the number of accidents in comparison to two-man cars is indicated by the fact that during five months in the year 1914 the company operated eight two-man cars on a certain line, these being involved in a total of 157 accidents of all kinds. During the corresponding months in the year 1915, nine one-man cars were operated on the same line, these being involved in a total of only fifty-three accidents of all kinds. With one-man cars at railroad crossings the motorman is required to flag himself across only because of the existence of a State law and not because it is considered to be necessary or productive of any additional safety. No complaints regarding the cars have been made, and they are being operated over various busy streets in the city of San Antonio. The company at the present time is contemplating the introduction of additional one-man cars.

In the city of Quincy, Ill., a city of 40,000 population, one-man cars have for years been in satisfactory service on lines which serve factory districts in the city. The one-man car is considered to be safer and much less liable to platform accidents than two-man cars. At railroad crossings arrangements have been made with the railroad company's watchman whereby he flags the cars across. No platform accident appears ever to have taken place on these cars.

The Topeka Railway Company, in Topeka, Kan., a city of 50,000 population, has operated eight one-man cars continuously since October, 1915. Prior to this time two similar cars had been operated continuously for ten years. At the present time twelve additional cars are being rebuilt for this service. The one-man cars are 31 ft. long and have single trucks, weighing about 22,000 lb. They operate on the main streets of the city just as safely, and in some respects much more safely, than cars upon which two men are regularly employed. Step accidents have been practically eliminated. It is the practice to have the motorman flag himself across all railroad crossings, whether on a one-man or a two-man car, because on account of this rule the motorman is always sure to stop his car before crossing the tracks. The introduction of the one-man unit has reduced operating expenses and has not interfered with the efficiency of the service. No complaints have been made by the city with reference to the operation of these cars. The earnings per car are between $25 to $35 per day.

The Lincoln Traction Company of Lincoln, Neb., which has about 68,000 population, has operated two one-man cars since October, 1914, and is considering an extension of this service. These cars operate over busy streets in the city just as safely as the cars upon which two men are employed. They have fewer boarding and alighting accidents than the types of two-man car that have open platforms. No complaints regarding the one-man cars have been made by the city of Lincoln, but there were some complaints from the patrons when the cars were first installed, although after the cars had been operated for a few weeks these complaints ceased, the public being entirely satisfied. The earnings of each car range between $20 and $30 per day.

During the past two winters, in the city of Duluth, which has a population of about 55,000, the Park Point Traction Company has operated its cars with one man for approximately 43 per cent of the time each day. The cars have given just as good service as with two men, and no accidents have occurred upon the cars operated by one man. During the winter time the cars could be operated as one-man cars for the whole of the day if it were not for the fact that an additional 2-cent fare has to be collected when transfers are issued by the conductor. In the same city the Duluth Street Railway operates one-man cars on one of its lines, this method of operation having been in effect for more than twenty years. The operation of these cars has been entirely satisfactory to the company and to the general public.

In the city of Clinton, Iowa, having a population of about 26,000, fourteen local street cars are operated, and five of these are of the one-man type. This method of operation was inaugurated in March, 1915, and the results have been very satisfactory to the company and to the public, no questions having ever arisen regarding its propriety. Platform accidents have been practically eliminated.

CONDUCTORS NOT REQUIRED TO FLAG CROSSINGS IN WICHITA

In the city of Wichita, Kan., a city of 65,000 population, six one-man cars have been operated continuously since September, 1913. Since August, 1915, ten such cars have been operated, and at the present time three more are being rebuilt for this service. In addition to the above-mentioned cars it is proposed to install twelve more in the near future. The one-man cars now operated are 34 ft. long and weigh about 20,000 lb. each, seating forty passengers. Their operation has proved to be just as safe as that of cars upon which two men are employed, and, in fact, step accidents have been practically eliminated. At railroad crossings it is the practice to have the motorman flag himself across the tracks, this being true both with respect to one-man and two-man operated cars. The conductor of a two-man car does not flag railroad crossings, and the motorman is required to go forward, because the motorman is thus always certain to stop his car before crossing the track.

The one-man service has been thoroughly satisfactory, and during the summer of 1915 an extremely heavy travel to and from a park was handled just as successfully, and more safely, than it had ever been handled before with two-man operated cars. Since the introduction of one-man operation the company has been able to increase the frequency of service on several of its lines. The earnings of each car range between $25 and $35 per day. No complaint has been made by the city of Wichita in regard to one-man car operation, and although there were some complaints on the part of the patrons with reference to the regularity and convenience of the service when it was first begun, after a short time the complaints ceased and the public became entirely satisfied.

In Oklahoma City, Okla., which has a population of about 85,000, the Oklahoma Railway has operated one-man cars continuously since the year 1909, having at the present time nine of these cars in service. These are 40 ft. long and weigh about 36,000 lb., seating from forty-four to forty-eight passengers. They operate just as safely as the two-man cars, and they are moved across the various railroad crossings in the city by having the motorman flag himself. This method of flagging is required because the company has a contract with the steam railroad requiring the cars to be stopped and flagged by one of its employees. If it were not for this contract, the motorman would not be required to go forward at railroad crossings, as a clear view can be obtained in both directions without leaving the car. The city is doing nothing to compel the railway to discontinue the use of one-man operation and the company's patrons have never complained with reference to it. The service is considered to be reliable, convenient, satisfactory and safe.

The Washington Auto Bus Company, Seattle, Wash., affiliated with the Puget Sound Traction, Light & Power Company, has started an automobile bus line between Puyallup and Orting. The round-trip fare between Puyallup and Orting is 40 cents. Buses connect with the street cars, so that patrons can travel from Tacoma to Orting and back for 50 cents.

Safety First At New England Club

Doherty Campaign Described in Detail—Mr. Bullock Gives Facts About National Safety Council

ONE hundred and twenty-five members and guests of the New England Street Railway Club celebrated a safety-first night at the American House, Boston, on Feb. 24, President C. E. Learned being in the chair. After the usual business meeting addresses were delivered by George Oliver Smith, supervisor of safety Doherty Operating Company, New York, and by H. A. Bullock, staff assistant to the president Brooklyn Rapid Transit Company.

SAFETY CAMPAIGN OF DOHERTY ORGANIZATION

Mr. Smith said that about 100 utilities are now operated by the Doherty organization, which includes properties in all parts of the country and a total employee list of 13,000. Thirteen electric railways are included in these companies. About three years ago accident study was taken up in a comprehensive way, and practical methods of prevention were investigated by a committee which made an extensive trip around the country, visiting many companies interested in safety work. Superintendents, claim agents, executives and many others interested in accident prevention were interviewed. A preliminary report was then made to the executives of the home organization and a tentative plan for safety work formulated with regard to the Doherty properties. Backed by an appropriation the committee then began a tour including every property under Doherty management, all being visited inside of a year.

At these plants an exhaustive survey of safety conditions was carried out, including boiler rooms, storerooms, substations, transmission lines, yards and all physical property. More than 1300 photographic negatives were taken showing dangerous conditions, and the subjects ranged from a piece of broken headlight glass in an alley between storehouses to unguarded belts, line shafting, etc. Lantern slides of local conditions photographed and of similar conditions elsewhere were prepared and meetings of employees called. Several moving picture reels showing accident prevention work were included. These slides showed the local employee the exact conditions prevailing on his own system and aroused intense interest. The local manager and other executives attended the meetings, and often these ran into the early morning hours, so great was the interest manifested. Every effort was made to approach the local employees tactfully and in a helpful spirit, rather than in a censorious manner. The betterment of the local property from the safety standpoint was the ideal set forth, and the response was most gratifying. Studies were made of the records of the local company in each case, including the economies effected by the management and the outlays of the claim department.

The next step was the inception of a local safety organization. This was planned to include every employee, and a feature was a central committee and above all, one employee specially charged with the responsibility for carrying forward the safety work. This employee, or local director of safety, gives from one-third to all his time to safety pursuits. At the close of the first year's inspection trip a central bureau was well established at New York to direct the safety work of all the Doherty companies, and a comprehensive system of records and correspondence was inaugurated. All kinds of accident prevention information are sent out from headquarters in a bulletin service emphasizing in a crisp, snappy style the lessons of accidents which come to the notice of the central office. So far as possible the attempt is made to show the conditions existing before and after the accident in each case. The bulletins, of from four to six sheets each, are issued fortnightly, and are posted in every plant at several points, going to twenty-six states. The importance of changing the bulletins frequently was early recognized. In the local companies the co-operation received was remarkable. The increased esprit-de-corps resulting is alone worth the cost of the entire safety work, although it is a by-product of the campaign. So far as possible the safety work is kept from interfering with the regular duties of employees fitting it in wherever feasible. The financial aspects of accidents as affecting the companies were not emphasized, but stress was laid upon the loss in efficiency, personal suffering, jeopardizing of prospects, etc., sustained by the injured employee, and the local organizations always responded to this point of view. The relation of freedom from accidents to success in personal competition received full consideration.

From New York a staff of field inspectors now works, each covering ten or fifteen plants. These men watch the physical condition of the properties, hold meetings for safety discussions, conduct competitions and make examinations and recommendations for improvements. A slogan contest with a first prize of $10 and lesser prizes running down to $2.50 was recently carried out, with surprisingly successful results. One slogan was sent in by a Swedish track foreman in his mother tongue. A follow-up system is an important part of the work of the central bureau. Inspectors' recommendations are made in duplicate, one copy going to the local manager and one to New York. The requested date of completing a safeguard is utilized at headquarters to direct any necessary inquiries to the local plant, and when the work is completed as recommended, the local manager sends his approved record to New York, upon the receipt of which the original is destroyed by the follow-up clerk. Accident report blanks providing full information are utilized, special attention being given to the recording of the conditions prevailing at the time of the accident as well as the causes. If a man has to leave his job the injury is considered an accident.

Executive letters are sent to local managers whenever a new means of prevention is learned, unless the topic is included in bulletin discussions. Graphic records are kept at New York relative to causes. Careful analyses are made to correctly fix the responsibility for accidents, especially in connection with the department at fault. Thus, an accident occurring when a passenger alights may be due to a defective step, in which case the shop and not the operating department must be charged with the trouble. Numerous suggestions as to prevention are received and encouraged at the central bureau, and all suggestions are considered by a special committee which determines their practicability.

The Toledo Railway & Light Company, Toledo, Ohio, one of the Doherty properties, has 2000 men in the railway department. There are 116 men on the accident committee, which meets one evening a week throughout the year. The company furnishes each man with an appropriate emblem, and after six months' service on the committee an "Honor Service" emblem is given. In the various properties it has been found better to encourage resuscitation by the prone pressure method than by pulmotors and lungmotors, since the latter cannot be handled with safety by inexperienced persons. Prizes are given to first-aid teams. One of the most helpful devices in facilitating the removal of dangerous conditions is the "defect tag," which is placed on a machine or other equipment needing alterations. The schools for motormen and conductors maintained by the Doherty organization were also described by the speaker. One of the most helpful devices in the interests of safety is a blotter issued every three months, which besides carrying a calendar, emphasizes safety points, mottos, slogans, etc.

WORK OF NATIONAL SAFETY COUNCIL

Mr. Bullock described the organization and activities of the National Safety Council, which now has about 1700 members embracing many branches of modern industry and a recently organized electric railway section including sixty companies. Twelve hundred delegates attended the annual congress of the Council last fall at Philadelphia. The headquarters at 208 South La Salle Street, Chicago, are a clearing house for accident prevention data and the four weekly bulletins issued by the Council are most valuable in carrying on safety propaganda in local companies. A regular weekly bulletin for the electric railway section will soon be issued by the Council.

COMMUNICATIONS

Purchasing Agent Calls a Halt

GEORGIA RAILWAY & POWER COMPANY
ATLANTA, GA., Feb. 28, 1916.

To the Editors:

In the course of years the Georgia Railway & Power Company has been evolved from a number of predecessors—I don't know how many, offhand. The names of these corporative ancestors have been forgotten by nearly everybody except the students of our genealogy and except also the manufacturers of things that electric and street railway companies are wont to buy. These manufacturers have not forgotten them. They are honoring to-day the memory of our dead and gone forebears. They are sending yet, addressed carefully to "Purchasing Agent" or somebody else of the Georgia Power Company, the Georgia Electric Company, the Atlanta Water Power & Electric Company and goodness knows how many other ancestors sleeping peacefully in the vaults of time, expensive catalogs and other mail matter that very nearly overcomes me with sheer weight of postage.

I always look over the advertising section first in your paper as well as in all other trade papers to which I subscribe, and I am often led to wonder how many of such advertising pages the manufacturers could buy in your periodicals with the value of the stamps they waste on me alone. How much the aggregate total of their waste is in this regard, taking the country at large, nobody knows, nor can anyone tell how much time and clerk hire and good ink and addressograph or pen wear-and-tear they throw away on sending me a dozen catalogs when one is all I possibly can use. I know only that they vex my spirit wofully and that they make me waste a whole lot of my time throwing stuff into the trashbasket or sending it back with pleas that they quit their extravagance.

My idea of a mailing list is, that while it is kept up to date and accurate, it is very valuable; but when it is neglected it can become one of the most expensive phases of any business.

Your directories of railway companies offer excellent investment for a number of manufacturers whom I could name. Those directories contain none of the defunct companies. They are not ancient histories. They are not corporative family trees. They are business lists for use by business men, and the proper use of them, or their equivalent, with reasonably occasional revision of mailing plates or other equipment, would mean much in the course of a year to the folks I have in mind.

Of course, I am interested mildly in efficiency on the part of others; but, understand me, my primary concern here is selfish. I've got a lot to do, and there are only twenty-four hours in a day and seven days in a week. Examining mail matter, only to find it is something I looked upon yesterday three or four times and saw again this morning twice or thrice, is discouraging. I want to sound a temporary armistice, anyhow. I want to show a white flag. I'm anxious to call a halt just long enough to get my second wind at least. I've got my hands up and I'm yelling for peace. Too much is enough.

Please be good enough to pass the word along that one piece of mail matter addressed to W. H. Smaw, purchasing agent Georgia Railway & Power Company, is sufficient for all of the purchasing agents of all the companies from whom we have descended. Yours in half-serious protest, W. H. SMAW, Purchasing Agent.

Mr. Foster's Hints to Technical Writers

UNITED RAILROADS OF SAN FRANCISCO
SAN FRANCISCO, CAL., Feb. 15, 1916.

To the Editors:

As a contributor to the department on "Equipment and Its Maintenance" of the ELECTRIC RAILWAY JOURNAL, and as one who has been in the harness for thirty years, perhaps a hint or two to your writers would be well taken.

In reading articles of the kind printed in this department, what I look for is "tricks of the trade," the little kinks that have been invented by heads of different departments, electrical engineers, superintendents and foremen. These bright jewels of economy and efficiency are hard to find out about, even when one is in personal contact with the inventor under favorable conditions. They are more difficult to see in actual use, and it is still more difficult to get whole-hearted explanations of their significance. It is almost impossible to get written descriptions of them into letters or into technical journals.

I may be a pessimist, but my general impression of all printed matter appearing in technical journals for the past thirty years has been that the men who know their work best cannot, will not, or at any rate do not, often write, and many of those who do seem to avoid getting down to the details that the practical man is after.

Some writers toss out an idea like a bone from the little toe of a mastodon, and seem to think that the average reader is like the paleontologists, who can construct a whole prehistoric animal from this toe bone as a starter. Obviously, the writer should expose his subject fully and from several points of view, and he should be exhaustive in his statements, even at the risk of irritating the editor.

S. L. FOSTER, Chief Electrician.

The Atchinson, Topeka & Santa Fé Railway sent a statement to each of its stockholders with their February dividend checks. The statement reads as follows: "You are one of about 40,000 owners of the shares of the Atchison, Topeka & Santa Fé Railway. As such, use your personal influence for fair treatment of American railroads. Do what you can to secure reasonable rates, equitable taxation and intelligent legislation."

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices
in Every Department of Electric Railroading

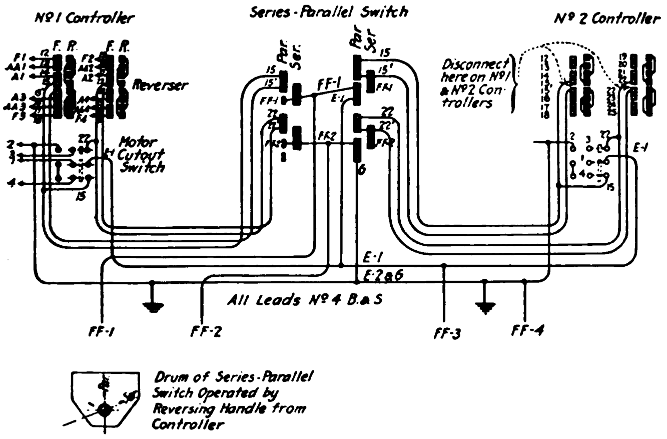
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Series-Parallel Switch on Line Car

BY H. M. LLOYD
Equipment Engineer British Columbia Electric Railway, Vancouver, B. C.

The British Columbia Electric Railway has for use on its interurban divisions four large line cars, built in the company's shops and designed for either construction or repair work. The cars are 40 ft. long and are mounted on Brill No. 27-E-2 trucks. Each car has a 28-ft. cab, centrally placed, with linemen's tower above, raised to the required height by pneumatic cylinders. The open platforms at the ends provide space for reels from which the wire or cable can be paid out as the car proceeds, while inside the cab are racks and lockers for all the tools, tackle, repair parts, etc., used in line work. In case of emergency one or two poles can be carried by shoving them through the end doors of the cab.

The motive power consists of four GE-57 motors, gear ratio 18:69, and two K-14 controllers. The car is also equipped with M.C.B. couplers and automatic air brakes, so that it can be used for switching work or hauling other cars with supplies, etc. When fully equipped the car weighs from 30 tons to 35 tons.



ELECTRIC CIRCUIT DIAGRAM SHOWING SPECIAL SERIES-PARALLEL SWITCH CONNECTIONS

In work of this kind it is frequently required to move the car along, a few feet at a time, and trouble has been experienced with the existing equipment owing to the controller frequently arcing over when shutting off the current so soon after starting the car. The rate of acceleration was also often sufficient to carry the car farther than was wanted. To avoid the former trouble the motormen have been in the habit of leaving the controller on the first resistance step and moving the car by closing and tripping the circuit breaker.

To improve these conditions one of these cars has been equipped with a change-over switch which connects all four motors in series when starting, and in series-parallel with the controller in the full "on" position. The connections were made between the motor cut-out switches and reverser, as indicated in the accompanying diagram. For the change-over switch a motor cut-out switch, discarded from a locomotive equipment, was used by making a few changes in the position of the segments on the switch barrel.

To minimize the liability of the change-over switch being thrown with current on, it was arranged to be operated by the reversing key from the controller, thus making it necessary for the motorman to shut off his power before he could operate the change-over switch.

The result has been very satisfactory, after more than a year and a half in operation, and with both speed and starting currents reduced one-half, the troubles mentioned have entirely disappeared, and the car is much more efficient in its work.

Construction and Maintenance of Rail Joints and Bonds[*]

BY E. R. SHEPARD
Associate Engineer United States Bureau of Standards, Washington, D. C.

In connection with the study of electrolysis and electrolysis mitigation the attention of the Bureau of Standards has been called to the past and present high rate of rail joint and rail bond failures and the consequence of such failures upon the electrolysis conditions throughout the country. With the idea of collecting information on the best present-day practices of bonding tracks a circular letter was prepared and copies were sent to 130 operating companies. The letter asked for information as to the number and types of bonds and joints in use and for the average life and causes of failure of each type; also for the manner and time of testing bonds and the criterion for replacement, etc. Replies were received from forty-two companies and information was also collected by a representative of the bureau who spent five weeks in the field and visited upward of fifty companies in the interest of the investigation. As a result of these investigations a number of conclusions have been reached of which the following paragraphs give a summary.

Soldered bonds of all types are falling into disuse, although a few companies employing thoroughly experienced and careful workmen still continue to use them. No one type of bond can be said to be better than all other types. Each has its advantages and disadvantages, and the selection of a bond for any particular service should be governed by the type of construction on which it is to be used, the grade of labor available for installation, and upon numerous other local conditions.

The problem of rail-bond maintenance is largely that of joint maintenance. No bond can be expected to last continuously on a loose and poorly-supported rail joint. The surfacing of all newly installed joints and the tightening of all bolts soon after installation and at regular intervals thereafter will do much to prevent loosening of joints and cupping of rails. Improved bolts having a high elastic limit and a great ultimate strength appear to be giving excellent results. It is recommended that bonds and joint plates be selected only after laying out a section of the joint on the drawing board and providing a proper clearance for the bonds.

The life of concealed bonds on exposed rails is much shorter than on rails in city streets owing to the expansion and contraction in the joint on the former type of construction. Such expansion and contraction can be overcome by the use of improved mechanical joints supplemented by expansion joints at regular intervals. It is believed that such construction would prove itself to be of ultimate economy and is recommended, at least on an experimental basis.

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[*] Abstract of paper to be published as Technologic Paper No. 62, Bureau of Standards.

Both the compressed terminal and the pin terminal types of bonds are giving excellent results where proper attention is given to their installation. The former type requires more care in the expansion of the terminal, while the latter type requires greater accuracy in the drilling of the holes. Each has its peculiarities and should be selected only after due consideration to local conditions. A strict adherence to the code of bonding rules given in Richey's "Electric Railway Handbook" is recommended.

Stranded bonds appear to be giving better satisfaction than ribbon bonds, as the conductors of the latter type are more easily separated and broken. Exposed ribbon bonds should have a clip or band at the center of the bond to prevent this separation of the conductors.

The use of solder in connection with the application of mechanically applied bonds will undoubtedly add to their life if the work is carefully performed. Its use, however, does not always appear to be justified as good results under modern conditions can be obtained without it. Its use should depend entirely upon local conditions.

The use of tinned terminals and plastic alloys in connection with mechanically applied bonds appears to be a good practice. Their use is recommended where trouble from corrosion of terminals has been experienced.

Mechanically applied head bonds are comparatively modern and are, therefore, more or less in the experimental stage. However, their use is increasing and in most installations they appear to be giving fairly satisfactory results. They are short, cheap and easily installed. Their contact resistance appears to increase with time but not ordinarily to the point of failure. When installed in city streets they are subjected to vehicle traffic and some failures must be expected.

Electrically welded bonds have a low and permanent contact resistance. Theft of this type is difficult and owing to the shortness of the bond and its tenacious contact has been reduced to a minimum. Failures of the head bond from the breaking of ribbons have been quite prevalent but are being reduced by a modification in the design of the bond.

Welded joints are being used more than ever before but there is also a growing tendency to adopt improved mechanical joints and various forms of special joints, several of which are a combination of welded and bolted or welded and riveted joints. These special joints seem to be meeting the demands of service with fewer failures and better results generally than any of the standard types.

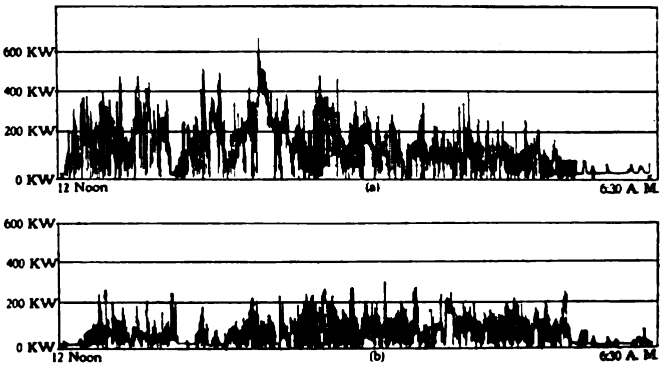
Power economy alone will not justify the best modern practice in bonding. Such practice, however, is justified and strongly recommended from the standpoint of good voltage conditions in the return circuit, which not only make for good electrolysis conditions but also for satisfactory operation. The present practice of basing the criterion for bond replacements upon a joint resistance which is defined in terms of the resistance of a given length of adjacent rail is shown to be somewhat irrational, but owing to its simplicity and ease of application the continuation of the practice is recommended. From 6 ft. to 10 ft. of rail as the limiting resistance for rail joints is shown to represent good practice and it is recommended that these figures be not exceeded under ordinary conditions.

Track bonding is in a state of evolution. New inventions and improvements in methods and practices have been so frequent during recent years that many types of bonds and joints can still be said to be in the experimental stage. Carefully kept records and a free interchange of experiences on the part of the operating companies will do much toward the establishment of definite and standard practice in this particular field.

Electric Locomotives for Spotting Service

BY R. K. CULBERTSON
Engineer Westinghouse Electric & Manufacturing Company, Buffalo, N. Y.

The handling of steam railroad rolling stock around industrial plants requires much "spotting" and general shifting of cars, as well as hauling them from the steam railroad interchange points to the manufacturing plants, and vice versa. As railroads are compelled to charge for all service other than dropping cars at a plant, it will undoubtedly prove economical for industrial plants to purchase their own locomotives, or in some cases, where the industrial plants are close together, the problem may be solved by the formation of a corporation for the purpose of giving this service. Where electric power is available, the electric switching locomotive is the best and most economical means of meeting this condition.



NIAGARA JUNCTION RAILWAY SUBSTATION LOAD RECORDS
(a) Heavy traffic fluctuations. (b) Average traffic fluctuations

The Niagara Junction Railway electrification, at Niagara Falls, N. Y., which is the most extensive of its kind in America, may be used in illustration. The main track of this road is about 4 miles in length, while the total length of sidings is approximately 11 miles. The function of the road is to act as an interchange or connection between steam railroads and a group of about twenty-five large industrial plants located along its right-of-way. In addition to this service the railway is called upon to make many local movements at the various plants, such as placing empty cars at specified points for loading, weighing, etc. The number of cars handled by two electric locomotives on this road is from 1200 to 2000 per month. Each is manned with a crew of three—engineer, conductor and brakeman or switchman.

The railroad companies pay the Niagara Junction Railway on a "per car" basis to the industrial plants, as do the plants for car delivery to the railroads.

A substation, located in one of the power houses of the Niagara Falls Power Company, supplies power to the railway. It comprises a 750-kw., six-phase, 25-cycle, 600-volt commutating-pole rotary converter; two 400-kva., 22,000-volt transformers and a control switchboard. The load on this substation is variable, as is indicated by the accompanying diagrams. Catenary construction, with No. 0000 contact wire suspended in general at a height of 22 ft. is used.

The locomotives are of the standard gage, double-truck type, designed for freight and switching service. They were built for double-end operation, having a centrally located steel cab, with a sloping hood at each end. The general characteristic features of these locomotives are as follows:

Weights in Pounds	
Mechanical parts	83,000
Motor equipment	26,940
Control equipment	5,468
Air-brake equipment	4,060
Forced ventilation equipment	532
Total	120,000
Weight on drivers	120,000
Weight per driving axle	30,000
Dimensions	
Total length between coupler knuckles	35 ft. 2¼ in.
Rigid wheelbase	7 ft. 4 in.
Total wheelbase	25 ft.
Diameter of outside driving wheels	36 in.
Diameter of inside driving wheels	31 in.

Performance

Track Profile	Number of Cars, Each Weighing 45 Tons With Load	Maximum Speed, Miles per Hour
Straight level	50	10.50
½ per cent grade	24	9.75
1 per cent grade	14	9.75
2 per cent grade	8	9.75

The maximum tractive effort with clean dry rail is 30,000 lb.

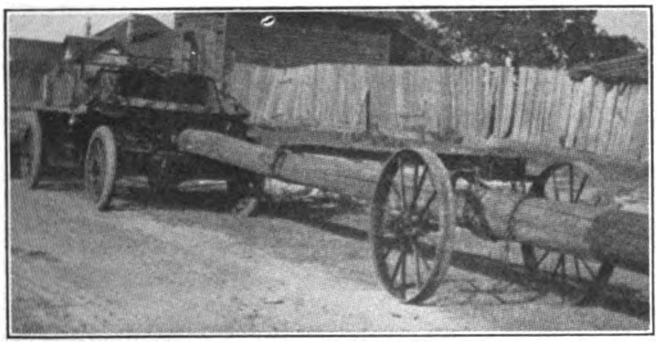
The electrical equipment consists of four Westinghouse commutating-pole, field-control, direct-current, 600-volt motors, with double-end unit switch control. Both the motors and control are particularly well adapted to meet the severe conditions incident to switching locomotive service. Current is collected from the trolley wire by means of a double-shoe pantograph. Extra long and drooping horns are used on both locomotives as a means of preventing damage which might otherwise be done to the overhead construction at turnouts.

Transporting Poles with Automobile and Dolly

BY W. E. NEES

Superintendent of Railway Selma Street & Interurban Railway, Selma, Ala.

The article by S. L. Foster in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 26, page 411, describing the pole dolly and tongs used by the United Railroads of San Francisco is interesting in showing the practical application of the familiar dolly in line work. We have found the combination of a dolly and an automobile shown in the accompanying illustration very useful in transporting poles for emergency and repair work.



HANDLING POLES FOR EMERGENCY LINE WORK

We made this dolly in our shops, and there is nothing particularly novel about it, the axle being made of 2-in. square iron on which 1¾-in. journals are turned to fit the roller bearings furnished by the wheel manufacturer. The hickory tongue is 14 ft. long, and it is braced with axle irons to the axle. It is fastened to the axle with U-bolts so as to avoid the weakening of the axle which would result from drilling bolt holes in it.

Large-Capacity Units for Boston Elevated Railway

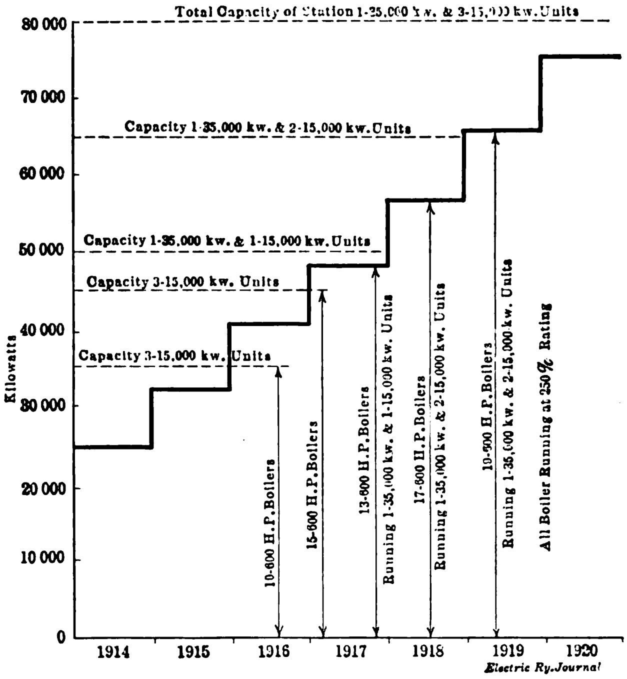
The Boston Elevated Railway has recently decided to make provision for its 8 per cent annual increase in load up to the year 1920 by the installation of a turbo-generator having the unusually large capacity of 35,000 kw., and to amplify the existing substation equipment by adding 4000-kw. rotary converters. The adoption of these large units was decided on because of their relatively low first cost per kilowatt and because, in addition, it has been estimated that the superior economy of a 35,000-kw. turbo-generator will save enough in coal during five years to pay for the increase in first cost over that of a 20,000-kw. unit, also postponing for one year any increase in boiler capacity. A feature of interest in connection with this machine is the decision to design it for a steam pressure of 600 lb., which will materially increase its steam economy when new boilers are installed, the company's plans providing that future additions to the boiler plant shall be made by purchasing units capable of generating steam at this higher pressure.

The three 15,000-kw. turbines now in operation at the South Boston station, where the new machine is to be installed, use steam at 200 lb., and the 35,000-kw. unit will be run at this pressure for the present. The machine, however, will be designed so that by the addition of probably six stages to the sixteen stages considered necessary for the present pressure and the 29-in. vacuum, the full 600 lb. can be utilized. The details of the arrangement have not been fully settled at this writing, but the additional stages will be provided either in an extension of the turbine casing or in a high-pressure section slightly separated from the main casing, with either a common shaft or a shaft and coupling between the two sections of the unit. In case the turbine casing is extended for the high-pressure section, the steam will be by-passed from the boiler header into the lower-pressure stage group; while if the high-pressure section is later added as an extension of the main casing, no by-passing will be required, the high-pressure section being omitted until the provision of the requisite boiler units is made. By thus fitting the number of stages in operation to the pressure available, economical operation will be obtained.

The company's decision to purchase a 35,000-kw. unit, with other improvements mentioned below, resulted from a report by the Stone & Webster Engineering Corporation of Boston, Mass., upon the power requirements of the road for the five-year period ending 1920. Regarding the use of higher steam pressures, Stone & Webster's engineers pointed out that the art of steam generation has reached a point where manufacturers consider it entirely practicable to build reliable equipment for operation at pressures ranging from 400 lb. to 600 lb., and that it seems probable that such equipment will be demanded by the best practice within a very few years. The company cannot, of course, take advantage of these pressures with the existing boiler plant, but the additional cost of designing a 35,000-kw. turbine for double the existing pressure is given as only about $15,000.

The extent of the increased power requirements that have made the new unit necessary is indicated by the fact that from 1905 to 1915 the company's d.c. load has increased 36,000 kw., or about 8 per cent per year. In the year 1912, when the a.c. system was first operated in Boston after the new South Boston a.c. plant had been completed and all but a few of the d.c. stations had been shut down, the load decreased 1000 kw. on account of improved efficiency in distribution, but the increase in output in 1913 and 1914 was at the rate of 8.36 per cent per annum. The company's policy is to carry all load increases on the South Boston station, thus reducing the importance of the present d.c. stations, four in number, with a combined capacity of 39,700 kw. The South Boston station supplies eleven substations on the system containing a total of twenty rotary converters with an aggregate capacity of 41,000 kw.

A study of the development of the whole load led to the conclusion that a 35,000-kw. machine would most satisfactorily handle the conditions. Such a unit can be installed for considerably less cost per kilowatt than a smaller unit and will have a higher efficiency over a wider range of load. Operated on the base load of the system, it is estimated that it will show a very substantial saving in plant operation over a 20,000-kw. machine. The following estimate, based on the use of 200-lb. steam pressure, indicates the approximate amount of these savings covering a period of five years after the unit has been placed in service:



GRAPH SHOWING COMBINATIONS OF TURBINES AND BOILERS REQUIRED FOR FUTURE YEARS' REQUIREMENTS

Estimated output for five years beginning 1917,	1,180,000,000 kw.-hr.
Approximate cost of manufacture of power for the same period:	
With 35,000-kw. unit	$3,200,000
With 20,000-kw. unit	3,400,000

While the curve of estimated maximum loads for the station indicates that a 20,000-kw. unit would provide for the expected increases in load for two or three years, the study of the load as affecting the operation of the individual units throughout the twenty-four hours of each day, shows that the saving in operating costs by the use of a 35,000-kw. unit on the large base load which it could carry would warrant the additional cost. The above tabulation shows that the additional cost of the larger machine, which is estimated at $200,000, would be entirely repaid in a five-year period by the savings in operation.

Another advantage of the larger unit is that the lower steam consumption of the station under the schedule of turbine operation which it will make possible will postpone the necessity for more boiler capacity for one year beyond the time when it would be necessary if a 20,000-kw. unit were installed. This is indicated in the accompanying graph which shows the expected loads on the South Boston station until the year 1920, it being assumed that the present d.c. stations will carry 50,000 kw. of the peak load. Assuming that all boilers are run at 250 per cent of rating, fewer boilers will be needed to carry the maximum load of 1917 with a 35,000-kw. unit in operation than are now needed to give the maximum rated output of the existing plant.

To provide for the increase in d.c. load there will be required each year the equivalent of about three 2000-kw. rotaries. To house these there would be needed space equivalent to one substation of the usual size per year. Seven of the vacant spaces in existing substations are on the outskirts of the system where rotaries cannot be installed in advance of the local needs, and it has been estimated that the load on these substations in the present winter will be less than 12,000 kw., so that if their load grows pro rata with the rest of the system, they will need less than 1000 kw. of capacity per year, or only the equivalent of one 2000-kw. rotary every two years.

However, the growth of load in the central section of the city may be estimated at about 5000 kw. per year, and to avoid an undue multiplicity of substations it has been decided that future downtown substations shall be of increased size. A large proportion of the cost of a substation is in land, buildings and switching equipment, all of which increase nearly in proportion to the number of units installed, so that a six-machine or eight-machine substation will have a unit cost but little below that of the usual two-unit or three-unit building. The 4000-kw. size will be adopted for future installations, since this not only reduces the cost and number of new substations but permits of the economical increase of capacity of existing substations whose 2000-kw. machines can be used to advantage in the outlying districts.

The present conduit loop, including the branch to and from the power house, is about 22 miles in circumference, and the greater part of the load to be carried will lie within this loop. A new conduit will be built in connection with the generating plant and substation improvements, with a new substation at Dewey Square, Boston, which will become one of the important stations on the system with the opening of the Dorchester tunnel. It is estimated that the cost of adding the 35,000-kw. unit to the South Boston station, exclusive of engineering and fixed charges, will be:

Building extension	$95,000	Combination exciter, 200 kw.	$9,000
Machine foundations	13,200	Generator air ducts	2,000
Auxiliary foundations	1,800	Air washer	4,000
Condenser tunnels	36,150	Switchboard and wiring	60,000
Condenser equipment	70,000	Incidentals	49,000
Piping and covering	35,000		
35,000-kw. turbo-generator	315,000		
Total			$690,150

All cars of the West Penn Railways, Connellsville, Pa., are equipped with trolley pick-ups. Each car is fitted with a glass-covered box permanently installed in the vestibule over the bulkhead door opening, where it is convenient and always ready for service. At first the pick-ups were simply placed in the motorman's cabs of all cars, but frequently they were not to be found when they were required. In order to obviate this difficulty the glass box receptacle was adopted, and now whenever the glass is broken the motorman must report it to the superintendent of transportation.

Rosettes Proposed in Philadelphia

Andrew W. Crawford, secretary of the City Parks Association in Philadelphia, is urging the use of wall rosettes to support the span wires on certain streets in Philadelphia and thus allow the removal of the side poles. In a letter to the association, President Mitten of the Philadelphia Rapid Transit Company has promised the co-operation of the company and said that the idea might be carried out successfully in the narrower streets of Philadelphia, such as Chestnut and Walnut Streets. He also referred to an attachment made by the company at the Bellevue-Stratford to do away with the pole near the main entrance to that hotel in Walnut Street, but says that the company wishes to be sure that no injury will be caused to the building before giving a more general adoption to the plan. The system of rosettes for supporting span wires is used extensively in Europe.

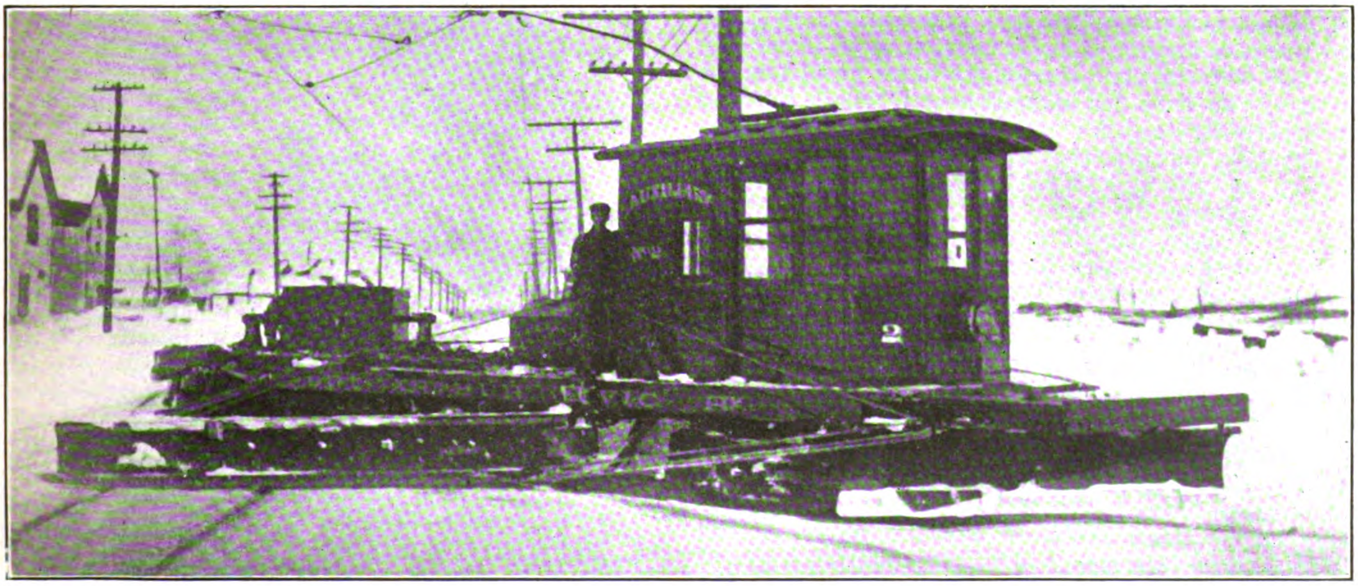
A Combined Work Car, Snowplow and Sweeper

The Public Utilities Commission of the city of Port Arthur, Ont., has found the utility car shown in the accompanying halftone very useful for several purposes. This car was designed by S. Philp, master mechanic of the commission, and it was built in the commission's shops.

The car is 45 ft. long over all, and 31 ft. long with the plow and sweeper removed. The body is mounted on Brill 27 G-E-1 trucks, and the car is equipped with four Westinghouse 101-B-2, 500-volt motors. It has a Westinghouse air-brake equipment, and Peacock hand brakes.

The plow is raised and lowered by means of a hand wheel, its own weight holding it in position when it is lowered. The vane is operated by a 3½-hp., 500-volt motor. When it is out to its fullest extent, it cleans a strip 14 ft. wide outside the track. The vane can also be raised to a height of 8 ft. at the extreme end, and in this position is useful in trimming down heavy snow drifts. The broom is operated by a Westinghouse 12-A motor, both broom and motor being on a special platform which can be removed when they are not required.

All of the appliances are operated from the cab, which is mounted on the front end of the platform, and the machine and equipment can be operated by two men.

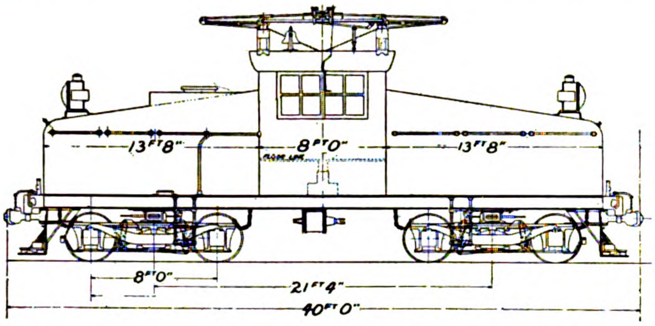


COMBINED WORK CAR, SNOWPLOW AND SWEEPER USED N PORT ARTHUR CIVIC RAILWAY

Switching Locomotives for the Chicago Milwaukee & St. Paul Railway

Two electric locomotives for switching service in the electrified yards of the Chicago, Milwaukee & St. Paul electric zone are under construction by the General Electric Company at the present time. They are of the eight-wheel type, weighing 70 tons, and each is equipped with four geared motors. The general dimensions and weight are approximately as shown in the accompanying table.

The locomotive running gear consists of two swiveling, equalized trucks, with inside-hung motors. The wheels are 40 in. in diameter, and have 3-in. tires shrunk on cast-steel centers. The superstructure is carried on a frame built up of longitudinal steel channels that are braced laterally with cross-sills, and over the whole is laid a steel floor. In the cab only one operating position is provided for the motorman, and in order to assist in giving him a clear view in all directions the floor has been raised approximately 2 ft. above the floor of the platform. The entire space within this main



70-TON SWITCHING LOCOMOTIVE FOR CHICAGO, MILWAUKEE & ST. PAUL ELECTRIC ZONE

DIMENSIONS AND WEIGHT OF SWITCHING LOCOMOTIVE

Length inside knuckles	40 ft.
Height over cab	13 ft. 10 in.
Height, trolley down	16 ft. 8 in.
Width over all	10 ft.
Total wheel base	29 ft. 4 in.
Rigid wheel base	8 ft.
Diameter of wheels	40 in.
Diameter of axles	7 in.
Main journals	6 by 11 in.
Minimum clearance under locomotive	4⅞ in.
Weight—locomotive complete	140,000 lb.
Weight mechanical equipment	85,000 lb.
Weight electrical equipment	55,000 lb.
Weight per driving axle	35,000 lb.

cab is unobstructed except for the heater and the necessary controller and air-brake apparatus, all electrical equipment being located either in the end cabs or under the floor of the main cab, so that there is no possibility of injury to persons through accidental contact with high-voltage parts.

The four motors on each locomotive are of the GE-255 railway type, which has a box frame and commutating poles, and is designed for operation on 3000 volts when connected with two motors permanently in series. Single gears are used for the drive.

The control is a type M single-unit equipment providing ten notches with motors connected all in series, and nine notches with motors connected in two parallel groups. The fuse compartment, main switch and contactors are of the same type as used on the large road locomotives for the main line. The transition from series to parallel is accomplished by means of a large electro-pneumatically operated switch which also serves as a motor cutout switch.

Other details of the auxiliary apparatus are designed to conform as far as possible to the equipment of the road locomotives, all small switches, headlights, cab heaters and the pantograph trolley being exactly similar, and the air compressor having parts interchangeable with those of the road locomotives. However, the 3000-volt motor-generator set furnished to provide forced ventilation for the motors, and power for the control and headlights is of a smaller type than that used on the large engines.

The locomotive develops a tractive effort of 42.000 lb. temporarily and 13,480 lb. at a speed of 13.2 miles per hour, or 18,400 lb. for one hour at 12 m.p.h., both of the latter ratings being on the basis of forced ventilation.

Storage-Battery Car Shows Low Operating Cost

An example of the low cost of operation attainable by storage-battery propelled cars on lines of light passenger travel is shown by the performance of the Cambria & Indiana Railroad's 50-ft. 30-ton Edison storage-battery passenger car which was described and illustrated in the ELECTRIC RAILWAY JOURNAL of Dec. 19, 1914, and which has been run over the Colver Heights-Rexis section of this Pennsylvania line for the last fifteen months. During a recent series of runs made by this car, amounting to 738 miles, the total cost for platform labor and electric power amounted to $102.60 or 13.9 cents per mile. This cost is comprised of $67.20 for wages of motorman and conductor, at $3.36 per day, and $35.40 for electric energy, the latter figured on the basis of two cents per kilowatt-hour. No allowance in the operating cost has been provided for attendance in charging the batteries, as this service is now performed on alternate days by the crew, during the interim between the runs.

W. E. Dobson, general manager of the company, believes that the car, with its present battery equipment, is capable of making an increased mileage of 50 per cent, which would reduce the cost per mile materially, because the only additional cost would be in the amount of energy consumed.

This railway company has just evidenced its satisfaction with this type of car propulsion after three years of experience with it by ordering an additional Edison storage battery car from the Railway Storage Battery Car Company, New York. The new car will be of somewhat smaller size than the car described above. It will be 35 ft. 8 in. in length, and will be equipped with 165 Edison A-10 cells and four Westinghouse motors. The body will be built by The J. G. Brill Company.

Installing Auxiliary Contact Wire in Catenary Construction

In the March issue of the *Electric Journal* R. C. Thurston, supervisor of electric service Erie Railroad, Rochester division, gives the cost of adding a steel contact wire to the catenary overhead construction on the electrified division of the Erie Railroad, between Rochester and Mount Morris, N. Y. This is a 34-mile branch line, which was electrified in 1906. The 11,000-volt overhead line is of single catenary construction with 7/16-in. steel-span messenger wire and No. 000 high-drawn-copper contact wire. The installation of the auxiliary steel contact wire was described in the issue of the ELECTRIC RAILWAY JOURNAL for June 7, 1913, page 999. The data now given by Mr. Thurston form a valuable supplement to that article.

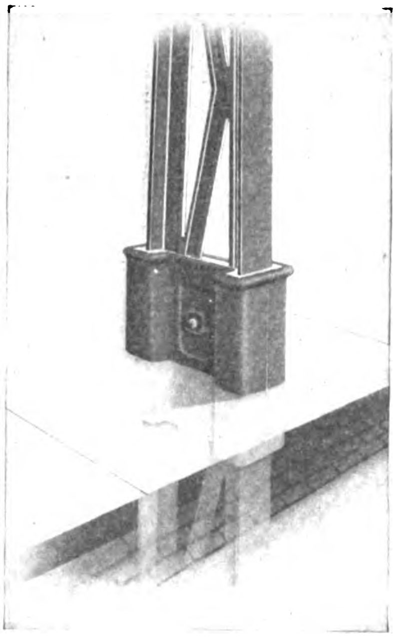
It was estimated that the addition of the supplementary wire would cost about $12,000 for the 34 miles of main track and 3 miles of sidings and yards, the cost to cover renewals of the deflectors or their adjustments to the level of the new wire. The actual cost follows:

Material	$8,176.24
Labor	1,036.60
Work train and crew	1,818.46
Supervisor, engineering	301.12
Total	$11,332.42

The new wire has eliminated troubles with broken contact wire, as it was designed to do, but it has decreased the life of pantograph shoes to about 2500 miles.

Cast-Iron Sleeve for Expanded Steel Poles

As an extra precaution against corrosion of its expanded steel poles at the ground line, the Bates Expanded Steel Truss Company, Chicago, Ill., has introduced a cast-iron sleeve as illustrated herewith. The high corrosion resisting qualities of cast-iron combined with a cement mortar or asphalt filler as a seal against the entrance of moisture between the sleeve and the pole makes this an ideal protective device. These sleeves are made in two sections which are fastened together with one ½-in. machine bolt as shown in the accompanying illustration. Those designed for a 35-ft. 5-in. pole weigh approximately 75 lb. The walls of the sleeve are ¾ in. thick. The sleeves are 18 in. long and are set 12 in. above the ground and 6 in. below. When placed in position on the pole there is a space approximately 1 in. wide between the pole and the sleeve. This interval, as mentioned before, is filled with cement mortar or asphalt to seal it, and thus prevent the entrance of water from the top or bottom of the sleeve.



CAST-IRON SLEEVE TO PREVENT CORROSION OF STEEL POLES

LONDON LETTER

London Electric Railway and Omnibus Companies Pool Profits—London County Council Tramways Report Figures

(From Our Regular Correspondent)

At meetings of the four electric railways controlled by the Underground Electric Railways, London, and of the London General Omnibus Company held recently, a perpetual agreement was approved between the several companies for pooling profits. The scheme consists of the payment of the half-yearly net profits of the five companies, after providing for transfers to reserve funds, into a common fund which will be distributed among the companies in certain proportions. Some idea of the vast amount of traffic handled by the five companies concerned is derivable from the fact that in 1914 the number of passengers carried totaled 819,000,000. The management of the various companies has done almost everything feasible to attract business by affording facilities of all kinds, and has initiated a system of through fares and through bookings. Despite these arrangements, only 42,000,000 of the passengers conveyed in 1914 were through passengers between the various systems controlled by the Underground Company. That this was so was due in part to the fact that each through ticket must be apportioned between the carrying companies, which made the provision of a complete and comprehensive system of through tickets practically impossible. The new arrangement is designed to do away with any need of apportionment of through bookings and will render possible a simple and effective system of through or interchange tickets, thus avoiding the expense of apportioning and clearing many millions of through fares, each of small amount.

Lord Claud Hamilton, presiding at the recent meeting of the East London Railway, said that the railway's main source of revenue was passenger traffic. He attributed the large increase in traffic to the electrification of the line, which was now entirely completed. In 1912 the railway carried 4,224,059 passengers, whereas at present it is carrying 8,497,284. The war may have had something to do with the increase, but too much importance need not be attached to that suggestion. Lord Hamilton believed that the facilities afforded, especially for through booking, had really brought about the great increase.

According to the annual report of the London County Council, the total length of the Council's tramways on Dec. 31, 1914, was 149½ route miles, of which about 143½ miles were electric tramways. During the year 1914 nearly 60,000,000 miles were run by the tramcars, while nearly 535,000,000 passengers were carried. The total capital expenditure upon the tramways undertaking to March 31, 1915, amounted to £13,315,723, of which £287,603 represented expenditure during 1914-1915. The total income for the year was £2,399,846 and the working expenses £1,700,571, leaving a surplus of £699,275. Debt charges and interest, however, amounted to £732,448, so that there was a deficit for the year of £33,172, which has been met out of the general reserve fund. The total debt incurred to March 31, 1915, amounted to £13,744,606. Allowing for debt repaid and sinking fund balances, and for surplus land valued at £122,216, the net debt at that date was £9,836,186.

Steady progress is being made with the equipment of additional suburban routes for electrical working on the London, Brighton & South Coast Railway. The lines which are now being converted from steam to electric traction on the single-phase system extend over a total of 220 miles of single track. It is unlikely that electrical services will be in operation between London and Brighton and other south coast towns for some years, but the work which is being done on the suburban routes is now approaching the final stages, and when the contracts now in course of execution are completed the main-line work will doubtless be taken in hand.

There have been a great many stoppages of late on the Edinburgh tramway system. At the annual meeting held recently, the chairman stated that the system at present was not in a state in which it ought to be. There are 13,000 pulleys on the system. These had been carefully examined and inspected. Out of that number about 5000 were either wanting or inefficient. The late engineer accounted for many of the delays by the fact that they were entirely due to the number of new drivers on the system, many of the old ones having gone on service at the front. Before the end of March the whole system would be thoroughly overhauled.

One of the Gateshead & District Tramway cars ran down an incline backward recently and jumped the track in Saltwell Road. Four persons were killed and two severely injured. The car was on a steep grade and in a loop waiting for another car to pass. After waiting for some time for the down car to move, the driver of the up car fixed the brakes and went forward to ascertain the cause of the delay. During his temporary absence the car began moving backward down the hill, and finally overturned. At the time of the accident there were between thirty and forty passengers on the car. The four persons who were killed were not traveling in the car, but happened to be passing at the time and were knocked down when the car left the rails and were crushed beneath it when it overturned.

A somewhat similar accident to that at Gateshead resulted in the death of one passenger recently on the Dudley system of tramways. On arriving at a terminus the driver left the car, telling the conductor that he was going for his tea, which he intended to eat on the journey. It appears that the car started of its own volition before the return of the driver, and the conductor proceeded to collect fares as if everything was in order. It was not until the car had proceeded a quarter of a mile that a passenger called the conductor's attention to the fact that there was no driver. The conductor promptly applied the brake at the rear, but too late to save the car from being overturned. At the inquest the jury returned a verdict to the effect that the overturning of the car was due to gross carelessness on the part of the conductor, and that the driver deserved censure for his neglect. The conductor has been charged at the police court with manslaughter.

The Metropolitan Electric Tramways, Ltd., as the lessee of tramways owned by the Middlesex County Council, has deposited a bill for introduction into Parliament next session to relieve temporarily the Middlesex County Council "from any liability to proceed or to be compelled to proceed" with the tramway and street widenings authorized by Parliament in 1911. The preamble of the bill states that this relief is required "in the circumstances of the present war and the curtailment of expenditure by public bodies arising in consequence thereof." The relief is to extend until three years after the termination of the war. The bill also postpones until the same period the time granted by Parliament in 1913 for erecting trackless trolley vehicle equipment in Wood Green and Tottenham from Green Lanes to Ferry Lane.

The Board of Trade has inspected the tramway to Acock's Green which has been constructed by the tramways department of the Birmingham Corporation. Owing to the shortage of men in the employment of the department, and to the fact that extra care must be observed in running the cars in consequence of the restricted lighting, it has been found desirable to reduce the speed on all routes, and thus lengthen the time consumed in the journeys to and from the city. This involved a complete revision of the time-table.

The terms of the award in the arbitration between the Plymouth Corporation and the Devonport & District Tramways, which system was recently annexed by the corporation, are as follows: The arbitrator awarded that the corporation should pay the company in respect of (1) the company's tramway undertaking; (2) the light railway; and (3) the profits the company might have been expected to earn between Oct. 2, 1915, and Aug. 12, 1919—that is, the whole of the matters referred to in the agreement between the parties dated May 10, 1915, scheduled to the Plymouth Corporation Act, 1915—the sum of £103,970. Each party is to bear its own cost of the reference, and the arbitrator's costs are to be borne in equal shares by the corporation and the company. Mr. Sellon, for the company, claimed in round figures £257,000, while Mr. Hamilton, for the corporation, assessed the value of the undertaking and compensation payable at £93,000.

More than 190 women are now employed as conductors on the London County Council Tramways. They work on an average eight hours and twenty-four minutes a day. They are paid the same rates of wages as men conductors.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

NEW YORK INVESTIGATION TO LAST UNTIL JULY 1

The Senate of New York on Feb. 29 voted by twenty-four to fifteen to give the Thompson legislative investigating committee until July 1 to complete its hearings and six months more to compile its report. Senator Thompson had previously offered a resolution extending the life of his committee from March 7 to Jan. 10, 1917.

In the meantime confirmation of the nomination of Travis H. Whitney and Charles S. Hervey by the Governor for appointment to the Public Service Commission for the First District of New York is being held up. Senator Thompson has announced himself as opposed to these appointments as unwise "in view of the disclosures that have been made in the course of our investigation." He said, however, that he was open to conviction with respect to the Whitney's record. Mr. Whitney is now secretary to the commission and Mr. Hervey was a deputy in the comptroller's office.

On Feb. 28 subpoenas were issued to the Interborough Rapid Transit Company calling for a record of financial details for a period beginning at its organization and of the Brooklyn Rapid Transit Company from 1908.

On Feb. 26 Mirabeau L. Towns, the lawyer, told the Thompson committee of receiving $5,000 from the Interborough Rapid Transit Company for arranging conferences between President Theodore P. Shonts of the company and Mayor William J. Gaynor in the negotiations over the then proposed subway extensions, and how he swayed the Mayor from a plan of municipal ownership to favor the Interborough plan. Mr. Towns denied that there was ever anything ulterior in his dealings with the Interborough. The committee also heard T. H. Gillespie, vice-president of T. A. Gillespie & Company, the firm which got the contract from the Interborough for third tracking the elevated lines. Mr. Gillespie appeared in answer to a subpoena, but he refused to turn over to the committee certain papers bearing upon his firm's dealings with a branch firm in Pittsburgh. Senator Thompson immediately got into touch with District Attorney Swann, but later decided to ask the Senate to summon the recalcitrant witness before it.

On March 1 the committee went more thoroughly into the subway prior determination account to find out if the bonus allowed President Theodore P. Shonts of the Interborough is to be paid by the city. On the same day Mayor Mitchel ordered Corporation Counsel Hardy to make a thorough investigation of the matter. In a letter to Mr. Hardy the Mayor said it had been suggested that the bonuses given Interborough officials and other charges have been made to the construction account, and that any charges improperly made to this account must obviously work to the detriment of the city. He ordered Mr. Hardy to obtain an official transcript of the minutes of the Thompson committee and find out if there is a basis for the city's contesting any such charges.

HOLYOKE COMPANY OPPOSES MUNICIPAL OWNERSHIP BILL

William H. Brooks, attorney for the Holyoke (Mass.) Street Railway, appeared at a hearing before the committee on street railways at Boston on Feb. 17 in opposition to the bill authorizing the city of Holyoke to purchase the road. Mr. Brooks declared that, to every intent, the bill is unconstitutional, and as class legislation it should be vigorously condemned. He charged the proponents of the measure, who appeared in force in the previous week, with playing politics. Mr. Brooks said that the stockholders of the company would be glad to sell their holdings if they could get back what they had put into the road. The company has 371 stockholders who own the 13,400 shares outstanding. The largest holder owns only 800 shares. According to the terms of the bill the city could purchase the physical plant and equipment of the property without paying anything for good-will and other intangibles.

NEW SAFETY MOTION PICTURE IN BROOKLYN

The central safety committee of the Brooklyn (N. Y.) Rapid Transit Company has staged a new safety moving picture which has been produced by the Universal Animated Weekly and forms an interesting supplement to the now famous Brooklyn Rapid Transit safety motion picture, "The Price of Thoughtlessness," which was produced two years ago. "The Price of Thoughtlessness" had an extraordinary run in moving-picture houses throughout the country, and has become a standard among safety films dealing with accidents to children.

In safety instruction, as in many other things, there is always a demand for something new. Accordingly the central safety committee of the company undertook last fall to produce a new film. The result is "The Cost of Carelessness," a movie also dealing with child accidents, the scenario being developed by E. C. Clarke, supervisor of instruction of the surface lines; A. P. Gumaer, formerly chief clerk of the bureau of public safety, and H. A. Bullock, chairman of the central safety committee, in co-operation with the management of the Universal Animated Weekly.

The picture begins by showing Gen. George W. Wingate, president of the Brooklyn Institution for Safety, giving a safety talk to a group of boys and girls at a school building, and then presents a scene in school with Mrs. Katherine D. Larrabee, the lecturer of the Bureau of Public Safety, conducting a safety meeting. A unique feature of the picture is "a movie of a movie," in which the children are shown looking at the picture. "The Price of Thoughtlessness" and the scenes from that picture as displayed on the screen actually pass before the eyes in the new motion picture, "The Cost of Carelessness."

The picture shows the safety patrols at work and follows children to their play after school hours. Two of the boys try stealing a ride on the rear end of a trolley car and one of them jumps off directly into the path of an approaching automobile. He is "run over." The next scene shows a group of the boys playing "cat" in the street. One of them stumbles and falls on the car tracks, and this juvenile actor is actually struck by the car and picked up on the wheelguard. Then the film shows how various boarding and alighting accidents occur, and passes finally to the reckless operation of automobiles.

The new movie was presented in public for the first time at the luncheon of the Brooklyn Institution for Safety at the Hotel Bossert on March 4. It will now be put into use in the public safety campaign.

ARBITRATION AGREED TO IN SPRINGFIELD, MO.

A strike of the employees of the Springfield (Mo.) Traction Company, conducted through the Springfield Division of the Amalgamated Association, was begun on Feb. 19, as an outcome of the demands for recognition by the company, submission by the company to arbitration in case of dispute and recognition of the privilege of seniority in the assignment of runs. Street car service in Springfield, which was suspended, owing to the refusal of strikers to work, was resumed in three days, and on Feb. 23 an agreement was signed by both parties. An abstract of this agreement follows:

1. The company officials agree to confer with representatives of the Division of the Association upon all questions within the spirit of the agreement, which may from time to time arise.

2. Upon failure to reach a mutually satisfactory agreement the matter in dispute shall be submitted to a temporary board of arbitration consisting of three disinterested parties of which one member shall be selected by the company, one by the Association Division and the third member by the two thus chosen. The day after the board has been chosen it shall meet daily, Sunday excepted, until a decision is reached. Each party shall bear the expenses of its chosen arbitrator

and both parties shall share equally in paying the expenses of the third arbitrator. Each party must select its arbitrator within five days after the agreement to arbitrate or notice is given by either party to the other that arbitration is desired.

3. If any member of the division is found after proper investigation to have been unjustly suspended or discharged he can be reinstated by the company and shall be paid for all time lost. Any employee laid off for cause shall receive a hearing on written demand within twenty-four hours by the superintendent of the company.

4. Preference of runs shall be assigned in accordance with seniority of service with the company. The company has a right to consider efficiency in questions of seniority, and should the schedules or runs be changed they will be made up in substantially the same manner and form as they are at present in effect and have been for the past five or more years. The present scale of wages shall be maintained without change.

BIDS WANTED FOR MATERIAL

The St. Paul Southern Electric Railway, St. Paul, Minn., announces that it is in the market for the following material: 100,000 ties, cedar, tamarack or oak; 1600 7-in. 35-ft. cedar poles; 4000 tons of 70-lb. rails and fastenings; eight passenger cars; one electric locomotive; one snowplow; 36 miles of fencing; copper bonds, and No. 0000 copper wire. All correspondence regarding this equipment and material should be addressed to W. L. Sonntag, general manager, 1127 Merchants' National Bank Building, St. Paul, Minn.

SAMUEL GOMPERS DISCUSSES PUBLIC OWNERSHIP AND ORGANIZED LABOR

In its issue of Feb. 19 the *Union Leader*, the official journal of the electric railway employees of Chicago and published by the Amalgamated Association, quotes Samuel Gompers, president of the American Federation of Labor, as follows:

"The defeat by the labor unions of the proposed municipal street car system in Detroit has puzzled and taken aback the intellectual group of advocates of public ownership in general. They have been in the habit of hastily going ahead with their theories without taking into account the lessons the wage-workers have learned thereon, sometimes at a dear price.

"Discussion in the trade unions of the right of government or municipal employees to organize has brought to the forefront above all other considerations concerned in the question the fact that the right of labor to stop work at will must not be in the least restricted in any part of the public service. Methods, directly applicable, open to all the wage-earners interested, must be established by which grievances shall, beyond question, be rectified. Petitions must be acted upon and hearings for individuals or delegations granted promptly, while lawful association of the workmen remains untrammeled and duly protected. In short, all the aims of organized labor, in point of wages, workday and worshop conditions, must be equaled or bettered in practice, or else every usual form of the activity of organized labor, including the strike, is to be expected, as labor's fundamental right.

"While the municipal ownership proposition was under consideration in Detroit, representatives of the labor movement appealed to us for advice. The following telegraphic reply was sent:

"'I would not vote in favor of municipalizing of the railroads unless it had at least this provision: right of the workers to organize and for the directors of the railroad to enter into joint bargain regarding wages, hours and conditions of employment. If proposition does not contain such a proviso, in my judgment it should be defeated.'

"Trade unionists are convinced that to take away by arbitrary order both the laborer's supreme lawful right to dispose of his labor at his own will and the laborer's correlative rights to hearing, petition and association is to crush him and abandon him in helpless slavery. No municipal ownership scheme, with trade unionism left out, can be acceptable to trade unionists and liberty-loving citizens."

PRACTICAL PUBLIC RELATIONS

International Railway Hauls Garbage, Ashes and Other Refuse in Emergency—Keeps Its Lines Open in Blizzard

Through the immediate co-operation of E. G. Connette, president of the International Railway, Buffalo, N. Y., the strike of ash, refuse and garbage wagon drivers employed by the city did not have a serious effect upon any particular section of Buffalo. Large double-truck flat cars and the single-truck automatic dump cars were pressed into service over all lines and there was but little delay in making collections. In the downtown sections collections were made during the night and in many instances the service was more satisfactory than the wagon collection. The heavy snowfall during the weeks of Feb. 20 and 27, which threatened to impede traffic if allowed to accumulate during the strike, was quickly removed by the company's laborers and hauled away in flat and dump cars. The railroad work was under the direction of N. H. Brown, general superintendent of transportation, and Thomas Connette, superintendent of the Buffalo city lines.

William F. Schwartz, commissioner of streets, commenting upon the spirit of co-operation displayed by officials of the company, said that much credit was due to Mr. Brown and Mr. Connette for the thorough manner in which the work was handled, as the situation during the first day of the strike threatened serious proportions. There was an exceedingly heavy fall of snow, and with no wagon drivers or laborers available to remove the snow and carry on the regular work of collecting the refuse, ashes and garbage, the city officials were at a loss to solve the problem.

Despite the blizzard and heavy snowfall in Buffalo and western New York on Feb. 26 and 27, the city and interurban lines of the International Railway did not have any serious trouble in maintaining schedules. Large rotary snowplows were used on the Buffalo and Lockport, Lockport and Olcott and in some parts of the Buffalo and Niagara Falls divisions, and all available push plows and sweepers were pressed into service on the city lines of Buffalo, Niagara Falls and Lockport.

KANSAS CITY RAILWAYS ORGANIZES PUBLICITY DEPARTMENT

E. B. Atchley, formerly connected editorially with various Western newspapers, and recently special editorial writer on the Kansas City *Post*, has been made head of the new publicity department of the Kansas City (Mo.) Railways. This department is to be subordinately a "press agent" service, since most of its activities will be directed to work for the benefit of the employees of the company. It will have charge of welfare work and safety-first propaganda. It will also handle the advertising of the company.

While there is no purpose to seek newspaper publicity through this department, its function will be to see that correct information goes out, complete in detail, and consistent with facts in other departments and with the plans of the company. The present plan is to give the information in skeleton form, to be written by the persons seeking the stories. It is probable that daily bulletins will be issued on current happenings, to which the newspapers will have access.

Perhaps the most important feature of the work of the new department will be that for the benefit of employees. It will systematize and expand the welfare work already being done, arrange for gymnasium facilities for employees and supervise the athletic equipment in all carhouses. A loan department will probably be established for the benefit of employees. A monthly magazine is to be established for circulation among the men.

Frank J. Munagle, publisher and editor of the *Electric Railway Trainman* of Kansas City, will assist Mr. Atchley. The *Electric Railway Trainman* will discontinue its Kansas City personal department, and become more of a national magazine for trainmen. Miss Green, formerly secretary to John M. Egan, formerly president of the street railway, closely in touch with the company's activities, will also be in the department.

The same department will handle similar work for the

Kansas City Light & Power Company. The details of this work will be arranged after the separation of this company from the street railway has been completed.

WORK STOPPED ON PHILADELPHIA UNDERGROUND ROAD

Engineering difficulties experienced in excavating for the Broad Street subway beneath City Hall in Philadelphia, Pa., have resulted in the suspension of operations entirely. This action was taken by Mayor Smith, after conferences with Senator McNichol, president of the Keystone State Construction Company; his engineers, Director Twining and William H. Quimby, the chief engineer, in charge of construction for the department of transit. When the Mayor was asked concerning the shut-down, he said he had ordered to work stopped, pending a report from the department of transit. Director Twining issued a statement as follows:

"The Mayor made a statement that he had authorized that work be temporarily suspended on the contract for the section of the Broad Street Subway beneath the City Hall. The Mayor stated that Director Twining had discussed with him certain changes which he favored, and that he was expecting a detailed report to be submitted to him in a short time. He stated that he considered these modifications would be very much to the benefit of the city. These modifications, if adopted, may alter the work now under contract beneath the City Hall to some extent, and the Mayor considered it wise to suspend that work until the detailed report was received and given consideration. The Mayor stated that he had been informed by Director Twining that if the modifications proposed be adopted the work will probably cost less money and can be constructed more quickly than otherwise, so that the operation of the system would be expedited."

$100,000 FOR PUBLICITY

The Brooklyn Rapid Transit Company spent $100,000 for publicity in its subway campaign prior to the signing of the contracts two years ago, according to a statement made by Timothy S. Williams, president of the corporation. In explaining these payments Mr. Williams said:

"These were legitimate expenditures incurred in our appeal to the public on behalf of Brooklyn and Queens. We thought they were just as proper charges to our construction account as many of the city's expenditures which were charged to its construction account, but the Public Service Commission did not agree with us, and so the items are not added to its construction account, but have to be amortized out of earnings during a certain number of years. The expenses to which I allude aggregate about $100,000, and nearly all of them were made up of bills paid to newspapers for advertising, the small balance being for other publicity purposes, such as printing and postage involved in circularizing, etc. The advertising was a very effective means of reaching the people, and was undoubtedly productive of much good in informing public officials."

PREPARING FOR BROADWAY SUBWAY OPERATION

With the idea of getting the new Broadway subway into operation early next year the Public Service Commission for the First District of New York is advertising for bids for station finish for seven stations on that line between Morris Street and Trinity Place on the south to and including Union Square on the north. Bids for this work will be opened on March 9 next at 12.15 o'clock and the contract will be awarded shortly thereafter. It is the intention of the commission to push this work so that it will be finished in time for the track-laying and signal installation in the spring. The construction contracts upon the lower part of the Broadway subway are nearly completed, and with good luck those between Bleecker Street and Twenty-sixth Street should be completed during the coming fall. The Canal Street subway, which is to connect the Broadway line with the Manhattan Bridge and the Fourth Avenue subway in Brooklyn, should be completed in March of next year, and then trains from the Fourth Avenue subway can operate through Canal Street to Broadway and north through Broadway as far as the completed structure will permit, which will probably be between Fourteenth Street and Twenty-eighth Street. As the Fourth Avenue subway is already operating to Coney Island by the Sea Beach connection, this will make possible through operation from Fourteenth or Twenty-eighth Street to Coney Island during the next summer season.

$180,000 TO BE SPENT FOR BUILDINGS IN TRI-CITIES

Car shops to cost $80,000 and an inn to cost $100,000 are two of the largest improvements the Tri-City Railway, Davenport, Iowa, will make in the tri-cities this season. Plans for the two improvements, both of which will be made in Rock Island, have been completed and officials announce work will begin immediately.

The new inn will be a historic structure on the heights overlooking Rock River. It will be erected on the sight of three former inns, two of which were burned. The present structure will be fireproof. The construction of the new inn will follow closely the construction of a similar building on Campbell's Island, another favorite amusement spot.

Plans for the new car shops indicate the company will build one of the most modern plants of the kind in any city in the Middle West. The shops will afford the company an opportunity to rebuild and repair its entire equipment, consisting of nearly 200 cars. The shop building will be two stories. The upper floor will contain the offices and baths and rest rooms, etc., for the conductors and motormen. The first floor will contain modern machinery and equipment. The building will be of brick, steel and concrete and of architecture to conform with the adjoining carhouse constructed two years ago following a fire in which the company lost practically all its rolling stock.

Traction Company Guarantees Saving Over Municipal Light Plant.—The Fort Wayne & Northern Indiana Traction Company has made a proposal to the board of public works of Fort Wayne, Ind., to take over the lighting of the city streets and has guaranteed to save the city $395,000 on a ten-year contract. The city has maintained a municipal lighting plant since 1907 and has engaged in both street and private lighting.

Signs of Spring.—Interborough Day will be celebrated at the Polo Grounds, New York, on April 11, when the New York Giants will meet the pick of the Interborough league players, who are employees of the elevated and subway roads included in the system of the Interborough Rapid Transit Company. The railroad shops will be closed that day and 5000 employees and their friends will attend the game. They will have the Interborough band of 150 pieces to provide the music. This will be the first event of its kind ever seen at the Polo Grounds.

San Francisco Ferry Loop Privilege Must Be Shared.—That the United Railroads, San Francisco, Cal., shall share the outer loop with the Municipal Railway or remove the tracks within thirty days was the dictum of the State Board of Harbor Commissioners, issued on Feb. 19. This is the outcome of the city's application filed several days ago and asking for the same privileges over the tracks of the ferry loop as the United Railroads enjoys. This ruling may secure for the city the right to operate cars on the loop as it was doing previous to the granting of the injunction. It is stated that permission will be secured from the property owners to allow the city to attach overhead wires to the buildings. Superintendent Cashin stated that only a short time would be necessary to install a new loop in case the United Railroads was ordered to remove its tracks.

Air Brakes and Toilets Ordered to Be Installed.—Members of the Ontario Railway & Municipal Board held a session in Windsor, Ont., on Feb. 21, and at its conclusion representatives of the corporation announced several important orders by the commission. Among the most important matters discussed was the question of having air brakes installed on cars of the Windsor-Tecumseh interurban line of the Sandwich, Windsor & Amherstburg Railway. Chairman McIntyre intimated that an order would be made to this effect, and also that toilets would have to be installed at once on the cars of this line. The board's engineers will investigate the operation of the service before any judgment is delivered. An application by the city to compel the company to lay tracks on Erie Street was not entertained by the board. Chairman McIntyre stated that this question was one with which the commission had not power to deal. The board will, however, see that if the city decides to make an extension of the line to Walkerville, they will not be interfered with.

Conflict of Provincial and Dominion Rights.—When the Dominion House of Parliament went into committee on private bills at its opening on Feb. 21, the question of conflicting provincial and dominion rights arose in connection with the consideration of a bill transferring to the city of Brantford, Ont., the right of operation of the Grand Valley Radial Railway, which has been acquired by the corporation of that municipality. W. F. Cockshutt explained that when the railway, which besides running over Brantford streets radiates to the cities of Paris and Galt, had gone into liquidation it had been acquired by Brantford and had hitherto been operated under license. It was now sought to transfer to the commission appointed to take it over the rights granted in the original act of incorporation of the road. William Pugsley said the proposition might be advanced that Parliament had no right to legislate in regard to purely local railways, which were not works for the general advantage of Canada, and Sir Robert Borden agreed that the bill should be inquired into by the Justice Department in this connection, and that the Ontario authorities should be notified in regard to it.

PROGRAMS OF ASSOCIATION MEETINGS

Wisconsin Electrical Association

As stated briefly in the ELECTRIC RAILWAY JOURNAL of Jan. 1, page 56, the annual convention of the Wisconsin Electrical Association will be held at Milwaukee on March 16 and 17, with headquarters at the Hotel Pfister. At the meeting the Railroad Commission of Wisconsin will define its attitude toward the security issues and outline the procedure to be followed in making application for an increase in capitalization. A member of the Wisconsin Tax Commission will explain the method of taxation of public service companies and why taxes have been increasing annually. The new schedule of rates for residence electric service now in effect in Milwaukee and the surrounding territory will be explained. A paper will be presented on street lighting rates and contracts which will state the underlying principles of rate making and cost accounting for street lighting service. There will also be a paper "Two Years' Experience in One-Man Car Operation." March 16, the first day of the convention, will be a joint session with the Wisconsin Gas Association.

New England Street Railway Club

The sixteenth annual meeting and dinner of the New England Street Railway Club will be held at the Copley-Plaza Hotel, Boston, Mass., on March 23. At the annual meeting at 3 p. m. the election of officers will take place, the annual reports of officers read and other business of the usual nature considered. Plans have been made to make the reception at 6 p. m. an unusually pleasant feature. The speakers' committee has succeeded in securing speakers of prominence and has announced acceptances from Capt. Halstead Dorey, aide-de-camp to Maj.-Gen. Leonard Wood, Headquarters Eastern Department, U. S. A., Governors Island, N. Y., and Camp Commander, First Training Regiment, Plattsburg, N. Y.; A. B. Leach, New York, president A. B. Leach & Company, former president of the Investment Bankers' Association of America and president of the Columbia Gas & Electric Company, Cincinnati, Ohio; Samuel W. McCall, Governor of the Commonwealth of Massachusetts, and James M. Curley, Mayor of the city of Boston. The toastmaster will be Guy A. Ham. The cost of tickets will be $5 each. The tables will seat eight each. Seats and tables will be assigned in the order of the receipt of applications. So far as it does not conflict with the "first come, first served" policy, the personal preferences as to location, etc., when expressed in writing by the applicant for seats, will be considered by the committee in the assignment, and every possible effort made to follow them.

Financial and Corporate

COST OF RAILWAY SUPPLIES INCREASING

Data from Authoritative Sources Show Serious Condition Confronting Electric Railways on Account of Rising Prices and Slow Deliveries

The increasing cost of supplies is becoming a problem of serious importance to the electric railway industry, and even more important is the fact that deliveries on some commodities are beginning to look impossible at any price. Such conditions are not at all imaginary, for data collected by the ELECTRIC RAILWAY JOURNAL from both railway and manufacturing sources clearly indicate the reality of the upward price movement.

For example, one company says that 6-in. trolley wheels which were sold last year for $1.20 are hard to get at $1.90, and steel trolley poles are practically out of stock. According to other reports, trolley rope is up 2 or 3 cents per yard, being affected by the cotton market, as are also tapes for winding armatures. The last purchase of tapes in one case was made in February at an advance of approximately 15 per cent above the normal. Cotton waste, purchased on contract last year at 5½ cents per pound for colored and 6½ cents per pound for white, is now 8 cents and 10 cents respectively.

Rail bonds are said to have steadily advanced in price during the last year, the increase now being about 40 per cent. Field and armature coils have, during the last three months, taken rapid strides in price, ranging from 30 to 40 per cent over previous prices. Dry batteries cost to-day 33.3 per cent more than a short time ago. Plate glass figures about 25 per cent higher in price than it did a few months ago, and window glass from 35 to 40 per cent higher. Bolts, nuts and washers have jumped about 50 per cent, and car axles had jumped about $1.50 per hundred pounds in December with a very long delivery period to be expected. Ball-bearing prices are way up. High-speed twist drills have increased in price about 300 per cent and at that are very hard to obtain. Gears and pinions have taken a tremendous jump in price. Iron castings, owing to the cost of coke, pig and labor, have advanced in one case 65 per cent at local foundries. Metal parts cannot be had short of from six to nine months' delivery.

The following testimony of a prominent railway purchasing agent aptly describes the trade conditions in the copper, as well as the iron and steel, market:

"One of the largest producers of copper trolley wire has advised us that it is promising deliveries of not less than ten months and does not care for the business at that. A scrap metal dealer said that he had never seen such conditions in his thirty years' experience, especially on copper and brass. He cited a couple of recent purchasers of this scrap who were never known before to purchase such material. In fact, they would not accept it as a gift, but to-day they are hounding him for it.

"Iron and steel are simply beyond us, and if any storekeeper dares to requisition for it we simply get dizzy when we see the items, no matter how small they may be. We had occasion the first of the month to purchase some cold rolled steel, and of course had to buy from jobbers on account of the small quantity. We were obliged to pay more than a 100 per cent increase over the normal price. We have been obliged, notwithstanding the stock put in, to purchase quantities of bar iron and steel. It is a common thing after we secure quotations and place our orders to be notified that the dealer cannot fill this or that item, for his stock was depleted during the one, two or three days intervening between the time of the quotation and the time of receipt of the order."

The coal situation in several cases has assumed a very serious aspect, on account of the great congestion at transfer points and terminals, and some railways are said to have been required to pay extremely high prices for coal regardless of their contracts. In view of the expected labor difficulties in the coal field, the outlook is deemed anything but favorable. Moreover, there have recently been substantial advances in automobile tires, broom stock, leather, paper, lumber and all sorts of chemicals, especially those entering into the manufacture of paints. Gasoline is selling at a fancy price. Indeed, one purchasing agent said: "I could enumerate every article costing more money to-day than in normal times, but such a list would comprise practically every article I purchase."

One of the companies furnishing the foregoing data anticipated its 1916 requirements in a "tremendous" variety of materials so that in its case the only present disturbing factor is deliveries. This company has not yet considered any substitutions, but it is felt that if the present conditions continue for another year or two, these may be necessary.

FINANCING RAILWAY CONSTRUCTION

Fresno Interurban Railway Desires to Raise Money from Abutting Landowners as Unsecured Creditors

A plan to finance the construction of an electric railway with money advanced by owners of land increased in value by the improvement, who shall be reimbursed from surplus earnings of the line but who shall not receive any security for repayment from any source other than from surplus earnings, has been sanctioned for the Fresno (Cal.) Interurban Railway by the California Railroad Commission. The company plans to build a line from Fresno to the Centerville district, with branches to Clovis and to Gould colony, a total of 26 miles, which can be built for $17,300 a mile or $449,800. Already 4.5 miles of single track are in operation.

According to the plan proposed, landowners subscribing to the construction of the line are to receive certificates of indebtedness, but money thus raised is to be used solely for refunding the $350,000 of bonds that the company has been authorized to issue. According to the plan, certificates of indebtedness will be sold to landowners under terms that payment be made on the basis of 10 per cent thirty days after the line has been completed to or opposite the property of the subscribers and the balance before ten years, with interest at 6 per cent from the time of the 10 per cent payment. For the unpaid 90 per cent balance the company proposes to take out mortgages on the property of the landowners, who would thus become unsecured creditors because the company would give no security for the payment and cancellation of the certificates of indebtedness. It is stipulated, however, that any surplus remaining after the payment of operating expenses, sinking fund instalments, interest on bonds and other fixed charges shall be used as follows: (1) For the payment of 6 per cent interest on all money paid by the landowners who sign the proposed agreement; (2) for the payment of an amount to the landowners who sign the proposed agreement equal to the interest due the company from these landowners on unpaid subscriptions; (3) for the payment and cancellation of bonds, and (4) for the payment and cancellation of the certificates.

The foregoing plan was approved by the commission on the condition that copies of the decision be shown every landowner asked to subscribe, in order that he may know just what is proposed. In discussing the plan Commissioner Loveland said:

"The landowner is to become an unsecured creditor of the company, and the company is to have a lien on the property of the landowner for unpaid subscriptions. If the landowners, who expect to be benefited by the construction of the line, desire to aid in its financing, this commission will not restrict them from so doing, and I do not desire to cast unnecessary doubt on this enterprise. This commission, however, has no means of determining whether the surplus earnings will be sufficient to pay the principal of and the interest on the certificates of indebtedness. The applicant will be required to furnish a copy of this decision to each landowner before he is called upon to sign the proposed agreement. It will also be necessary for the applicant to submit to this commission for approval a copy of the proposed agreement which it expects the landowner to sign, as well as a copy of the proposed certificate of indebtedness which it proposes to issue. I suggest that the certificates be made negotiable, that they be issued for a term not exceeding fifteen years and that they be made a lien on the property, subject to the lien of the first mortgage bonds."

ANNUAL REPORT

Oregon Electric Railway

The statement of income, profit and loss of the Oregon Electric Railway, Portland, Ore., for the twelve months ended June 30, 1915, follows:

Railway operating revenues	$984,395
Railway operating expenses	695,647
Net revenue, railway operations	$288,748
Taxes assignable to railway operations	78,918
Operating income	$209,830
Non-operating income:	
Income from lease of road	$496
Miscellaneous rent income	102
Net income from miscellaneous physical property	3,739
Total	$4,337
Gross income	$214,167
Deductions from gross income:	
Rent for leased roads	$462
Miscellaneous rents	1,404
Net loss on miscellaneous physical property	1,234
Interest on funded debt	100,000
Interest on unfunded debt	473,023
Miscellaneous debits	150
Total deductions	$576,273
Net deficit transferred to profit and loss	$362,106

The gross earnings of this company, which is a 194.52-mile interurban line controlled by the steam Spokane, Portland & Seattle Railway, showed a decrease of $197,409 or 16.6 per cent, as compared to the preceding year. The operating expenses and taxes decreased $86,105 or 10.0 per cent, so that the operating income decreased $111,304 or 34.6 per cent. Non-operating income increased from $553 in 1914 to $4,337 in 1915, but the deductions from income increased from $321,687 to $576,273. As a result, although no dividends on the preferred stock were declared as compared to $12,000 for the preceding year, there was a deficit of $362,106 for the fiscal year comparing with a deficit of $54,308 for the preceding year.

The decreased earnings are said to have been caused by the competition of other lines and by automobile trucks and jitneys, besides the general business depression. It is reported that since the beginning of the current fiscal year the operating revenues have shown an increase, but the net earnings are far short of paying the fixed charges, on account of the large interest on unfunded debt. This debt, said to be nearly $8,000,000, represents the advances made by the Spokane, Portland & Seattle Railway for the extensions from Salem to Eugene and Albany to Corvallis, and for double-tracking and other improvements south of Portland. Most of the stock and bonds of the Oregon Electric Railway are held by the steam line, but $200,000 of 6 per cent preferred stock is outstanding. Until about a year ago, it is said, the company was buying the stock in at par and interest for retirement.

WORCESTER INCREASE IN STOCK OPPOSED

Mayor Wright of Worcester, Mass., has petitioned the Public Service Commission of that State for a reopening of the hearings on the petition of the Worcester Consolidated Street Railway for permission to issue $1,880,000 of additional capital stock. In a statement which he made the Mayor was quoted as saying:

"This action has been taken because I know, from information that I have already accumulated, the discrepancy between the capital stock and the bonds of the Worcester Consolidated Street Railway and the actual or estimated cost or value of the electric railway property for the use of the public, and that this will in the future make some difference in arriving at the reasonable rate of fares to be charged. In fact, I feel that, sooner or later, the Worcester Consolidated Street Railway, following the lead of other companies, will ask for the right to increase fares in Worcester. If the evidence and facts as to the methods of financing and managing the Consolidated Street Railway property in Worcester are made known, it is my opinion that there will be no increase in fares in that city, where the company is now receiving 5 cents for about 3 cents' worth of service."

EMPIRE UNITED NOTES IN DEFAULT

Principal and Interest of $681,900 of Guaranteed Notes Unpaid—First Mortgage Bondholders Issue Circular About Reorganization Plan

The Empire United Railways, Inc., Syracuse, N. Y., on Feb. 16 defaulted on the principal and interest then due at the offices of the Bankers Trust Company, New York, on $681,900 of one-year guaranteed notes. These notes are spoken of as part of the $869,000 of notes put out to take up notes issued before the merger by the Rochester, Syracuse & Eastern Railroad. A list of the guarantors of the notes and the amount of their claims includes the following: Burns Lyman Smith, $94,068; Clifford D. Beebe, $81,919; William Nottingham, $81,919; Hendricks Holden, $81,919; Willis A. Holden, $81,919; Clarence W. Seamans, $81,919, and John A. Roebling's Son's Company, $81,919.

The committee of holders of the first mortgage 5 per cent bonds of the Rochester, Syracuse & Eastern Railroad due on May 1, 1945, of which committee Arthur W. Loosby is chairman, issued a circular dated at Syracuse on Feb. 18. The committee said that it believes that any plan of reorganization should preserve the integrity, as to both amount and lien, of the existing issue of the Rochester, Syracuse & Eastern Railroad bonds and pay the defaulted interest thereon. The committee also says that the receivers at the instance of the committee prepared and presented to the court on Feb. 15 a comprehensive report which in every way confirmed the judgment of the committee. The receivers are quoted by the committee as saying in substance: "We believe that (a) the system can be operated as a whole so that the interest on the underlying first mortgage bond can be paid with a surplus after the interest of $123,389; (b) the three constituent properties, if operated separately, should pay the interest on their first mortgage bonds with a small margin."

The committee says that for the year ended June 30, 1915, owing to various causes tending to diminish travel, the receipts of the company were at as low a point as they ever reasonably can be expected to fall. This statement shows total operating income of $1,345,524 and a deficit for the year of $132,396.

It is stated that for the fiscal year ended July 1, 1917, the receivers expect a total income of not less than $1,338,050. The operating expenses they expect to cut $118,422, and after payments for taxes and major fixed charges, there would be a balance of $123,389, which amount would be applicable to the payment of $125,571 interest upon junior obligations. The committee further says that the report of the receivers indicates that the Rochester, Syracuse & Eastern property should earn for the fiscal year commencing July 1, 1916, $768,450 and that the surplus balance should be $5,837. The foregoing figures do not take into consideration theoretical computations for depreciation, which it is felt, however, should not materially change them.

HONOLULU LINE WINS CAPITAL CASE

Circuit Court Dismisses Injunction Against $392,500 Stock Increase—"Actual Cost" Limit Set by Franchise Is Not Present Value

Judge Stuart in the Circuit Court at Honolulu has dismissed the injunction suit brought by the Territory of Hawaii against the Honolulu Rapid Transit & Land Company to prevent the railway from increasing its capital stock from $1,207,500 to $1,600,000. A previous reference to this case was made in the ELECTRIC RAILWAY JOURNAL of Nov. 27, page 1096. The Territory contended that the "actual cost" of the property, stated in the franchise to be the criterion for security issuance when increased by 25 per cent, should not be construed as being the original cost but the present value. Although the present value was shown to be far in excess of the present issue of stock, the court decided in the company's favor that as a matter of law the actual cost was the basis to be used, and that the company had a clear right to increase its stock to at least $1,600,000. The government has given notice of an appeal to the Supreme Court of the Territory.

Early in the case, before the company had entered upon its evidence, a written agreement was filed showing an undisputed actual cost of $1,603,057, with disputed amounts totaling $568,919, making a total of $2,171,976. The disputed amount covered admittedly actual expenditures for overhead expenses and for investment in the Hawaiian Tramways and the Pearl Harbor Traction Company, the point at issue being whether these were items legally to be included in the basis for stock issuance. The addition of 25 per cent to the above-mentioned total would give an authorized stock limit of $2,714,970. From this basis one engineer for the Territory asserted that $624,955 should be deducted for depreciation in order to secure the present value, while another expert for this side estimated the depreciation at $983,571.

In order to have full information about present value in case of a review by higher courts, Judge Stuart allowed the Territory a mass of evidence in regard to depreciation, but in his decision he concluded that it was all faulty and calculated to mislead the court in its endeavor to get at the actual depreciation instead of adopting a theoretical amount. Judge Stuart held that the company's evidence was framed upon a more proper basis and was more satisfactory, but he did not believe that the actual depreciation in the plant was anywhere near even the amount allowed by the company. Be that as it might, however, he considered that the cost agreement superseded all question of depreciation, as far as arriving at a conclusion in this particular case was concerned, even if depreciation was involved.

Judge Stuart said that in fixing rates the amount of stock issued was only one of the many elements that might be considered. The company is authorized to issue stock to the amount that the plant legitimately costs, plus 25 per cent, but this might have very little relation to the present value upon which rates might be based. He asserted that it is on the value of the plant at the time of the rate fixing that the rates are based, and what the plant may have cost has but little, if any, relation to this question.

NEW JERSEY FRANCHISE ASSESSMENTS

The 1915 assessments levied by the State Board of Taxes and Assessment of New Jersey upon 322 corporations and five individuals under the municipal franchise act amounted in the aggregate to $1,505,776. This was an increase of $40,192 over the 1914 tax. The taxes paid by the various utilities are shown by the following table:

Classification	Number	Gross Receipts	Tax
Street railway	33	$16,087,761	$804,388
Water	115	3,993,123	79,862
Gas and electric light (or power)	118	23,186,414	463,728
Telegraph and telephone	43	7,570,213	151,404
District telegraph messenger	3	73,773	1,475
Sewer and pipe line	15	245,914	4,918
Total	327	$51,157,201	$1,505,776

Binghamton (N. Y.) Railway.—At the recent annual meeting of stockholders of the Binghamton Railway Mortimer B. Fuller was elected a director in place of W. L. Connell.

Boston (Mass.) Elevated Railway.—The West End Street Railway has petitioned the Massachusetts Public Service Commission for authority to issue $815,000 and $1,581,000 of negotiable thirty-year bonds bearing interest at not more than 6 per cent. The proceeds are to be used in connection with the retirement of $815,000 of 4 per cent bonds, dated May 1, 1896, and maturing May 1, 1916, and $1,581,000 of serial debenture bonds dated Aug. 2, 1915, and maturing on Aug. 1, 1916.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—In a statement which appeared in the Milwaukee *Leader* recently it was suggested that the Milwaukee Electric Railway & Light Company might be planning to purchase the Chicago & Milwaukee Electric Railroad, which, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 18, 1915, is advertised for sale under foreclosure on April 1. R. B. Stearns, vice-president and assistant general manager of The Milwaukee Electric Railway & Light Company, has denied that the company contemplated the purchase of the other railway. In a statement to the *Leader* he said: "If you knew more about the Chicago & Milwaukee Electric you would know that no one could possibly buy it except the bondholders. The property is worth about $5,000,000, and there is about $16,000,000 in securities outstanding. Its bondholders are chiefly Canadian parties. You can find out the situation from the records of the receivership in Judge Geiger's court."

Fort Wayne & Decatur Traction Company, Fort Wayne, Ind.—The Fort Wayne & Decatur Traction Company has been incorporated to succeed the Fort Wayne & Springfield Railway, the property of which was sold at receiver's sale on Dec. 2 to Charles H. Worden, Fort Wayne, as noted in the ELECTRIC RAILWAY JOURNAL for Dec. 18, 1915, page 1234.

Interborough Consolidated Corporation, New York, N. Y.—Holders of the voting trust certificates of the Interborough-Metropolitan Company have been notified by the board of trustees that the agreement dated March 6, 1906, will expire March 6 next, and that certificates may be exchanged for certificates of the capital stock of the Interborough Consolidated Corporation, successor to the Interborough-Metropolitan Company, to the amount and of the class called for by the respective voting trust certificate. The voting trustees are August Belmont, Edward J. Berwind, Thomas DeWitt Cuyler, Theodore P. Shonts and Cornelius Vanderbilt.

Kansas City (Mo.) Railways.—The Kansas City Railways has received from the Public Service Commission of Missouri the necessary authorization for the issuance of mortgages and notes as provided in the reorganization plan. The Public Utilities Commission of Kansas has taken the application of the company for the issuance of securities under advisement.

Kansas Electric Utilities Company, Lawrence, Kan.—Announcement has been made that the Kansas Electric Utilities Company has sold to Chicago, Grand Rapids and New York bankers $1,500,000 of first mortgage ten-year 5 per cent bonds. The Kansas Electric Utilities Company was organized in 1915 and acquired the Lawrence Railway & Light Company, Emporia Railway & Light Company and Parsons Railway & Light Company. In addition to the Kansas companies, the Kansas Electric Utilities Company also owns all the capital stock of Sidney (Ohio) Electric Company, Union City (Ind.) Electric Company and United Lighting Company of Albion, Pa.

Lancaster & Southern Street Railway, Millersville, Pa.—John H. Myers and John M. Groff have been appointed receivers of the Lancaster & Southern Street Railway.

Los Angeles (Cal.) Railway Corporation.—The Railroad Commission of California has authorized the City Railway Company to issue at par to the Los Angeles Railway Corporation $280,000 face value of principal of its bonds dated Feb. 1, 1911, to refund a similar amount of indebtedness to the company incurred for betterments.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Railroad Commission of California has authorized the Los Angeles & San Diego Beach Railway to pledge its first mortgage 5½ per cent sinking fund gold bonds at a ratio of not to exceed $100 of bonds for $70 of notes as collateral security for a six months' note to the Southern Trust & Savings Bank, San Diego, for $5,000 at 7 per cent and as collateral security for a similar note for the same amount to the American National Bank, San Diego.

Lykens & Williams Valley Street Railway, Pottsville, Pa.—The Lykens & Williams Valley Street Railway has been reorganized under the name of the Lykens Valley Railway with a capitalization of $200,000. The Harrisburg Trust Company, which was trustee under the company's mortgage, last autumn took charge of the line temporarily at the request of the bondholders' protective committee, with which nearly all the bonds were deposited. According to information just now available, the trust company at the expiration of the required notice sold the road under the provisions of the mortgage. The property was first released by the court, as it was in the hands of the Schuylkill & Dauphin Traction Company, which was in turn in the hands of a receiver appointed by the court. The title of the Lykens property was taken over individually by the members of the protective committee, who are still working on the reorganization plan. Dr. John Oenslager, Harrisburg, has been appointed by the new management to take charge of operating the road temporarily.

Mountain Railway, West Orange, N. J.—The sale of the property of the Mountain Railway as junk was postponed from Feb. 24 to March 3 on the application of the Public Service Corporation of New Jersey, which has a judgment against the company for $1,600. The company operated 2 miles of track and two cars. Service was abandoned months ago.

Norton & Taunton Street Railway, Norton, Mass.—The bondholders' committee of the Norton & Taunton Street Railway, which purchased the property of the company at foreclosure sale on Feb. 7, 1916, has filed with the Public Service Commission notice that if the Supreme Court confirms the sale a new company named the Norton, Taunton & Attleboro Street Railway will be formed to operate the company purchased. The notice says that the fair replacement value of the railway and property so acquired is not less than $250,000 and it is agreed to issue $120,000 of 5 per cent first mortgage bonds and $150,000 of common stock and requests the commission to determine the fair replacement cost of the company and to approve the issues.

Northern Ohio Traction & Light Company, Akron, Ohio.—The Ohio Public Utilities Commission has authorized the Northern Ohio Traction & Light Company to issue $1,518,400 of 6 per cent preferred capital stock at not less than 95 a share, to be used as follows: The payment of the uncapitalized balance of the cost for applicant's 1914 additions and improvements, $8,431.07; the payment for applicant's 1915 additions and improvements, $851,431; the payment for applicant's 1916 additions and improvements, $1,000,000. Thomas H. Hogsett has been elected a director of the Northern Ohio Traction & Light Company to succeed B. Mahler.

Public Service Corporation of New Jersey, Newark, N. J.—The monthly financial report of the Public Service Corporation of New Jersey for January shows a gross increase in total business over the corresponding month last year of $327,404 or 10.4 per cent. The balance available after payment of operating expenses, fixed charges, sinking fund requirement, etc., for amortization, dividends and surplus, was $505,165. The increase in surplus available for dividends over the corresponding month of 1915 amounted to $69,249.

Public Utilities Company, Evansville, Ind.—The Public Utilities Company has called for payment on April 1 at the office of the Citizens' Savings & Trust Company, Cleveland, Ohio, trustee, bonds numbered eighty-one to ninety inclusive of the Evansville & Princeton Traction Company. They are to be redeemed at 105 and accrued interest.

Railways Company General, Camden, N. J.—At the annual meeting of the Railways Company General, the directors were re-elected and William H. Crook, Jr., was added to the board. The retiring officers were re-elected.

Schenectady (N. Y.) Railway.—Harris, Forbes & Company, New York, N. Y., and Perry, Coffin & Burr, Boston, Mass., are offering jointly $2,256,000 of Schenectady Railway 5 per cent first mortgage thirty-year gold bonds referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 25, page 423. The bonds are dated March 1, 1916, and are callable on any date on and after March 1, 1919, at 102½ and interest. The interest is payable on March 1 and Sept. 1, at the office of the United States Mortgage & Trust Company, New York, N. Y.

Third Avenue Railway, New York, N. Y.—The directors of the Third Avenue Railway on Feb. 28 decided to pay 2½ per cent interest on the income bonds for the last six months and declared the usual dividend of 1 per cent for the quarter, both payable on April 1. Announcement was made that 225 of the adjustment bonds had been bought as the nucleus of a sinking fund. The Third Avenue Railway earned a gross operating revenue of $898,808, in January—a gain of $26,645 over the same month last year. The net income, after interest and rental charges had been met, was $72,708—an increase of $44,575. The company earned in the seven months ended Jan. 31 a net income of $502,368—an increase of $65,950 over the corresponding period in 1914.

Underground Electric Railways, Ltd., London, England.—The Underground Electric Railways, Ltd., announces that the revenues of the company will enable it to pay full interest to Dec. 31, 1915, on its 6 per cent first cumulative income debenture stock and on its 6 per cent income bonds, and to carry forward about £38,500.

Washington (D. C.) Interurban Railroad.—The Public Utilities Commission of the District of Columbia has approved the transfer of the Washington Interurban Railway to the Washington Interurban Railroad. The property was sold under foreclosure on Dec. 23, 1915, and the sale was ratified by the District Court of the United States for the District of Maryland on Jan. 26. The commission has also authorized the issue and sale by the Washington Interurban Railroad of $50,000 par value of common stock divided into shares of the par value of $50 each, and $150,000 face value of first mortgage 5 per cent thirty-year gold bonds secured by a first mortgage on the franchise and property to be acquired. The securities are to be issued with the understanding that the Washington Interurban Railroad use so many of them as are necessary for the payment of the purchase price; that the remainder of the securities shall be apportioned among the bondholders who elected to participate in the purchase; that the common stock be sold at not less than its par value, and that all discounts and expenses in connection with the sale of the bonds authorized to be issued, together with the difference between the face value of the securities authorized and the value of the utility hereafter to be determined by the commission, be amortized out of the income of the company before Jan. 1, 1945.

DIVIDENDS DECLARED

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Rochester Railway & Light Company, Rochester, N. Y., quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.					
1m., Jan., '16	$148,860	$97,092	$51,768	$40,725	$11,043
1 " " '15	144,145	96,297	47,848	39,802	8,046
7 " " '16	1,173,181	747,043	426,138	282,824	143,314
7 " " '15	1,241,521	781,360	460,161	279,387	180,774
CITIES SERVICE COMPANY, NEW YORK, N. Y.					
1m., Jan., '16	$663,543	$18,215	$645,328	$42,966	$602,362
1 " " '15	425,900	12,928	412,972	40,833	372,139
12 " " '16	4,717,443	178,143	4,539,300	492,132	4,047,168
12 " " '15	3,945,594	126,250	3,819,344	431,667	3,387,677
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
1m., Dec., '15	$300,315	*$164,527	$135,788	$41,189	$94,599
1 " " '14	278,561	*151,427	127,134	43,463	83,671
12 " " '15	3,113,175	*1,846,437	1,266,738	476,281	790,457
12 " " '14	3,066,298	*1,886,746	1,179,552	520,438	659,114
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., Dec., '15	$163,213	*$106,446	$56,767	$36,597	$20,170
1 " " '14	192,136	*102,226	89,910	36,208	53,702
12 " " '15	1,936,228	*1,206,457	729,771	433,309	296,462
12 " " '14	2,424,119	*1,310,859	1,113,260	441,125	672,135
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., Jan., '16	$367,141	$211,605	$155,536	$53,580	$101,956
1 " " '15	280,838	181,978	98,860	50,251	48,809
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., Jan., '16	$2,153,920	$1,200,537	$953,383	$816,777	$136,606
1 " " '15	1,998,395	1,173,758	824,637	812,413	12,224
7 " " '16	14,570,892	8,160,473	6,410,419	5,712,570	697,849
7 " " '15	13,943,519	8,072,479	5,871,040	5,660,369	210,671
THIRD AVENUE RAILWAY, NEW YORK, N. Y.					
1m., Jan., '16	$898,808	$541,731	$357,077	$284,369	$72,708
1 " " '16	872,163	576,640	295,523	267,390	28,133
7 " " '16	6,536,931	4,047,546	2,489,385	1,971,665	‡592,368
7 " " '16	6,474,477	4,063,573	2,410,904	1,931,975	‡526,418
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.					
1m., Jan., '16	$830,283	$543,199	$287,084	$145,952	$141,132
1 " " '15	772,045	531,540	240,505	143,956	96,549
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
1m., Dec., '15	$17,514	*$20,515	†$3,001	$1,723	†‡$4,692
1 " " '14	18,421	*21,922	†3,501	1,312	†‡4,806
6 " " '15	133,742	*129,733	4,009	9,840	†‡5,648
6 " " '15	141,805	*138,562	3,243	7,537	†‡4,220

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*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

PLAYING THE GAME

Pennsylvania Official Says Statement That All Cards Are On Table Is Not Enough

Some time ago the Pennsylvania Railroad displayed on bulletin boards all over its system large posters asking the people to give the management the benefit of their advice. The responses to that bulletin were very interesting. A great many dealt with some personal grievance, but for the most part they showed a most helpful spirit on the part of the public. In referring to the campaign in a speech which he made before the Traffic Club of Baltimore on Feb. 29 Robert C. Wright, freight traffic manager of the Pennsylvania Railroad, said:

"The thing that is needed in our business life—which I might say has been lacking the last few years—and the thing which is particularly necessary in the relations between the carriers and the public, is confidence. The railroad companies have been urged to take the public into their confidence, but they can't take the public into their confidence until the public has confidence in them. I have tried it and I know. You tell a man your cards are all on the table and try to take him into your confidence, but unless he has confidence in you he suspects that there are some aces up your sleeve.

"The first step in mutual confidence between the carriers and the public is to restore the public's confidence in the carriers. I realize perfectly that the public's lack of confidence in the railroads has been more or less justified in the past, due to the practices of the carriers, but let bygones be by-gones. We must look ahead—not behind. It is unfair to refer continually to the abuses of times gone past, in an effort to keep alive hostility toward the railroads.

"I sometimes wonder if people realize how a railroad such as ours is being ground continually between the upper and nether millstones. Baltimore wants something and tells us what great things we are doing for Philadelphia and New York. Philadelphia wants something and her papers chide us about favoring Baltimore and New York. Pittsburgh wants something and we are reminded how we favor Baltimore, Philadelphia and New York. Chicago wants something and we are berated because they say we discriminate against her in favor of Pittsburgh, Baltimore, Philadelphia and New York. And so it goes.

"Let us have confidence in each other. If we don't understand the other's viewpoint, let us talk it over, and if we still cannot reach the same conclusion, let us then submit it with no feeling to the proper commission or court, in order that a settlement may be reached. Then let's be good sports and stand by the decision and not keep on complaining that the other fellow won't do what we want. Above all, let's believe that each wants to be fair. Let us give each other a chance to show why he thinks he is fair and retain through any difference of opinion confidence in each other, which will make for a furtherance of the mutual help of business men and railroads, which goes to make the prosperity of the nation."

INCREASE IN ST. LOUIS BRIDGE FARE SUSPENDED

The 10-cent fare between St. Louis and Granite City over the McKinley Bridge, announced by the Illinois Traction Company to become effective on March 1 was suspended pending a hearing on the case by the Interstate Commerce Commission. E. D. Bell, the general superintendent, said:

"We have decided to provide 'excursion rates' for the month of March. Round-trip tickets will be sold for 10 cents, which to all practical purposes will continue the effectiveness of the 5-cent fare for thirty days. Conductors will sell these tickets on all cars and the return coupon will be accepted as the regular fare during that period. This will give the city and the company an opportunity to appear before the Interstate Commerce Commission if it is so desired, and arrive at a thorough understanding, the interests of the public not to be affected in the meantime."

Permission to make the increase was granted by the Interstate Commerce Commission a few days ago after the application of the company had been on file twenty days, no protest having been received in that time. Cards were at once posted in the interurban cars announcing the new rate would be effective on March 1. City officials said that the failure of the city to protest was due to a misunderstanding of the time allowed and the method of procedure.

Under the rules of the Interstate Commerce Commission, if no protest is received against an increased rate within twenty days, the new rate is allowed. Ten days thereafter is allowed for the filing of protests, but the increased rate may be put in effect in the meantime and the protest is put on the "complaint docket" of the commission. The Illinois Traction System's application was filed on Jan. 27, and although the city did not protest within twenty days, it still had ten days in which to file a protest. The railroad company's agreement to suspend the rate is a concession to the city. This agreement means that the application for increase will be put on the "suspension docket" and that present fares will remain in force until the matter is finally heard by the Interstate Commerce Commission.

MILWAUKEE SERVICE SUIT SETTLED

A compromise settlement of all the Milwaukee service cases has been reached under which The Milwaukee Electric Railway & Light Company has agreed to pay $10,000 of the total penalty of $186,000 sought to be recovered in the Dane County Circuit Court by the State for alleged violations of orders of the Railroad Commission. S. B. Way, vice-president and general manager of the company, said that the officers of the company went over the alleged violations at considerable length and ascertained that in a great many cases there were disturbances in operation due to blocked railroad crossings, open bridges, etc., on the lines beyond the control of the company that resulted in the alleged overcrowded conditions complained of. He is quoted as follows:

"As a practical matter it is impossible to design schedules which will successfully anticipate traffic that may originate at a certain point at a certain time. At times overcrowding is bound to occur. To play safe, we would be required to operate much more service than was contemplated by the commission. We had the choice of entering into an extended trial of the merits of the alleged violations and the reasonableness of the order on the one hand or paying a moderate judgment on the other hand. We decided that the value of the time of the employees and officers required to present our case satisfactorily would be greater than the amount of money involved in any judgment which might be reasonably imposed. We have accordingly determined that it is more advantageous for our company to pay the judgment than it was to enter into the extended defense that would be required were we to try the case properly on its merits.

"While we are reasonably confident that we would have ultimately won our case had we proceeded to a complete trial on its merits, it might prove more expensive in the long run to win than it is to pay the judgment. Statements alleging that the company had pleaded guilty to 100 counts and had been fined $10,000 are not in accordance with the facts. The stipulation between the attorney general and the company's attorneys, which was approved by Judge Stevens, reads in part as follows:

"'It is hereby stipulated by and between the parties, by and with the approval of the court, that, as a compromise and settlement of all of the causes of action in plaintiff's complaint, judgment may be entered against the defendant in favor of the plaintiff in the sum of $10,000 without costs and that such judgment when entered shall be a full and complete discharge of all penalties, obligations, liabilities and indebtedness of the defendant to the plaintiff for or on account of or in any way arising out of or connected with the matters and things alleged in any and all of the 186 causes of action in plaintiff's complaint.'

"It is thus apparent that the compromise settlement agreed upon is a complete settlement of the entire case and involves no admission on the part of the company as to guilt in respect to certain counts as alleged in the city attorney's interview."

BUS PETITION DENIED

The Public Service Commission for the Second District of New York has again denied the application of William B. Gray for certificates of public convenience and necessity for two auto-bus routes in New Rochelle, paralleling the North Avenue and Winyah Avenue routes of the Westchester Electric Railway. The order of the commission says that no complaints against the service of the electric railway on these routes had ever been lodged with the commission prior to the hearing held on the application of Mr. Gray. When complaints against its service were made at these hearings the company promptly promised to try to remedy them and has already taken steps to insure more frequent and more regular service on the routes concerned. The commission says that in view of this it would be an unwarrantable exercise of its discretionary powers to permit conditions of competition on these routes which might in the end work to the harm rather than the benefit of the public by making both the operations unprofitable, if not ruinous. Mr. Gray's petition, therefore, is again denied with permission to renew it if it should appear in the future that the electric railway is unwilling or unable to furnish adequate service on the North and Winyah Avenue routes. A previous order of the commission granted certificates to this applicant for numerous other routes in New Rochelle where his buses did not come into direct competition with the electric railway. It was in connection with the previous application of Mr. Gray that the commission laid down the principles to govern it in all future applications of the kind. These principles were referred to at length in the ELECTRIC RAILWAY JOURNAL of Oct. 30, 1915, page 929.

LOUISVILLE BOARD OF TRADE BOOSTS RAILWAY

An instance of how a street railway may be favorably recommended to the business men of its community is supplied in the latest number of the weekly bulletin of the Louisville Board of Trade. The leading item in this particular number of the publication relates to the Louisville Railway. It follows in part:

"Louisville has the best street railway system in the United States, everything considered. At least that is what the traveling community say and they ought to know.

"It might be said that the service could stand improvement at one or two points, but, as a general thing, it can truthfully be stated that our service in this city is second to none anywhere else.

"The *Bulletin* particularly wishes to call attention to the magnificent repair shops built and operated by the Louisville Railway. These shops, in their fireproof construction, saw-tooth roofs for natural lighting, mercury vapor lamps for artificial illumination, thorough system for transporting and storing materials and other features, are a worthy example of car maintenance standards; and that is the opinion of the ELECTRIC RAILWAY JOURNAL, which is the best authority in matters of this kind in the country.

"The general manager of the line will be glad to furnish anyone interested with a permit to visit these shops, and they are well worth a visit. The people of Louisville, as a whole, do not know the big things we have in Louisville."

HEARINGS ON JITNEYS IN ROCHESTER

The Public Service Commission of the Second District of New York, with Commissioner Emmett sitting, has been holding a series of hearings at Rochester on the applications of sixty-seven jitney operators to continue to operate in that city after the expiration of their licenses to operate. These licenses were granted to them before the public utility law was amended to bring the jitneys under commission jurisdiction.

Attorney Daniel M. Beach appeared for the railway. Attorney Powell for the jitney operators sought to prove the need of the jitneys by offering in evidence a traffic count taken over a period of one week and designed to show the irregularity of the service of the New York State Railways, Rochester Lines.

The company's evidence was cumulative. Robert A. Badger, secretary of Curtice Brothers Company, said that if he was Mayor he would not allow the jitneys to operate on any street where there was a car line. The security holders of the company should be protected. Edward Walsh, editor of the *Labor Herald*, said that the jitneys were irresponsible and tended to deprive railway employees of their jobs. A. Frank Warren, Ward N. Britton and J. George Kaelber, all real estate men, testified that the street cars have done a great deal to build up the outlying sections of the city and, in many instances, have done so at a loss to the railway company. Mr. Kaelber, representing the Browncroft Realty Company, said he knew the street railway was losing money on the line which traverses the Blossom Road extension, but that the service to that section of the city was fast developing a desirable residence district which could not otherwise be made attractive to homeseekers. The hearing was to be continued on March 2.

ONE-ARM FAKER AT LARGE WHO OPERATED IN THREE CITIES

About seven o'clock in the evening on Feb. 22 the Lynchburg Traction & Light Company, Lynchburg, Va., was notified that a one-armed white man was near the corner of Fifth and Main Streets in Lynchburg claiming that he had fallen from one of the company's cars and been hurt, and that he wanted help. Inspectors of the company investigated the matter immediately. The man gave his name as C. L. Bell and claimed that he had fallen in trying to get off a crowded car that had not stopped at the street intersection where he wished to leave it, and that his back had been severely and painfully injured and that he could not walk without assistance.

The company at Lynchburg had just received advice from the Durham (N. C.) Traction Company that this man claimed to have been injured in a similar manner in that city a few days ago and that the company in turn had been warned by the Georgia Railway & Power Company, Atlanta, to look out for him. Bell was accordingly taken to a hospital for examination because the company at Lynchburg had been advised from Durham that he had an ulcer on his left leg near the ankle. As soon as the doctor examined this leg the man showed symptoms of nervousness and wanted to leave the hospital. Meanwhile the local police authorities had been notified and one of the city detectives was sent to the hospital to investigate. After learning the facts the police authorities gave him the option of leaving town immediately or going to jail and he disappeared. This man's description is as follows: Luther Carl Bell. Home: Savannah, Ga. Occupation: machinist, construction foreman, traveling salesman, etc. Age: about forty. Height: 6 ft. Weight: 215 lb. Black hair, dark complexion, left arm amputated, right leg ¾ in. shorter than left. Ulcer on left leg near ankle.

WASHINGTON COMPANIES CO-OPERATE IN SAFETY CAMPAIGN

The Washington Railway & Electric Company and the Capital Traction Company, Washington, D. C., have begun the distribution of a series of safety-first blotters among the pupils of the graded and ungraded schools in the National Capitol. The plan to impress the children in the public schools by means of blotters with the need of being vigilant in the streets was approved by the police department and the superintendent of schools.

On each blotter is a picture of an accident or near accident. Children are shown about to be run down by street cars and automobiles while they are at play. The first blotter distributed shows a large coasting sled crowded with children about to be struck by a street car, and warns the "kiddies" to "coast away from the tracks." The distribution of blotters will cover a period of twelve months, both railways jointly reaching all the enrolled pupils with one blotter each month.

Two years ago the Washington Railway & Electric Company distributed a specially designed blotter as part of its own safety-first campaign, but the campaign now under way is the first time that the two companies have joined in such a movement. It is believed that by reaching the child the attention of adults will also be gained, becoming of value to the local authorities in its efforts to decrease the number of street accidents due to vehicular traffic and thoughtlessness on the part of the general public and visitors to the nation's capital. The plan of campaign has received considerable publicity in the Washington newspapers, which have designated the railway companies' co-operation and expense attached thereto as a real public service.

Skip-Stop Hearing Postponed.—The hearing on skip stops in St. Louis, set to be held on Feb. 18, before the Public Service Commission of Missouri in that city, was postponed indefinitely.

One-Man Car for Rutland.—The Rutland Railway, Light & Power Company, Rutland, Vt., proposes to transform one of its single-truck belt line cars into a one-man pay-as-you-enter car. The work will be done at the company's Park Street carhouse.

New Denver Publication.—The Denver (Col.) Tramway has begun the publication of a four-page weekly 4½ in. wide by 7½ in. high. As yet it is unchristened, but a prize of $25 in cash is to be awarded on March 4 to the person suggesting the name considered most suitable by the judges selected to pass upon the suggestions made by readers.

Postponement of Fare Case Asked.—The Public Service Commission of Massachusetts has taken under advisement the petition to postpone action on the application of the Massachusetts Northeastern Street Railway for permission to increase its fare unit to 6 cents until a decision has been reached in the Bay State Street Railway fare case, which also involves an increase in the fare unit to 6 cents.

Hearings on Request for Increase in Fare in New Jersey.—The Board of Public Utility Commissioners of New Jersey is conducting hearings on the petition of the Burlington County Transit Company, Mount Holly, N. J., for permission to charge higher fares. The corporation wishes to increase the fare between Moorestown and Mount Holly, and from Mount Holly to Burlington from 10 cents to 15 cents.

Subway Flood in New York.—The New York subway was blocked on Feb. 25 from 10 a. m. until 2 p. m., between Ninety-sixth Street and Grand Central stations, because of flooded tracks under Times Square. The primary cause of the flood, according to Robert Ridgway, chief engineer of subway construction for the Public Service Commission, was the inability of the sewers in the Times Square region to carry off the heavy downpour between 4 p. m. on Feb. 24 and noon Feb. 25. Train service had to be suspended for several hours.

Reduction in Fare Asked.—The Warren & Jamestown Street Railway, Jamestown, N. Y., has been asked by the residents of Russell, 7 miles north of Warren, for a 10-cent fare between these two points, a new freight terminal in their town and extra service during the morning and evening rush hours. Samuel Q. Smith, secretary and treasurer of the company, says the requests will be taken up by the management. As stated in the ELECTRIC RAILWAY JOURNAL of Feb. 26, page 424, the Public Service Commission recently upheld the company's rate of 10 cents between Frewsburg and Jamestown.

Supplemental Bill of Complaint in Trenton Case.—In a supplemental bill of complaint just filed, the Trenton & Mercer County Traction Corporation, Trenton, N. J., has asked the United States District Court to set aside the order of the New Jersey Public Utility Commission forbidding the company to discontinue the sale of strip tickets at the rate of six for a quarter and charge a straight 5-cent fare instead. The company alleges that the board lacks jurisdiction and that the order is discriminatory. The court is also asked to issue an injunction restraining the board from fining the company $100 a day for violation of the ruling.

Hearing on Skip Stop for Newark.—There was a brief hearing on Feb. 23 before the Board of Public Utility Commissioners of New Jersey on the petition of the Mayor and Borough Council of Verona for adoption of a skip-stop traffic rule on the Bloomfield Avenue line of the Public Service Railway. C. H. Walker, representing the borough, stated that Verona, Caldwell, Glen Ridge, Bloomfield and Montclair were in accord in favoring a modified skip-stop rule. The only obstacle remaining, he said, was the city of Newark, whose sanction is asked for the cancelling of certain corner stops in order to speed up the service between Newark and Caldwell.

New Jersey Jitney Bill Amended.—A committee substitute for the Kates bill to regulate jitneys has been reported favorably in the New Jersey House of Representatives by the municipal corporations committee. The substitute, eliminating the more drastic features of the Kates measure, to which exception was taken by jitney owners, was agreed upon at a conference. The new bill omits the requirement that consent of the Public Utility Commission be obtained before cars can be operated, and also that for a bond. As a substitute for the bond, indemnity insurance will be required. Another provision of the amended measure is that a tax of 5 per cent on gross receipts of cars, payable to the municipalities in which they operate, shall be in lieu of all other taxes. This, however, does not exempt jitney owners from taking out a motor vehicle license nor the drivers from having licenses from the State motor vehicle department.

Safety Patrols Proposed for Allentown Schools.—The organization of safety patrols to consist of older boys and girls and recruited at each school building in the city has been proposed to the school board of Allentown, Pa., by the Lehigh Valley Transit Company through E. C. Spring, who has been foremost in promoting safety-first work for the company. Mr. Spring outlined the system developed with success in Brooklyn. This patrol, consisting of ten or twelve of the larger boys of a school building, would have as its duties the care of the children of that building. They would arrive in the vicinity of the school fifteen minutes in advance of the regular assembling hour, take up positions assigned by the chief of the patrol at street intersections in the vicinity of the school and at any points where accidents might occur to children and as far as possible keep the children off the public highways. The patrols would meet once a week to discuss the subject of safety and the prevention of accidents.

Dallas Employees to Compete in Safety-first Campaign.—Richard Meriwether, general superintendent of the Dallas Consolidated Electric Street Railway, the Rapid Transit Railway and the Metropolitan Electric Street Railway, Dallas, Tex., is offering $300 in prizes to employees for the best record in safety work. A board of safety will supervise and have charge of the work in all departments. In the transportation department the men will be enrolled in sixteen divisions. Since March 1 a record of all accidents has been kept. At the end of each month the division having the fewest accidents will be scored sixteen points, the next best fifteen points and so on. At the end of the year the division scoring the greatest number of points will be declared the best in accident prevention. A prize to this division of $200 will be given on Jan. 1, 1917. The second prize will be $100. The prizes will be divided among the members of the successful division. Each division will elect from its members a captain who will advise with the members as to the best way to increase the efficiency of the safety-first plan. He will distribute monthly a set of questions and the man turning in the best answers for a year will be awarded $10 in gold. A similar plan will be adopted among the shop employees.

Zone System for New York City Lines.—As a result of conferences between the committee of the Public Service Commission, the transit committee of the Board of Estimate, and representatives of the Long Island Railroad, the Interborough Rapid Transit Company, and the Brooklyn Rapid Transit Company, the operating companies have been requested to submit a definite proposition for the operation of rapid transit trains over the tracks of the Long Island Railroad from Corona to College Point and Whitestone, and to the city line at Little Neck, in accordance with the report of Alfred Craven, chief engineer of the Public Service Commission. This report, which recommends the acceptance of the railroad company's proposition on condition that a two-zone system be established, in one of which a 5-cent fare and in the other a 10-cent fare would be charged, shows that the operation of rapid transit trains for a 5-cent fare to Whitestone and to the city line at Little Neck would result in a deficit of approximately $180,000 the first year, whereas with a two-zone system, providing for an additional fare beyond College Point and Broadway, Flushing, the deficit would be only $26,000 the first year, and this would be entirely wiped out in a short time by the natural increase in traffic from that section.

Personal Mention

Mr. Frank H. Miller, superintendent of motive power of the Louisville (Ky.) Traction Company, has been elected president of the Louisville Jovian League.

Mr. C. H. Read, formerly chief accountant in charge of accounting matters for the Rock Island & Southern Railway System, located at Davenport, Iowa, has been appointed auditor of the Kansas City, Kaw Valley & Western Railway, at Bonner Springs, Kan.

Mr. Roger W. Toll has resigned as chief engineer of the Denver (Col.) Tramway. Mr. Toll has been in charge of all matters pertaining to civil engineering, track and roadway construction and maintenance, bridges, viaducts, subways, etc., since his appointment as chief engineer in January, 1913.

Mr. Edward A. West, connected with the Portland Railway, Light & Power Company, Portland, Ore., as efficiency engineer, has been appointed chief engineer of the Denver (Col.) Tramway to succeed Mr. Roger W. Toll, resigned. It is expected that Mr. West will assume his duties in Denver on March 10.

Mr. H. C. Faithorn has been appointed traffic manager of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind. Mr. Faithorn has taken up the work begun by Mr. W. H. Ogborn, resigned, and will have charge of the passenger traffic as well as the development of a general freight handling business.

Mr. E. W. Hill, formerly treasurer and assistant treasurer of the Electric Bond & Share Company, New York, N. Y., has been elected a vice-president of the company. He will be succeeded by Mr. A. E. Smith. Mr. E. P. Summerson and Mr. William Reiser have each been made assistant secretary and treasurer.

Mr. Fred A. Vogel has been appointed assistant division superintendent of the Sherman, Baker, Harper, Springwells and Chene extension lines of the Detroit (Mich.) United Railway vice Mr. Leon Snyder, transferred. Mr. Fred O. Sauer has been appointed inspector of service for the same lines to succeed Mr. Vogel.

Mr. James L. Weir, assistant joint agent of the Detroit United Lines at the Detroit station, has tendered his resignation to become associated with the Detroit office of the Standard Accident Insurance Company. Mr. Weir has been connected with the Detroit United Lines since Feb. 6, 1902, filling various positions in the freight department of the company.

Mr. H. C. Eddy, who recently resigned as engineer for the Public Utilities Commission of the District of Columbia, has received a temporary appointment with the Navy Department and is now located at the naval proving ground at Indian Head, Md., supervising the enlargement of the power station and the installation of several additional boilers, coal conveyor, etc., and remodeling the present boiler plant.

Mr. F. R. Slater, who for the last three years has been general superintendent of the Texas Power & Light Company, with headquarters at Dallas, has been appointed acting general manager of the company, succeeding Mr. George S. Haley, who resigned recently. Mr. Slater is a graduate of Cornell, class of 1894, and after work on the design of the new power station for Columbia University entered the organization of the Otis Elevator Company as a designing engineer. In 1899 he joined the forces of the Manhattan Elevated Railway, New York City, which was then converting its lines from steam to electric operation. Later he became a member of the engineering staff building the New York subway, serving as assistant engineer in charge of direct-current distribution and later as principal assistant engineer of the Interborough Rapid Transit Company. In 1907 Mr. Slater formed with H. N. Latey the consulting engineering firm of Latey & Slater, from which he withdrew in 1912 to go to Dallas. At the time of the St. Louis exposition in 1904 Mr. Slater served as a member of the advisory council of the Electric Railway Test Commission.

A. BENHAM

Mr. Albert Benham, general manager of the Ohio Electric Railway, Springfield, Ohio, was elected president of the Central Electric Railway Association at its annual meeting, held in Dayton, Ohio, on Feb. 24 and 25. Mr. Benham was born in Ohio in 1868 and entered railway work with the Fifth Avenue Cable Company, Pittsburgh, Pa., in 1891. He continued in the service of that company and the Consolidated Traction Company, Pittsburgh, in various departments until January, 1901, when he resigned to become connected with the Cincinnati (Ohio) Traction Company. He served as inspector and later as assistant general superintendent of the Cincinnati Traction Company until March, 1906, when he was made general superintendent of the Indiana, Columbus & Eastern Traction Company, with headquarters at Columbus, Ohio. In 1908 Mr. Benham was appointed assistant general manager of the Ohio Electric Railway, and in July, 1913, was made general manager.

Mr. Frank H. Sommer, counsel for the Board of Public Utilities Commissioners of New Jersey, has been elected by the council of New York University to be dean of the University Law School, of which he is a graduate. Mr. Sommer succeeds Dean Clarence D. Ashley, who died on Jan. 26. Mr. Sommer has been a lecturer in the school since he was graduated in 1893. He was born in Newark forty-three years ago. He was formerly a member of the Board of Public Utilities Commissioners of New Jersey and when his term of office expired on May 1, 1911, he was retained as counsel to the commission in accordance with the provision of the new utility law which gave the board authority to engage counsel. Previously, the commission had referred to the Attorney General of the State all questions which required an expression of legal opinion.

R. L. LINDSEY

Mr. R. L. Lindsey, who has been elected vice-president of the Durham (N. C.) Traction Company in addition to general manager, was born on a farm near Kinston in North Carolina. He attended school until he was ten years old, when he went out to work. At fifteen he had mastered telegraphy, at seventeen stenography and typewriting and at twenty he had twice read the course prescribed by the State of North Carolina for a lawyer's license. He was admitted to the practice of law in the courts of North Carolina at the age of twenty-one. For four years thereafter he was secretary to Gen. J. S. Carr, president of the Blackwell Durham Tobacco Company. Mr. Lindsey entered public service work in May, 1899, as secretary, treasurer and manager of the Durham Electric Lighting Company. He promptly overhauled the station and installed a twenty-four-hour service. He also changed the customers over successfully from flat rate to meters. In February, 1901, the Durham Traction Company was organized by R. H. Wright, J. S. Carr, and others, through the purchase of the Durham Electric Lighting and the Durham Ice companies and the acquisition of the old horse car line franchise. On its organization the Durham Traction Company elected Mr. Lindsey auditor. He continued in that capacity until April, 1905, when he was made general manager. He is a Mason, a Shriner, a Pythian and an Elk and is a member of many local civic and commercial bodies.

OBITUARY

M. D. Thatcher, one of the principal owners of the Pueblo & Suburban Traction & Lighting Company, Pueblo, Col., prior to its being taken over by the Arkansas Valley Railway, Light & Power Company, died at his home in Pueblo on Feb. 22.

L. T. Garnsey, Los Angeles, Cal., is dead. Mr. Garnsey was one of the promoters of the Los Angeles & Redondo Railway, now included in the system of the Pacific Electric Railway, and was president of the company for some time. He was also a large real estate operator. Mr. Garnsey was born in Great Bend, Pa., seventy-one years ago.

John M. Eshleman, Lieutenant-Governor of California, died at Indio, Cal., on Feb. 28. Mr. Eshleman was born in Villa Ridge, Ill., on June 14, 1876, and was graduated from the University of California in 1902. He was admitted to the bar in 1905, and in 1907 was elected a member of the California Legislature. From 1907 to 1910 he was district attorney of Imperial County, Cal., and from 1911 to 1914 he was president of the Railroad Commission.

James Sweeney Thompson, North Tonawanda, N. Y., a director of the International Railway, Buffalo, N. Y., and one of the most widely-known bankers in western New York, died in the Johns Hopkins Hospital in Baltimore, Md., on Feb. 18. Mr. Thompson was born in North Tonawanda on Oct. 11, 1855. He was a director of the Marine Bank; vice-president of the Central National Bank, Buffalo; vice-president of the State National Bank, Tonawanda; vice-president of the First National Bank, Tonawanda, and was connected with other business and financial institutions. He was active in advocating the construction of the proposed high-speed line of the International Railway between Buffalo and Niagara Falls, now under construction.

George E. Miller, superintendent of transportation of the Lehigh Valley Transit Company, Allentown, Pa., died on Feb. 22 after a short illness, of catarrhal pneumonia. He was forty-nine years of age. Mr. Miller was born in Pottsville, Pa., and started life as a printer. For six years he was a compositor on the Pottsville *Chronicle*. He then entered the service of the Philadelphia & Reading Railway and for three years was in charge of the yards at St. Clair. For five years thereafter he was superintendent of the electric light and power plant at Port Carbon, Pa. Eighteen years ago Mr. Miller entered the electric railway field as master mechanic of the Jackson (Miss.) Street Railway, where he remained nearly a year. He then became master mechanic of the Chattanooga (Tenn.) Traction Company and a year later was appointed superintendent of the company. He next went to Dubuque, Iowa, as general superintendent of the Dubuque Light & Traction Company. Six years later he returned to Chattanooga and in 1910 was brought to Allentown by Mr. R. P. Stevens, then president of the Lehigh Valley Transit Company. Mr. Miller was one of the pioneers of the safety-first movement, and it was a source of intense pride to him that in the last five years he carried 150,000,000 passengers without the loss of life of a single paid passenger. He was also active in the interest of the welfare of his employees. A widow and eight children survive.

The directors of the Interborough Rapid Transit Company, New York, N. Y., have unanimously voted to establish a pension system for the benefit of all of its employees. The pension system will apply to employees who shall have attained the age of seventy years and have been in the service of the company or its predecessors not less than twenty-five years, and also to employees who shall have been twenty-five or more years in such service and have become physically disabled. The acceptance of the pension allowance will not debar an employee from engaging in other business. There are at present nearly forty employees more than seventy years of age whose length of service ranges from twenty-five to forty-two years. The regulations to govern the pension system are to be administered by the director of welfare, who shall act as chairman; the vice-president and general manager, the general auditor and the treasurer. At the first meeting of the newly appointed pension board, as named above, the superintendent of the voluntary relief department was elected secretary of the board.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Fort Wayne & Decatur Traction Company, Fort Wayne, Ind.—Incorporated to succeed the Fort Wayne & Springfield Railway, which was sold at receiver's sale on Dec. 2 to Charles H. Worden, Fort Wayne, as noted in the ELECTRIC RAILWAY JOURNAL for Dec. 18, 1915, page 1234. Capital stock, $200,000. Incorporators: William J. Vesey, Edward X. Ehinger and G. M. Leslie.

***Newport & Alexandria Interurban Railway, Newport, Ky.**—Incorporated to construct an electric line from Newport to Alexandria, via Fort Thomas, Cold Spring and Silver Grove, 15 miles. Capital stock, $100,000. Among the incorporators are C. D. Miller, Huntington; Blair P. Wilson, Huntington, and Capt. Gottlieb Hartweg, Cincinnati.

Cleburne (Tex.) Traction Company.—Application for a charter has been made by this company to succeed the Cleburne Street Railway. Capital stock, $15,000. Incorporators: F. C. Cotton, Fort Worth, and Lawrence Hewitt and Daniel Hewitt, both of Cleburne.

FRANCHISES

Riverside, Cal.—The Council of Riverside has denied the application of the Pacific Electric Railway to abandon the lower end of its Brockton Avenue line and that portion of its Victoria Avenue line which extends across the Victoria Bridge.

Kankakee, Ill.—The Kankakee Electric Railway has applied to the Public Utilities Commission of Illinois for permission to remove its tracks on South Washington Street, south of Hawkins Street. The Council of Kankakee refused to give the company this permission.

Peoria Heights, Ill. — The Peoria & Chillicothe Electric Railway has asked the Council for a franchise in Peoria Heights. [Jan. 22, '16.]

Battle Creek, Mich.—The Michigan Railway Company has received a franchise from the Council to construct an extension in Post Addition.

Trenton, N. J.—The New Jersey & Pennsylvania Traction Company has received a franchise from the Council to double-track West Hanover Street from Green's Alley to Calhoun Street.

***East Cleveland, Ohio.**—J. L. Free, president of the J. L. Free Company, Cleveland, has asked the Council to advertise for bids for a street railway line on Noble Road. He says that if no other bids are received his company will build the line, but other allotment owners, who will be benefited, will be asked to participate. He estimates that a single track will cost about $40,000.

***Salt Lake City, Utah.**—Le Grand Young has asked the Council for a franchise to construct a line on Twenty-first East Street from Tenth South Street, through Holliday, up Big Cottonwood Canyon to the mines and Brighton.

TRACK AND ROADWAY

Municipal Railways of San Francisco, San Francisco, Cal.—The contract for furnishing and installing electrical conductors and appurtenances for the Church Street municipal railway has been awarded by the Board of Public Works to E. Earl Browne.

Aurora, Mendota & Western Railroad, Aurora, Ill.—The Public Utilities Commission of Illinois has denied the petition of the Aurora, Elgin & Chicago Railroad asking that the Aurora, Mendota & Western Railroad be compelled to operate its cars over the tracks of the Aurora, Elgin & Chicago Railroad from Montgomery to Aurora and has granted a certificate of convenience and necessity authorizing the construction of the new line. [Oct. 9, '15.]

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—It is reported that this company will spend about $225,000 in improvements of various kinds in Galesburg.

Rapid Transit Company of Illinois, Murphysboro, Ill.—Plans are being considered by this company to build a line between Murphysboro and Mount Vernon. [Sept. 11, '15.]

Illinois Traction System, Peoria, Ill.—This company contemplates the construction of a line between Champaign and Bloomington, 50 miles.

Peoria, Canton & Galesburg Railway, Peoria, Ill.—It is reported that the proposed interurban line of the Peoria, Canton & Galesburg Railway is to be revived this year. The Public Utilities Commission of Illinois has given its approval to the plan. Horace Clark, Peoria, president. [Nov. 21, '14.]

Union Traction Company of Indiana, Anderson, Ind.—This company is constructing an extension to its bridge on the Muncie division.

Evansville (Ind.) Railways.—This company has planned to extend its service by automobile bus to New Harmony, Ind., and Morganfield, Ky., and by gasoline boat to Uniontown, Ky. The company is also constructing two fast, twin-screw gasoline boats for use between Rockport, Ind., and Owensboro, Ky.

Tri-City Railway Company, Davenport, Iowa.—This company has deeded to the city of East Moline a strip of land which formed a part of the right-of-way between Twelfth and Thirteenth Streets. The company reserves the right to use the land and to relay tracks therein should it extend its system up State Street.

Boston (Mass.) Elevated Railway. — This company has awarded a contract to H. Nawn Contracting Company, Boston, for the construction of foundations for its Mystic River bridge. The work includes seventeen piers of concrete on pile foundations and thirty-eight small concrete foundations for the viaduct.

Detroit (Mich.) United Railway.—The formal acceptance by the Detroit United Railway of the city's proposal for the extension of the Kercheval and Forest Avenue car lines has been filed with the city clerk. The Kercheval Avenue line will be extended to connect with the Jefferson Avenue line, single-track connections being built on Hart and Lycaste Avenues. The Forest Avenue tracks will be extended east from Gratiot Avenue to the city limits.

Houghton County Traction Company, Houghton, Mich.—Plans are being made by this company to extend its line from Hancock to Dollar Bay.

Muskegon Traction & Lighting Company, Muskegon, Mich.—It is reported that this company is planning extensions and improvements to its system during this year at a cost of about $35,000.

Laurel Light & Railway Company, Laurel, Miss.—Plans are being made by this company for building a lake at Interurban Park for swimming and boating purposes.

Kansas City Railways, Kansas City, Mo.—The Wyandotte Board of County Commissioners on Feb. 10 approved plans prepared by L. R. Ash, engineer, for the construction of the Central Avenue bridge and viaduct in Kansas City, Kan. Advertisements for bids have been ordered and they will be opened on March 6. The bridge will be 3092 ft. long and will be double-decked. The lower deck will be on the level with the road and will have an 18-ft. roadway. The upper deck will connect with the Central Avenue viaduct and will have a roadway 30 ft. wide, a 6-ft. sidewalk and two street car tracks. The estimated plans contemplate the expenditure of $650,000. This new bridge and viaduct proposes a great elevated highway across the Kaw bottoms from Riverview to James Street, which finally will be extended to the State line to connect with the Twelfth Street viaduct built by Kansas City, Mo. The Kansas City Railways will pay one-half of the cost of that part of the bridge utilized by the car tracks and the balance will be paid by the county. R. L. McAlpine, county engineer.

City Electric Company, Albuquerque, N. M.—An additional order has been placed by this company for track material to be used on its extension to the University of New Mexico. It is expected that the line will be in operation by June 1.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has sent to the Board of Estimate & Apportionment for approval the route and general plan for Route No. 64. This is a modification of Route No. 49, known as the Culver line or Gravesend Avenue route in Brooklyn. Route No. 49 is included in the dual system contracts as one of the branches of the Fourth Avenue subway, to be operated by the New York Municipal Railway Corporation. This route connects with the Fourth Avenue subway through the Thirty-eighth Street Cut, and continues from Tenth Avenue over the private right-of-way of the Prospect Park & South Brooklyn Railway Company to Gravesend Avenue at about Cortelyou Road, and thence down Gravesend Avenue and Shell Road to Coney Island. The construction contracts for the elevated railroad have already been awarded, and for some months the commission has been negotiating with the company for the required easement. The commission and the company have not been able to agree as to the value of the easement. The commission, therefore, decided to modify the route by continuing the elevated railroad from Tenth Avenue through Thirty-seventh Street to Gravesend Avenue, thus avoiding the company's right-of-way. Route No. 64 provides for this modification.

Interborough Rapid Transit Company, New York, N. Y.—Bids for track-laying in the Lexington Avenue subway were opened during the week by the Public Service Commission for the First District of New York. The contract is divided into three parts, namely, the Lexington Avenue line, the Jerome Avenue line and the 149th Street loop. The city will furnish rails and other track materials and the contractor will be required to do only the work of installation. He must begin work on the Jerome Avenue line and the Lexington Avenue line within thirty days after the delivery of the contract, and must complete the tracks on Jerome Avenue within six months and on the Lexington Avenue line and 149th Street loop within nine months after the delivery of the contract. The lowest bidder was the Empire Construction Company at $276,433.

Toronto (Ont.) Civic Railway.—Bids will be received by the Board of Control, City Hall, until 12 o'clock noon on March 14 for the supply and delivery of special track work for the St. Clair Avenue carhouse.

Lehigh Valley Transit Company, Allentown, Pa.—Among the improvements to be made by this company is the double-tracking of its line between Bethlehem and Easton. An order has been placed by the company for automatic signal equipment covering every line of the company not heretofore equipped with automatic devices. These include the local lines in Allentown, Macungie, Nazareth, Egypt and Easton.

Philadelphia, Pa.—It is reported that the construction of the steel superstructure for the elevated railway on Frankford Avenue will be begun on April 1 and it is estimated that the line will be placed in operation nineteen months later.

Vercheres, Chambly & Laprairie Tramway, Montreal, Que.—The railway committee of the Legislative Assembly on Feb. 24 passed the bill to incorporate the Vercheres, Chambly & Laprairie Tramways Company. The company will operate electric lines in St. Lambert, Longueuil, Boucherville, Varennes, Vercheres, Chambly, Chateauguay and Laprairie parishes, and has power to enter Montreal through agreement with other companies. One important change was made regarding route. The plan of the promoters proposed to construct the line within 2 miles of Boucherville. Dr. Desaulniers, deputy for Chambly County, insisted that it be located nearer, and it was fixed at 1 mile from the parish church of the town. It was also provided that in cases where municipalities would not allow the railway entrance that the Quebec Public Utilities Commission could be appealed to for arbitration. [Feb. 5, '16.]

Charleston-Isle of Palms Traction Company, Charleston, S. C.—This company reports that it would like to receive information relative to amusement attractions for a beach resort. W. W. Fuller, general superintendent.

Citizen's Street Railway Association, Clarksville, Tenn.—The organization of this company, which has recently taken over the Clarksville & Dunbar Cave Railway, has been completed. Work of clearing the track will be begun shortly and the road will be placed in operation as soon as possible.

Tacoma Railway & Power Company, Tacoma, Wash.—Details of the damage done by recent storms to the tracks and equipment of the Tacoma Railway & Power Company are not yet known, but engineers for the company state that a conservative estimate places the total at $25,000. The greater part of the damage was to the tracks. An expenditure of $5,300 will be made immediately to repair some of the damaged pavement.

Milwaukee Western Electric Railway, Milwaukee, Wis.—An increase of $1,250,000 in the capital stock of this company was voted at its annual meeting. [Feb. 5, '16.]

SHOPS AND BUILDINGS

Jamestown, N. Y.—Tentative plans are being made by the traction interests of Jamestown for the construction of a large union trolley terminal at West First and Washington Streets. Certain street changes have been suggested to the City Council before the plans can be carried into execution. Plans which have been submitted to the City Council call for the completion of the improvements within two years after the street changes have been made.

Jamestown, Westfield & Northwestern Railway, Jamestown, N. Y.—The Kellogg Iron Company, Buffalo, has begun construction on a new carhouse for this company at Jamestown.

New York, N. Y.—Bids will be received by the Public Service Commission for the First District of New York until March 9 for station finish work on seven stations of the new Broadway subway. The contracts for the work will be let as soon as possible to permit the completion of the work so the subway can be placed in operation next spring as far north as Twenty-eighth Street. The stations for which bids will be received extend from Morris Street and Trinity Place on the south to and including Union Square on the north.

Toronto (Ont.) Suburban Company.—Plans of new offices and waiting rooms to be erected on Keele Street near Dundas Street have been approved by this company. The cost is estimated at $10,560.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company reports that it expects to build a new carhouse and repair shops.

POWER HOUSES AND SUBSTATIONS

Southern Illinois Railway & Power Company, Chicago, Ill.—This company is installing new power plant equipment consisting of an Allis-Chalmers turbine generator of 5000-kw. capacity. The boiler equipment will be enlarged to correspond with the generator improvement. The boiler room will be extended about 50 ft.

Wisconsin Railway, Light & Power Company, Winona, Minn.—This company will erect a new and modern steam reserve station in Winona to take the place of the present emergency plant. The proposed new plant will cost $200,000.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—This company has purchased the power plant of the Crawford County Gas & Electric Company at Crestline. Improvements and changes will be made in the plant.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio.—This company has recently placed a contract with the General Electric Company for a 1000-kw. turbine.

Lehigh Valley Transit Company, Allentown, Pa.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for a 10,000-kw. steam turbine to be installed at its Front Street power house at Allentown. An order has also been placed with this company for several 60-cycle converters to be installed at the substations at Catasauqua, Siegersville and Slatington. The 25-cycle rotary converters will be taken out of these substations and will be installed in new substations to be erected on the top of the Lehigh Mountain and at Quakertown. The substations at Ambler and Fort Washington will be increased by the addition of new rotary converters. This equipment was referred to in a general article on Lehigh Valley improvements published in the ELECTRIC RAILWAY JOURNAL of Feb. 19, page 376.

Carbon Transit Company, Mauch Chunk, Pa.—Extensive improvements are being made to the power plants of this company at Hacklebernie and East Mauch Chunk. New engines and generators are being installed.

Manufactures and Supplies

ROLLING STOCK

Lincoln (Neb.) Traction Company is building four cars.

Sioux City (Iowa) Service Company is building fifteen cars.

Hutchinson (Kan.) Interurban Railway is building three cars.

Berkshire Street Railway, Pittsfield, Mass., is constructing a convertible car in its shops.

Washington (D. C.) Interurban Railway is reported as expecting to purchase new cars.

Grand Rapids (Mich.) Railway is building an electric locomotive in its shops.

Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich., is reported as being in the market for additional cars.

Rockland, Thomaston & Camden Street Railway, Rockland, Me., has ordered one closed car body from the Laconia Car Company.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., is reported as considering the purchase of twenty-five or thirty cars.

Bangor Railway & Electric Company, Bangor, Me., has ordered three center-entrance cars with radial trucks from the Laconia Car Company.

City Light & Traction Company, Sedalia, Mo., is reported as having ordered seven light Haller-type cars from the American Car Company.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., is reported to be in the market for several interurban passenger cars.

Cumberland & Westernport Electric Railway, Cumberland, Md., has increased its recent car order from the Southern Car Company from three to five cars.

Boston (Mass.) Elevated Railway is reported as expecting to purchase some new cars for elevated service, in addition to the surface cars for which it is now in the market.

Cambria & Indiana Railroad, Colver, Pa., has ordered an additional storage-battery car from the Railway Storage Battery Car Company, as noted elsewhere in this issue.

Harrisburg (Pa.) Railways is reported as considering the purchase of seven new cars. This news was received as this paper was about to go to press and has not been confirmed.

Albuquerque, (N. M.) Traction Company is reported as expecting to purchase at once additional cars for use on its new University line which is expected to be in operation on June 1.

Johnstown (Pa.) Passenger Railway, noted in the ELECTRIC RAILWAY JOURNAL as expecting to purchase ten double-truck cars, has ordered this equipment from the St. Louis Car Company.

West Penn Traction Company, Pittsburgh, Pa., is reported as having ordered from the Cincinnati Car Company seven city cars for Wheeling, W. Va., and six interurban cars for the Connellsville line.

Kankakee & Urbana Traction Company, Urbana, Ill., has purchased two gondola cars from the St. Louis Rail & Equipment Company. This railway company is also in the market for an express car.

Tri-City Railway, Davenport, Iowa, has re-entered the car manufacturing business and has just completed the first cars of a small order for the Iowa Railway & Light Company, Albia, Iowa. The cars have single trucks and are equipped with sliding doors and folding steps.

St. Paul Southern Electric Railway, St. Paul, Minn., announces that it is in the market for eight passenger cars, one electric locomotive and one snowplow. All correspondence regarding this equipment should be addressed to W. L. Sonntag, general manager, 1127 Merchants' National Bank Building, St. Paul, Minn.

Massachusetts Northeastern Street Railway, Haverhill, Mass., lost eight closed cars and four open cars, two four-motor plows and two service cars in a fire which destroyed its carhouse in Merrimac on Feb. 29. A report states that orders for new cars have been placed.

Chicago, Lake Shore & South Bend Railway, South Bend, Ind., has purchased two 72-ton Westinghouse-Baldwin electric locomotives, equipped with four 190-hp. motors capable of pulling a 6000-ton trailing load. This company has also ordered seven 50-ton composite gondola, two 50-ton float and nine 40-ton steel frame box cars from the Western Steel Car & Foundry Company.

TRADE NOTES

Curtain Supply Company, Chicago, Ill., has received an order to equip with ring fixtures and Rex rollers the Pantasote curtains provided for the 200 new city cars ordered by the Pittsburgh (Pa.) Railways.

U. S. Metal & Manufacturing Company, New York, N. Y., has transferred its Southern office from Atlanta, Ga., to the Munsey Building, Washington, D. C. J. T. Martyn, formerly with the Pressed Steel Car Company, has been appointed manager in charge, succeeding H. K. Porter.

Ohio Brass Company, Mansfield, Ohio, has received an order for 40,000 third-rail insulators from the New York Municipal Railway, Brooklyn, N. Y., and for 3000 35,000-volt transmission insulators to be used for replacement purposes by the Havana Central Railroad, Havana, Cuba.

Ohmer Fare Register Company, Dayton, Ohio, on Feb. 28 held a dinner which was given by the president, John F. Ohmer, to his employees. The dinner was followed by addresses, and a distribution of $200 in prizes, a regular custom of the company, for employees making the best suggestions for the betterment of the company's system and plant.

Holden & White, Chicago, Ill., is the name of a new firm formed by R. R. Holden, formerly with the Wesco Supply Company, St. Louis, Mo., and lately a manufacturers' agent in Chicago, and W. McK. White, formerly sales manager of the Esterline Company, Indianapolis, which will represent a number of manufacturers of high-grade railway materials and equipment. This firm has affiliated representatives in fifteen cities in the United States and Canada, and in addition to personal visits will conduct merchandising campaigns for the various manufacturers it represents. At present this firm is located at 39 South La Salle Street, Chicago, Ill.

Lauren J. Drake, Jr., resident manager at Indianapolis of the Galena Signal Oil Company, on Feb. 23 was elected vice-president and director of that company. He will move to New York shortly. Mr. Drake is a native of Iowa, where he was born in 1880, and in 1900 went to work in the Whiting, Ind., refinery of the Standard Oil Company. His experience there included work in all of the divisions of manufacturing and selling. Later he was appointed manager of the Republic Oil Company at Columbus, Ohio, and for the last eleven years he has been resident manager of Galena Standard Oil Company at Indianapolis. Mr. Drake has attended many electric railway conventions and has a large number of friends among electric railway operators.

ADVERTISING LITERATURE

Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a folder which contains illustrations of some of its representative outdoor, indoor and portable substations.

Cleveland Battery & Electric Company, Cleveland, Ohio, has issued a folder describing Hywatt dry battery cell, suitable for use with car buzzer systems and for other uses. In the construction of this battery the familiar round type of zinc container is abandoned and a flat type is adopted, similar to the lead plate construction of the storage-battery cells. In the round cell the zinc container, which is the fuel supplying the electrical energy, becomes thinner with use and will eventually be eaten through in spots. The cell is then rendered useless and the remaining zinc and other materials become waste products. In the flat type, however, the zinc sheet can be entirely consumed and will deliver current up to the last. The cell, owing to its greater depolarizing area, maintains a higher voltage under load than the round cell.

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PREPAREDNESS IN THE SCHOOLS

A combination of the boy scout and safety-first idea for schools, which has proved very successful in Brooklyn, is being advocated by Col. E. C. Spring of the Lehigh Valley Transit Company before the school board at Allentown, Pa. Briefly, the idea is to have a safety patrol for each school, consisting of ten or twelve of the larger boys who would reach the school earlier than the rest and would station themselves outside of the building where accidents might occur, as at street intersections, and guard the younger children from accidents. Such a plan would be beneficial not only to the younger children, but to those who participated in this guard duty by giving them a sense of responsibility under direction in the performance of an honorary duty. Such service is enjoyed by the average boy, as shown by the boy scout movement as well as by the practice in some schools of having military battalions, and is the foundation of the plan now current of introducing a regular system of military drills into more of the schools. The only question in matters of this kind is in keeping up the *esprit de corps*, but this would have to be the task of the director in charge of the work. The Brooklyn plan is one which should commend itself to school principals, as it would be of benefit to all concerned.

ON PRYING GOOD COPY LOOSE

The men in an electric railway system who have to do with the physical equipment are not as communicative regarding their work as are those in departments in which publicity is a natural and, in some cases, necessary part of the work. This is not due to their unwillingness to give out, for the benefit of others, the results of experience and study, but rather to the fact that they consider "doing things" to be more important than telling about them. And yet, if the industry is to advance, there must be interchange of facts and views through the technical press. The difficulties in the way of prying loose the information that practical men most prize are humorously referred to in a letter from S. L. Foster printed in last week's issue. Mr. Foster is a railway pioneer who has solved many difficult equipment problems. Moreover, he has shown his willingness to practise what he preaches by furnishing to our equipment columns several suggestive articles describing devices which show originality, practicability and adaptability. While Mr. Foster has not used many words in his letter he has said a great deal, and we commend his suggestions to our present and prospective contributors.

STANDARDS SHOULD CHEAPEN COST

Of late there has become evident a rather widespread belief that full advantage is not being taken of the standards established by the American Electric Railway Engineering Association. From a technical standpoint the practice outlined in the Engineering Manual of the association is literally invaluable. It is developed not only at considerable direct expense to the association, but also at great personal effort on the part of the committee members, whose selection, because of their intimate knowledge of the various phases of the industry, gives each report a technical value unsurpassed by any other source of information. Nevertheless, the association standards are not being universally used, and the incongruity of their lack of recognition is at least disquieting, especially because the smaller railways, for whose benefit the standards are particularly designed, have, as a rule, no standards of their own to interfere. On the larger roads local standards have been developed, and there seems to be a tendency to regard this fact as a sufficient reason for adhering to them in preference to the standards of the association. Here, perhaps, is a partial answer to the problem. The large companies, which are the large buyers, frequently do not buy according to association specifications. Instead, orders for standard material come from the smaller roads whose annual demands are insignificant, as witnessed by the pitifully small tonnage of rail rolled to standard design. Is there, then, any object for the manufacturer to sell association standard material by making attractive quotations on it? And is there any incentive for the small road to demand it when its use involves no visible return? We are inclined to doubt it, and as a corollary believe that the conditions are chargeable largely to the insular attitude of larger companies.

EFFICIENCY IN ADVERTISING

We published last week a letter from a purchasing agent regarding the vast amount of catalogs and advertising literature received by him and of its frequent duplication on account of being addressed from obsolete or inaccurate mailing lists. He wonders how much printed matter, postage and clerk hire is wasted because of these inaccurate and careless methods. He further wonders how many advertising pages could be purchased in trade periodicals with the money which is so wasted. Were it possible to arrive at such a comparison as this suggests, the figures would undoubtedly run to astonishingly large proportions. There is little conception of the enormous amount of advertising literature which comes through the mails to all electric railway officials. The manufacturer sending out such material rarely visualizes the fact that some hundreds of other manufacturers are mailing similar material at the same time. Advertising pages of trade periodicals, however short they may be of perfect efficiency, furnish at least these advantages. They come to the recipient in convenient form for reference. They are already classified and indexed for his convenience, and are therefore self-filing. They come to him in one size and one shape and so bound together that in one document he has ready reference to all sorts of subjects. They are certain to be addressed properly because the recipient is paying for his subscription and would be sure to complain if copies of the paper were not received. Finally, as these advertising pages come to him weekly, or at other regular intervals, he always has them before him when he is ready to buy, whereas circulars reach him at irregular intervals and may be received just after he has placed the order. Hence, trade paper advertisements have this trinity of virtues: They go where they are wanted, in the form they are wanted and when they are wanted. While the value of trade literature and catalogs cannot be questioned, the methods of their distribution seem fairly open to debate. A solution might be to use the advertising pages of the trade publication, in a more extended way, to advertise selling literature, with an increase of efficiency and results to all concerned.

UNCERTAINTY OF UTILITY INVESTORS

The article by Mr. Bauer published elsewhere in this issue should be of particular interest to electric railway operators because of the emphasis laid upon one point whose importance these days is becoming more widely recognized—*i.e.*, the necessity of relieving the investors' uncertainty in regard to the stability of public utility securities. Without a doubt the present chaotic state of utility valuations and restrictions on the rate of return has made investors display at least a hesitancy toward increasing their utility holdings, notwithstanding the sums needed for utility developments. If electric railways and other utilities are henceforth to be valued and have their rates regulated to give a certain return, it is highly necessary that the basis of valuation be more simplified and that a plan be adopted for an automatic control over the rate of return.

Like Mr. Bauer we are not inclined to argue here for any particular basis of valuation to begin the process of simplification, but merely to stress the fact that some definite, clear-cut basis ought to be selected. The one chosen should be liberal, taking full cognizance of past hazards and of what the investors might reasonably be supposed to have expected in view of the past indefiniteness of rate regulation. Yet it must be a compromise, too, for the utilities cannot afford to force the highest possible valuation endurable by the public, any more than the public can profit by insisting upon any policy not generally fair to existing investments. The whole problem is to look ahead, and in the light of future requirements select a valuation basis for all companies that will in the sum total give substantial justice to existing properties.

As regards the rate of return to be allowed under Mr. Bauer's plan, we wish to emphasize the point that electric railways should be recognized as hazardous undertakings. Even their monopolistic features, as far as railway operation is concerned, have not rendered them immune to labor troubles, charges for obsolescence due to changes in the art or the competition of private automobiles and jitneys. Still another hazard is the possibility of the future municipal purchase of the line at a depreciated price. As citizens we hope this danger is not great, but it is one which the investor naturally will take into consideration. This factor of risk should receive due weight in establishing the rate of return.

Anyone who believes that the electric railway business, owing to its monopolistic character, is free from financial problems and dangers need only look over the statements of the companies for the past twelve months, as reported in our financial columns, and to read the analyses of conditions which are presented in our pages from week to week. If any more concrete statement is desired he can consider the petition just presented by the California roads to the Railroad Commission in that State, asking for assistance in the solution of their financial problems, brought about mainly by the jitney, by antiquated franchises and by the increasing burden of taxation.

Again, we are firmly of the opinion that some sort of a bonus plan for good management without any municipal guarantee of the return would constitute the most proper and equitable method of dealing with the investor. To our mind the support of utility operation through the taxing power, so as to relieve the company from the responsibility to its stockholders of earning the allowed return would be inadvisable, for the city would be doing what it was never created to do—paying for service to a few citizens by taxing all, or possibly burdening all with the results of utility inefficiency of management. The utility itself should be made responsible for earning the return, and since this would be known in advance the investor could enforce the recognition of the risk involved. But some bonus or profit-sharing scheme should be adopted in regard to any excess over the return allowed, for this is the best earnest of efficiency in management and honest accounting.

The plan outlined by Mr. Bauer in its general principles is not new. Several electric railway companies are now operating under franchises which provided for a revaluation and a regulated return with bonus for good management. The results on the whole have been satisfactory. His plea is for an extension of the idea, and we believe that some such plan is well worthy of consideration at least where resettlements are necessary. In all cases, however, the points already mentioned should be observed and the equity of the railway company as regards the value of its property and a fair rate of return on it should be protected.

PUTTING SNAP INTO THE FREIGHT BUSINESS

The 1915 report of the committee on freight and express traffic of the Transportation & Traffic Association contained some statements which merit more than passing attention during these times of stress in the electric railway business. The committee urged that if relatively the same expenditures were made for freight equipment, facilities and advertising as for these elements of the passenger business the freight business would show a much larger increase. That this statement was founded on fact is illustrated by the experience of the two Maine companies described in an article by F. E. Wood, their general freight agent, in this issue.

The rapid increase in the freight business of these companies and the fields which are opening up for the creation of new business have proved to be sources of encouragement and inspiration. Under such conditions initiative and originality are stimulated, and unexpected problems of unique character present themselves for solution. Take for example the potato situation mentioned by Mr. Wood. With soil and climate favorable for potato culture the farmers were not raising potatoes on any considerable scale, because of obstacles which were readily surmountable under suitable leadership. These farmers might have got together and organized for co-operative storage and distribution, much to their own profit. But organizing talent which is so vital to the electric railway is not lying around loose on the farm, although it is being developed greatly in some sections through agricultural education. It remained in this case for the electric railway to step in and take the lead. If the response is as good as it promises to be, the community will have a new industry and the railway a new source of traffic.

One feature of the electric freight and express business which appeals to us as a fundamental reason for its continuing strength is that the electric railway is by its very nature equipped to do certain business that the steam roads cannot do or can do only at a loss. This might be termed the "retail" end of the freight business. Frequent and speedy service in the transportation of shipments of moderate size is a special business, and the ponderous steam-hauled train is not adapted to it. The electric freight organization can relieve, or rob if you please, the steam road of this work on one hand, and can build up an original business on the other, and can profit greatly thereby.

During a few years past the electric railway income from passenger business has dropped off, or at best has increased slowly. Jitney competition has had a transient influence in depressing passenger income, and the private automobile will always be with us. The forces which have acted to render the automobile a permanent rival of the trolley car are not effective in the freight and express field. Competition exists here, to be sure, but it is economic competition, and the best service for the least money will win. And in certain lines the electric railway can furnish the best service if it will go after the business.

ELECTRIC RAILWAY NEEDS IN CALIFORNIA

Considerable significance attaches to the communication just sent to the Railroad Commission of California by a committee representing practically every electric railway company in that State and which sums up the urgent needs of the situation which these companies now face. An abstract of the communication appears on another page. California is now enjoying very prosperous conditions in many lines of industry, but it would seem that a crisis is at hand for the electric railways, nearly all of which have suffered severely from several contributory causes in the last year or two. If their affairs can now be shaped to suit conditions, if such franchise rehabilitation and regulatory measures as are needed can be secured, there will be opportunity for the electric railways to share in the improved financial conditions. It is well known, however, that any change in legislation or regulation which will make conditions easier for the public utility corporation, is not easy to secure nowadays, and the desired results, therefore, cannot be expected unless the need is made very clear to legislative bodies and is backed up by proof that the action desired is entirely fair. The fact that all the various companies are giving united support to this matter and have prepared for the commission a statement and request on which there is unanimous agreement, is in itself evidence that there is an urgent need for remedial measures, and that such measures would benefit all alike. Briefly, the companies ask for regulation for the jitneys, some workable form of franchise, such as one with an indeterminate term, and relief from burdensome and wasteful taxation requirements, such as the paving tax. The idea of indeterminate franchises was not received with favor some years ago because it did not then fit in with the general plan under which electric railways operated, but under present conditions, with commission control to regulate company finances the matter takes on an entirely different aspect, and the old plan of granting franchises for stated periods may very well work only hardship on all concerned.

The situation now is that if strict regulations are to control the operations of a public utility, and at the same time permission to grow and to meet the changing conditions of the times is withheld, the organization must very soon collapse. Certainly no such condition is desired for electric railways in California by the public, by the Railroad Commission or by any other legislative body. The facts of the serious difficulties which the California companies now face have been frankly stated and the commission is asked to investigate on its own account. This is a critical time for the public utilities involved, and we trust that the promised investigation of the subject by the Railroad Commission will bring with it some means of relief. If the commission is willing, in addition to enacting measures that regulate corporations, to extend those corporations help when this can be done in fairness to all, there is now an excellent opportunity for demonstrating such a policy.

L.A.&W.ST.RY.
FREIGHT &
EXPRESS
500

BUILDING UP A FREIGHT BUSINESS—TYPICAL LUMBER TRAIN, TURNER (ME.) LINE, L. A. & W. ST. RY.

How One Electric Railway Is Building Up Profitable Freight Traffic

The Cumberland County Power & Light Company and the Lewiston, Augusta & Waterville Street Railway Have in a Year Developed a Gross Freight Business of More than $100,000—Prompt Service, Convenient Terminal Facilities and Co-operation with Producers and Shippers Were Factors in This Achievement

By F. E. WOOD
General Freight Agent Cumberland County Power & Light Company, Portland, Me.

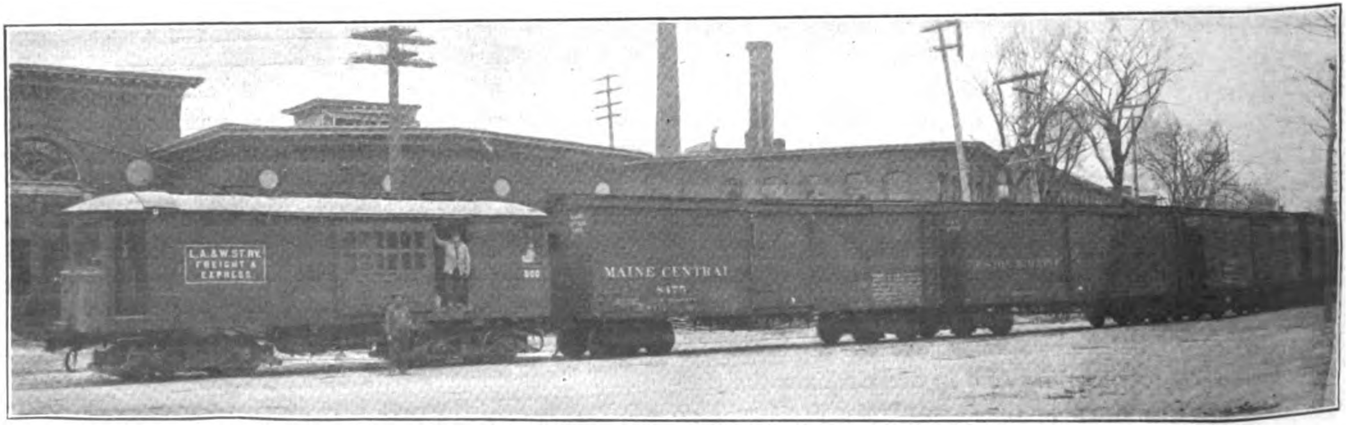
ON Dec. 1, 1914, the Lewiston, Augusta & Waterville Street Railway and the Cumberland County Power & Light Company made definite arrangements to take over the operation of express cars over their lines on Jan. 1, 1915. Previous to this time service was given through an express company, which made all rates and handled all operations, paying a proportion of its revenue to the railroad for the use of cars and track, for power and for the wages of motormen. The class of goods handled represented express shipments of light weight at high rates, and the development of freight service at freight rates was neglected excepting that a few carload shipments of lumber were handled around Lewiston.

When the railroad took over the operation, freight service at freight rates, governed by the official classification, was established. It was soon found that many of the past practices resulted in confusion, an example being the making of rates at any time without record by local agents. It was impossible to obtain records of special rates issued by these agents, and the whole organization lacked a uniformity which was later established only after months of effort.

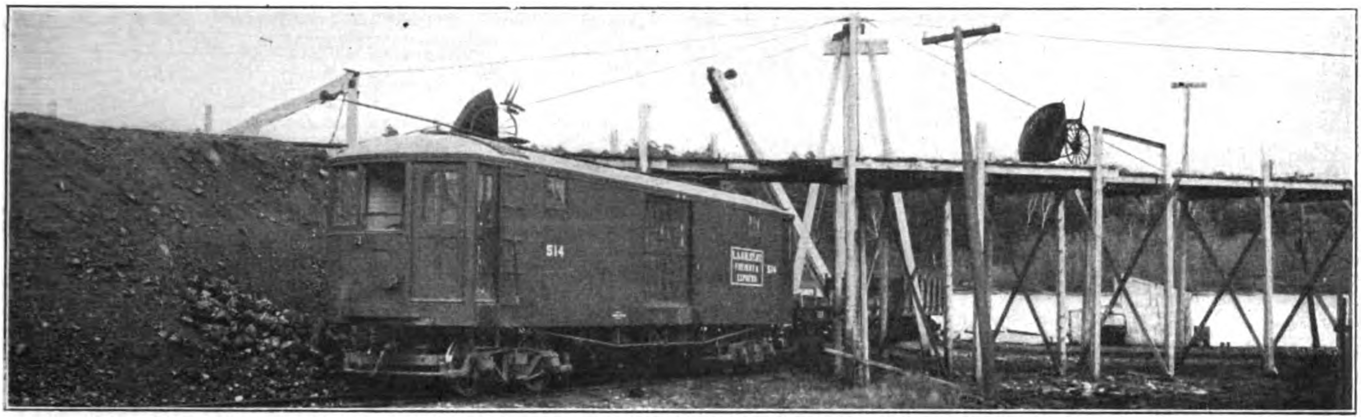
Along with many other handicaps were the equipment, which was old and worn, and the terminal facilities in large towns, where the business was handled at many points from the middle of the streets. However, in spite of these handicaps, by the introduction of freight rates and fast and frequent service, together with solicitation of business, the freight receipts in April exceeded those of January by seven times, increasing each month without fail thereafter, and the first year's operation produced a gross revenue to the company of $102,904.52.

FREIGHT SERVICE AND EQUIPMENT

Electric freight service operating over these properties covers approximately 175 miles of line through manufacturing and farming territory, serving a population of more than 235,000. The principal cities served are Portland, Lewiston, Auburn, Augusta, Brunswick, Waterville, Bath, Biddeford, Saco, Gardiner and Hal-



BUILDING UP A FREIGHT BUSINESS—SWITCHING STEAM RAILROAD FREIGHT CARS IN LEWISTON, ME.



BUILDING UP A FREIGHT BUSINESS—COAL DOCK AT HALLOWELL ME., SHOWING FREIGHT CAR AND TRAILERS

lowell. In addition there are a number of smaller towns and villages between which the territory is principally agricultural, while certain sections also furnish lumber, granite and gravel.

The service consists of regular scheduled runs to all points from the three most important centers, Portland, Lewiston and Augusta, with fast and frequent service as required by the demands of the territory. This service takes care of the less-than-carload shipments of fruits, vegetables, meats, groceries, hardware, dry goods and all other commodities drawn from the larger centers to the smaller cities and towns. The heavier commodities, such as livestock, canned factory products (vegetables and fish), coal, lumber, cord wood, stone, gravel, brick, etc., are handled by trail cars, hauled by the regular motor cars used in taking care of the less-than-carload freight. These cars are fitted with M. C. B. radial couplers and automatic air brakes.

The equipment consists of thirteen motor cars, twenty-nine flat trailers, two box trailers, and two small four-wheel trailers. The locomotive motor cars are of 60,000 lb. capacity, 40 ft. in length, and they are electrically heated. The flat and box trail cars are of 60,000 lb. capacity, and their length is 35 ft.

CHARACTERISTICS OF THE BUSINESS

Every effort is being made for the satisfactory handling of high-class freight, as this portion of the business is steady the year through, while the carload work is heaviest during the winter months. Lumber is hauled to the line to better advantage on sleds and the market is better in the winter. The crops of the previous summer are held by the farmers for good market prices and shipped in greater part between November and May. The flow of freight is, in greater part, less-than-carload from the larger points, the carload shipments coming to the cities and towns. The inward freight consists of apples, potatoes, hay, cord wood and lumber.

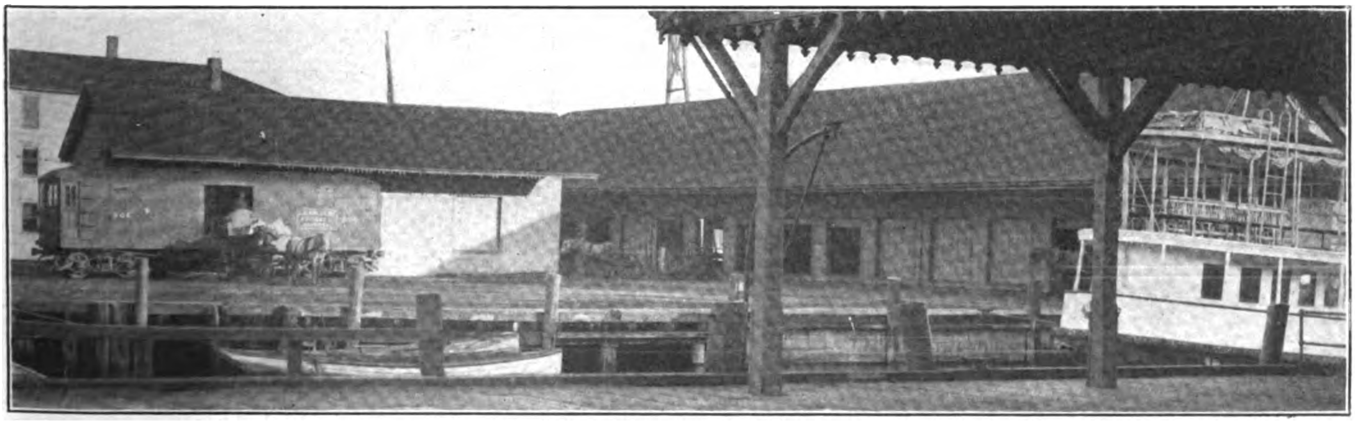
Connections with the steam railroad at outlying points permits the handling of steam freight cars at various sidings along the country lines, thus giving the farmers a means of shipping through to distant points without transfer of goods. Connections and through rates with boat companies permits shipping and receiving goods from Boston and New York via water.

Express service, including pick-up and delivery of package freight, is handled over the lines in the regular freight cars under an agreement with an express company, the railroad not being a party to this service other than transporting the goods for the express company.

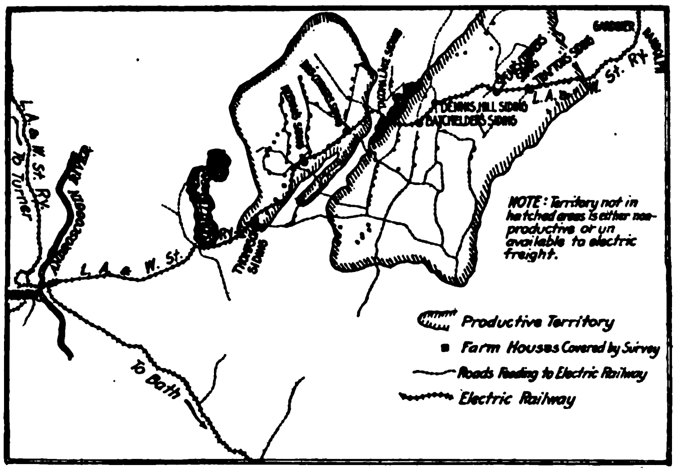
Comparison of the population of the territory served with that of street railroad properties in other sections of the East would lead to the conclusions that a small business would be all that could be expected. However, the character of the country is such that on the Lewiston, Augusta & Waterville division, with the fewest inhabitants per mile of track, the freight is heaviest, this being especially true of the easily handled carload business. It follows that a conclusion as to the amount of business to be expected cannot be drawn from an estimate of the number of people to be served.

HANDLING L.C.L. FREIGHT

While the carload business is attractive and remunerative, the revenue is not all derived from that source; in fact, few carload lots are moved that are not accompanied by a motor car packed with less-than-carload freight. Located a considerable distance from large metropolitan centers, the territory is necessarily self-supporting to a considerable degree. This condition has led to the establishment of wholesale houses exceeding in size those of larger cities not similarly located. Portland is the most important distributing center,

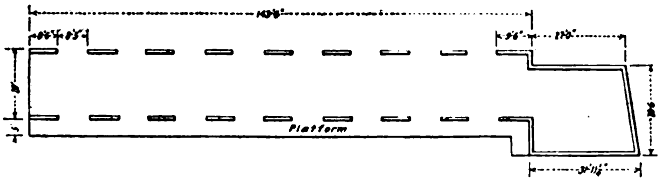


BUILDING UP A FREIGHT BUSINESS—L. A. & W. ST. RY. FREIGHT HOUSE AND CAR ON EASTERN STEAMSHIP DOCK, BATH, ME.


L. A. & W. St. Ry. To Turner
Androscoggin River
L. A. & W. St.
To Bath
Thompson Siding
Dennis Hill Siding
Batchelder's Siding
L. A. & W. St. Ry.
Gardiner
NOTE: Territory not in hatched areas is either non-productive or unavailable to electric freight.
Productive Territory
Farm Houses Covered by Survey
Roads Feeding to Electric Railway
Electric Railway

BUILDING UP A FREIGHT BUSINESS—MAP OF DISTRICT COVERED IN RECENT FARM SURVEY, L. A. & W. ST. RY.

therefore the greater portion of less-than-carload freight is handled at that point. All near-by towns are covered by two trips daily, in some cases three. The long-run service consists of a through train each night from Portland carrying freight for Lewiston, Gardiner, Augusta and Waterville. Goods shipped on this car arrive at night or in the early morning, and are on delivery at 9.30 a. m. at the Waterville terminus of the line. Lewiston is the second center as regards quantity of less-than-carload goods forwarded, but it is first in producing carload lot business, trains of three to five cars being no unusual sight.

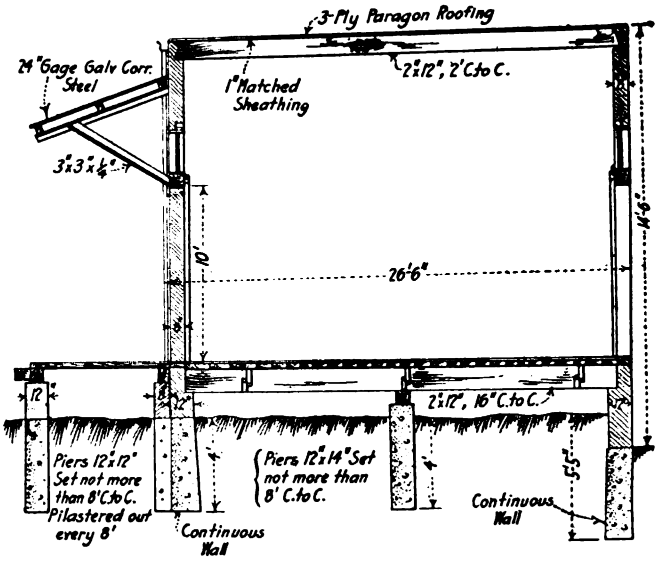

9'6"
Platform

BUILDING UP A FREIGHT BUSINESS—OUTLINE PLAN OF FREIGHT TERMINAL IN PORTLAND, ME., C. C. P. & L. CO.

ORGANIZATION OF THE FREIGHT DEPARTMENT

The organization consists of a general freight agent, an assistant general freight agent, an auditor and a traveling representative, together with necessary agents, clerks and car men.

The general freight agent, located at Portland, has charge of all operations in the freight department, including accounting, schedules, claims and filing of tariffs. The assistant general freight agent has charge of the detail operation and of the men on the Lewiston, Augusta & Waterville division, and has a voice in the general plan and method of all operations. The auditor is directly under the general accounting office, but the freight accounting is taken care of by the freight auditor in the general freight agent's office and under his direction.

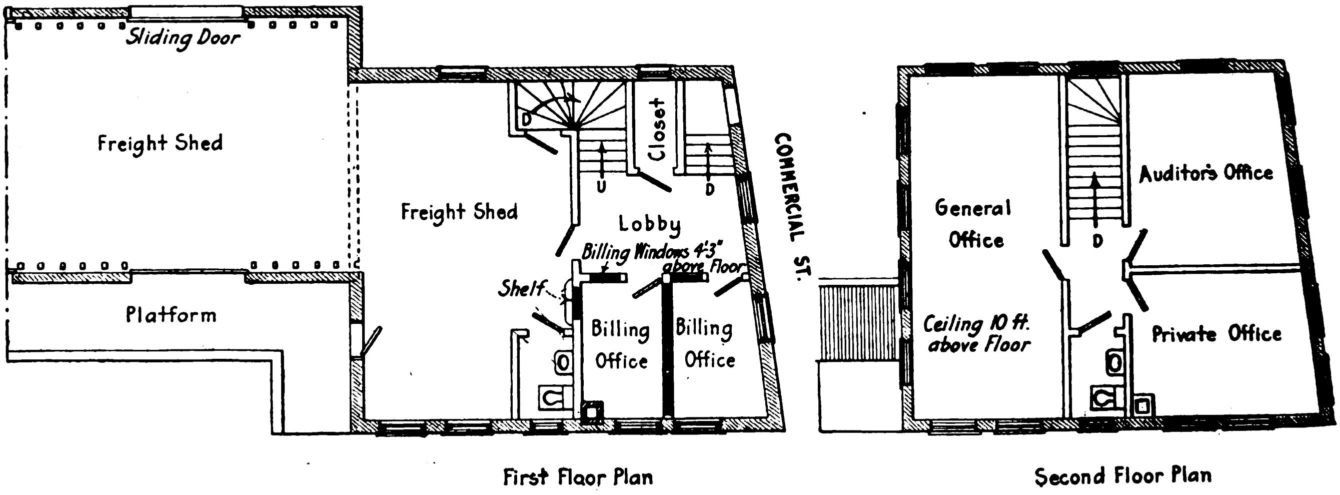

3-Ply Paragon Roofing
24" Gage Galv. Corr. Steel
1" Matched Sheathing
2"x12", 2' C. to C.
3"x3"x¼"
10'
26'6"
14'6"
12"
8"
12"
2"x12", 16" C. to C.
Piers 12"x12" Set not more than 8' C. to C. Pilastered out every 8'
Continuous Wall
4'
Piers 12"x14" Set not more than 8' C. to C.
4'
5'5"
Continuous Wall

BUILDING UP A FREIGHT BUSINESS—CROSS-SECTION OF FREIGHT SHED IN PORTLAND, ME., C. C. P. & L. CO.

The system of accounting is built around the use of unit system single waybills, made in five copies at one writing on a billing machine, distributed as follows: Copy No. 1 is used for making forwarded reports, and is sent to the auditor; copy No. 2 is the freight receipt and accompanies the goods; copy No. 3 is the freight bill for collection; copy No. 4 is the waybill and is forwarded to the reporting station under cover, from which the received report is made, and copy No. 5 is the forwarding office copy, filed in numerical order. Daily reports are forwarded to the auditor and a balance is made monthly.

Reports for the whole line are made only at designated stations, which are the larger points, seven in number. The waybill shows the point on which a shipment is to be billed for reporting, also the point of actual destination, the latter point being the destination of the goods to which the rate is shown.

The billing point is determined through the use of


Sliding Door
Freight Shed
Platform
Freight Shed
Closet
U
D
D
Lobby
Billing Windows 4'3" above Floor
Shelf
Billing Office
Billing Office
COMMERCIAL ST.
First Floor Plan
General Office
Ceiling 10 ft. above Floor
D
Auditor's Office
Private Office
Second Floor Plan

BUILDING UP A FREIGHT BUSINESS—PLANS OF HEAD HOUSE OF FREIGHT TERMINAL IN PORTLAND, ME., C. C. P & L. CO.

the next reporting station beyond the actual destination of goods. The practice does away with the delay and errors experienced in securing reports from agents, who in smaller towns cannot devote all of their time to the freight business, having other work to do. It also permits the company to maintain agencies at a small expense, which could not be done if numerous reports were required from the man in charge of the station.

NEW FACILITIES FOR HANDLING FREIGHT

As the business has developed the need for stations, sidings and cars became pressing and, as the "child seemed worthy of its keep," the company dealt generously with the freight department. The car equipment and other facilities have been greatly increased, including the building of new freight houses in Lewiston, Augusta, Gardiner and Portland.

At Lewiston a frame freight shed, 80 ft. x 20 ft. in size, was completed in June, 1915. Within sixty days negotiations had to be opened for the purchase of additional land. At the present time there are two freight houses in Lewiston, the second one being 100 ft. x 20 ft., with a yard 75 ft. wide and 300 ft. deep. At the rear three yard tracks, each approximately 100 ft. long, are used for delivery of carload freight. Confusion incident to the use of one shed for inward and outward freight is avoided by designating one house to receive freight to be forwarded and the other for freight on hand to be called for.

At Portland the business was handled in a shed 110 ft. x 35 ft., having the track inside the building. This allowed a floor space of 90 ft. x 24 ft., with a 90-ft. x 6-ft. platform on the team side. This building was erected a number of years ago by the street railway and used until recently by an express company. After six months of use as a freight house the congestion became such that the company was compelled to figure on larger quarters.

As the old building was remote from the wholesale district and on a steep grade, it was deemed advisable to secure a location which would eliminate a long, difficult haul. A lot, 69 ft. x 269 ft. in dimensions, was therefore selected on Commercial Street, running through to Fore Street. A wider lot would have been acceptable, but owing to the congestion of business houses and wharves, difficulty was experienced in securing even the allotment mentioned.

THE NEW FREIGHT HOUSE IN PORTLAND

The new freight house is of brick, 25 ft. wide and 170 ft. long, including platforms. The plans are reproduced herewith. The head house is two stories in height, the general freight agent, auditor and agent having offices on the second floor. Two small billing offices, a supply closet and a hall are located downstairs.

THIS CAR IS LOADED WITH
HUSTON'S CRACKERS
MADE IN AUBURN, ME.
SCUIT
EXPRESS

BUILDING UP A FREIGHT BUSINESS—UTILIZING A LOADED EXPRESS CAR FOR ADVERTISING PURPOSES

One billing office has a window opening into the freight shed, delivery bills being issued through this window to customers calling for freight.

The offices are sheathed and plastered, and fitted with a semi-indirect electric lighting system, doing away with the necessity for desk lamps. A lavatory is located on each floor, and heat is furnished from a steam plant located in a small cellar under the front of the building. The agent's office overlooks the yard, enabling him, from his desk, to see teams loading or unloading freight.

The track comes in from a siding on the street, and runs along one side of the building, extending about 50 ft. beyond the rear platform. The siding in the street is used only by freight cars, thus permitting any shifting or placing for loading that may be desired. On account of the extensive use of "low gear," underslung wagons the height of the team side of the receiving platform was made to vary from 18 in. to 47 in. by suitably grading the yard. As the filling for the yard was placed in freezing weather, it was covered with 3-in. planking to avoid difficulty when the frost leaves the ground. This planking is to be removed next summer and replaced by granite block paving.

The freight-shed floor is double, of ½-in. spruce laid on 3-in. planking. The use of thin upper surface boards permits renewal without excessive cost when the floor becomes rough. All of the freight-house doors are of the sliding type, wooden construction, covered on the outside and the edges with heavy tin. The new shed was opened on Feb. 21, 1916, and is answering its purpose admirably.

DEVELOPING NEW BUSINESS

While the country served by this railway system is productive at the present time, the possibilities for an increase are large. A canvass of the outlying farms was recently made, and a card index of the information

L.A.&W.ST.RY.
FREIGHT DEPARTMENT
L.A.&W.ST.RY.
FREIGHT DEPARTMENT

BUILDING UP A FREIGHT BUSINESS—FIRST FREIGHT SHED IN LEWISTON, ME., L. A. & W. ST. RY., BUILT JUNE, 1915

BUILDING UP A FREIGHT BUSINESS—FREIGHT HOUSE IN AUGUSTA, ME., L. A. & W. ST. RY.

secured was prepared, showing in detail the information in regard to the size and products of each farm. The purpose of this survey was not alone to impress upon the farmers the shipping facilities of the railways, but also to secure general information which may be used by the company to formulate a plan for increasing productiveness by providing storage for large quantities of products until the market requires them. It was hoped also to assist in establishing a "farmers' exchange" at some large distributing point.

The canvass was made by a company employee during the early winter. He was furnished with a horse and buggy, and he put up at night with the farmers in the locality where he happened to be. A personal interview with each farmer was sought for the purpose of enlightening him as to the company's intentions and the means and facilities offered, making it clear that the company planned to do all in its power to aid the farmer.

The card index, with an accompanying map, shows the location of each farm, the name of the owner, his acreage, crops and stock, the length of his hauls to the electric road and to the steam railroad, his attitude toward the electric road, and his suggestions or criticisms regarding the plans outlined by the agent.

This work has proved to be valuable to the company for purposes of record, and has further resulted in the building of small shelters and platforms at country crossroads. It has established also the necessity for building lumber loading wharves in order to prevent the hauling of lumber several miles across our line to the steam railroad. In addition, land has been purchased at reasonable figures to which lumber may be hauled and stored while sledding is good, remaining there until a market is secured. This feature assured the electric road the haul when the shipment is made, and stimulated business by reason of the fact that sales are made locally instead of goods being sent out of the State.

"GETTING NEXT" TO THE FARMERS

To further interest the farmers a special car was sent over the line at an appointed time and all were invited to visit it. The general manager, general superintendent, general freight agent, assistant general freight agent and other employees accompanied the car and a general discussion and talk was given at each stopping point.

This "get-together" gave the farmers assurance directly from the road officials that the company was interested in their welfare and made clear to them the plans by which their interests were to be furthered. They were promised a reduction in the charge for hauling steam railroad cars, the handling of fertilizers and grains at low rates, the building of platforms and shelters where needed, a storage shed at one point for hay, lumber wharves, etc. The company also, as an experiment, promised to build a potato storage shed of 15,000 bushels capacity. The purpose of this shed is to stimulate the interest in potato raising, as the use of such a shed permits the farmer to hold his crops during cold weather until higher prices can be secured. Without this shed production is discouraged, as the crops must be moved and sold at the approach of freezing weather regardless of prices which the potatoes will bring. It is the intention of the company to build a small shed to start and, if the results are favorable, extensions will be made later.

A study of conditions revealed the fact that the soil and climate between Lewiston and Waterville are at least as favorable for the raising of potatoes as those of the Aroostook County district, located farther north in the State. Production in that country is heavy and has come about through having a "hand at the wheel," and the proper concentrated effort. It is felt that this company's modest start may be the means of injecting new life into the territory along its lines, and lead eventually to the development of a second potato raising section of importance in the State of Maine.

A PROFITABLE COAL-HANDLING PROPOSITION

The pursuit of new business by the department is not altogether along the line of agricultural products, as a new venture was added in the fall of 1915 in contracting for the hauling of 2500 tons of coal per year to a textile mill. This mill is several miles from a railroad so that the securing of fuel entailed excessive drayage charges. The mill officials agreed to the placing of a siding in their yard for the delivery of coal, if any saving could be offered as an inducement. Inability to make physical connection with the steam railroad necessitated the formulating of plans for the handling of the coal in the electric railway company's own cars, and the securing of the coal at tide water. The resulting arrangement involved the leasing of a dock, the placing of a spur track and the building of an elevated runway over which the coal could be wheeled and dumped when taken from the vessel. The coal is shipped to the mill trestle as needed. Loading from the pile is accomplished by means of an electric, endless-chain, bucket machine, which elevates the coal and drops it into gondola cars below. This venture has been successfully carried through and the possibilities of handling coal on a still larger scale are receiving attention.

GENERAL CONSIDERATIONS IN ELECTRIC FREIGHT HANDLING

As the facilities and equipment for handling freight improve the field of operation broadens, and the transportation of heavy carload material becomes a regular part of the work together with the smaller high-class freight. The elasticity and rapid movement create a demand on the part of the shippers for a means to ship through freight via electric to steam railroads or boat connections, allowing them to take orders up to the last minute and still have goods in the market on time.

The people are told by this company that the service to their towns will be what they make it. In other words, we can give towns two or more deliveries a day if they will support them, and it takes less business to support this service than to support equal service furnished by the steam railroad. This is true because the cost of operation of an additional car does not compare with that of an additional steam freight train. It is also a simple matter to vary schedules to suit the requirements at various points, and the ability to do this gives those concerned the elasticity of service desired.

Another feature of the electric freight service that appeals to the public lies in the fact that the organization, being a local affair, is able to give satisfaction without the complainant being sent here and there to different officials, being finally referred to some office located miles away. In such a case, on account of the expense and time involved, the matter must be taken up by correspondence, oftentimes without result through the peculiar ability of the complaint department to tire out the ordinary complainant.

In our case here in Maine it is safe to say that the short period of operation has given time for but a small portion of the possible development. The freight nearest and easiest of access has been our mainstay; but we feel that the limit of the prospect is still far removed, and that the future is laden with possibilities for heavier tonnage and increased earnings.

Relieving the Investor's Uncertainty

Terms for Employment of Private Capital in Public Service Should Be Defined—Author Discusses Automatic Control Through Fixing of Valuation and Rate of Return—Flexibility and Elasticity of Return—Single Valuation Basis Will Give Substantial Justice

By JOHN BAUER

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INVESTMENT conditions in railroad and other public utilities are in a chaotic state. This fact appeared clearly in the papers and discussion at the recent mid-year meeting of the American Electric Railway Association in Chicago [ELECTRIC RAILWAY JOURNAL, Feb. 5] as well as at the Conference on Valuation held in Philadelphia on Nov. 10-13, 1915, under the auspices of the Utilities Bureau [*ibid.*, Nov. 13 and 20, 1915.] At present investors do not know where they stand. Their rights are undefined; the burdens and restrictions placed upon the companies seem to be constantly increasing; investors are hesitating to furnish new capital for the public service. Construction and improvements have fallen off greatly in recent years, which undoubtedly has been caused to a considerable extent by the unclear methods of regulating rates and limiting the return on investments.

DIFFERENCE BETWEEN THEORY AND PRACTICE IN RATE REGULATION

In theory rate-making is a legislative function, which is especially delegated to a commission. Usually nothing is said in the law as to the control of return on investment. The rates fixed by the commission must be reasonable, and the principal test of reasonableness is that they must be high enough to cover operating expenses and bring a fair return on the property devoted to the public service. A lower schedule would be viewed by the courts as confiscatory and therefore unconstitutional.

The theory of the law sounds reasonable enough. The difficulty is that the theory has not been worked out in sufficient detail so as to form a clear and definite policy capable of exact and practical administration. It does not make clear what the valuation is upon which a return should be allowed; it does not fix an adequate standard by which a reasonable return may be determined, and particularly it provides no administrative machinery for the regular control of these matters. Every case must be considered by itself; a separate valuation must be made and a rate of return established. The investor's interest, therefore, appears directly antagonistic to the public or the consumers. Each step in the case furnishes ground for dispute; the company urges every possible claim for value and return, while the representatives of the public work for the lowest possible reduction of the figures. The hearings extend into months or years; huge volumes of more or less useless evidence are accumulated; finally the decision is a rough compromise, accomplishing little toward permanent determination of principle or method.

THREE WAYS OF STRAIGHTENING TANGLE

Something, it seems, should be done to straighten out the present tangle. We cannot continue indefinitely with such uncertain and cumbersome methods. The interest of the public, as well as that of the investors, demands that the confusion be cleared up. Construction and improvements have already been interfered with too much. There are three conceivable ways out of the present situation: (1) Give up the regulation of rates and return altogether, except for the prevention of gross discrimination; (2) turn to public ownership and operation, or (3) define the terms under which private capital is employed in the public service, *i.e.*, make clear the rules by which the control of return on investment is to be determined.

The first is really not a possible way. While it would undoubtedly be preferred by the corporations, so that they would be free to fix rates according to what the traffic would bear and make all the profits that they could, the public would not stand for such a step backward. Public utilities are recognized monopolies; competition is wasteful and foolish and is practically impossible to maintain. Monopoly is inevitable, but the public will scarcely be willing to offer itself up freely to exploitation.

The second way, government ownership and management, has been extensively discussed and is bound to be considered with increasing seriousness in the future. Many experiments have been tried; some have been very successful, but it is difficult to give a fair verdict as to the general results. Conditions in this country, however, do not appear especially favorable to a successful extensive trial of public ownership. It seems to be opposed to the mass of opinion and is unsuited to our political and administrative organization. While it may not be inherently unworkable, and it may very well be the method of operation that will finally become effective, it will require extensive and thoroughgoing reconstruction of public administration. It will necessitate a centralization of authority, and a continuity and permanence of position, which as yet we seem to consider inconsistent with democratic government.

The third way offers the only practical immediate solution of the unsatisfactory situation—namely, to define the terms under which private investment is made for public purposes. This would be in harmony with the general theory that has been applied to public utilities, *i.e.*, private ownership and public control, except that the investors' rights would be clearly determined.

NEED OF A DEFINITE POLICY.

In a sense, private utility investments are loans which are entitled to a return from the public. The difficulty is that when a loan has been made and the money has been irrevocably sunk in property, both the amount of the loan and the rate of return become indefinite quantities. While both the amount and the rate must be reasonable, they are not fixed in a business way, controlled by the usual methods of accounting, but are finally determined by the judgment of a commission. Suppose the government attempted to borrow money outright in this fashion, how many investors would trust their funds to such haphazard dealings? Could business men borrow capital under such loose terms?

Does it not seem surprising that any new capital is put into utility enterprises?

A definite policy should be enacted through legislation, clearly setting forth the rights of investors, creating stability in the utility enterprises and establishing regulation along sensible and permanent lines. If such policy were reasonably worked out, it would undoubtedly stand the test of constitutionality. All the present machinery of regulation is really a by-product of rate regulation. But if we wish to control the return on investment, why not do so directly, providing a clear plan and furnishing the administrative machinery for the purpose?

FIXING THE RETURN ON FUTURE INVESTMENTS

If we intend to limit the return on investment, it seems that the amount of the investment and the rate of return should be definitely fixed, so that control would be simply a matter of accounting, carried on automatically, not involving formal proceedings before a commission. The following paragraphs will outline a plan by which control could be thus automatically determined. In the discussion of the plan it will be necessary to distinguish between existing and future investments. In regard to the latter, definite control can be obtained without much difficulty. The investment entitled to a return would reasonably be the amount of money or fair equivalent actually put into the property through the issue of securities, and the fair rate of return would be the rate that actually induced investors to furnish the capital.

If in any case funds are raised through the issue of bonds, the procedure would be no different than it is now. The mortgage definitely fixes the rate of interest paid on the face value. If when the bonds are actually issued, the rate of return required by investors is greater than the rate fixed by the mortgage on the par value, the bonds would sell below par, and the other way about, they would sell above par. In any event the purchaser, or the lender to the utility, would get on the money actually provided the market rate of return—the rate which induced him to make the loan. This would then be a settled matter, determined on a contractual basis, not subject to change.

But if funds are raised through the issuance of capital stock, substantial changes would have to be made from present methods. Stocks would have to be treated in the same way as bonds—the rate of return would have to be definitely fixed on the par value, and then the price of the actual issue would be determined by market conditions. The difference between bonds and stocks would simply be a matter of risk. The interest on the bonds would constitute a preferred claim on the income of the company as a whole. Consequently the rate of return required on investment through stocks would be higher than for bonds. If the dividend rate is definitely fixed, then again when stock is issued, if the rate of return demanded by investors is greater than the rate on the par value, the amount paid will be less than par, and the other way about, more than par. Legal provision would have to be made for the issuance of stock below par. The return would be based on the actual investment, and the rate would be determined by agreement. What other method would be reasonable?

The idea carried throughout the following discussion is that the return allowed should be as stated in the stock and bond certificates, and no more; that securities should be issued by the order or consent of a commission; that the price or rate for service should be freely fixed so as to give full opportunity to earn the return, but that the responsibility of earning it should rest upon the business, and that any excess profits above the stipulated return should go to the public in the form of a franchise tax. The question, however, may well be raised whether in the case of stocks it would not be desirable to permit a return above the rate fixed on the certificates, so as to stimulate efficiency of management. If this should seem desirable, a bonus or profit-sharing scheme might be devised and made a part of the general policy. But the details should be definitely worked out, so that the rights of the stockholders would be clearly stated and the matter handled through the accounts.

RETURN WOULD BE FLEXIBLE TO MEET CHANGING CONDITIONS

There are various technical points in the scheme which would have to be clearly settled, but which cannot be discussed within the limits of this paper. Perhaps it should be emphasized, however, that while the rate of return would be fixed, it would still be flexible to meet the changing market conditions as securities are issued and new capital is required. For illustration, let us assume that the dividend rate be fixed at 7 per cent; then the elastic element would be the price paid for $100 par value of the stock. If at the time a particular issue is made the market rate of return should be 8 per cent, then the actual investment for every $100 par value would be $87.50; a dividend of $7 a year would be 8 per cent on this amount. If, however, the market rate should be 6 per cent, the actual investment per $100 par value of the stock would be $116.66, and the dividend of $7 a year would furnish a 6 per cent return. Thus, while the rate would be fixed by contract as stated in the stock or bond certificate, the actual rate realized by investors and paid by the public would be determined by the market conditions at the time the securities were issued. It would be a matter of agreement, which would be a definite obligation upon the public and would state clearly the rights of the security holders.

GUARANTEEING THE RETURN

The question would naturally be raised whether if the return on investment is limited, the amount should not be guaranteed. The answer is that the policy under discussion is elastic enough to permit what seems best. As here outlined, the idea is that the responsibility should be placed upon the business to earn the return stated on the bond or stock certificate. But we might well guarantee the amount, supporting it by the taxing power. If this seemed desirable, the risk of return would be reduced to a minimum, and new capital could be obtained at a correspondingly low rate. If no guarantee is given, but a free chance is granted for earning the fixed return, the rate required by capital would be determined accordingly. The important point is that the conditions upon which capital is obtained be clearly stated so that they can be understood by reasonably intelligent men. If the conditions are clear, investors may be left to take care of themselves. They may be presumed to act intelligently.

COULD SUFFICIENT CAPITAL FOR DEVELOPMENT BE SECURED?

Another important question is whether under the proposed plan sufficient capital could be obtained for the reasonably necessary utility developments. There seems to be no particular reason why not. Even now the bulk of utility investments is made through the issue of bonds, on which, as far as the bondholders are concerned, the return is limited in the way suggested. The plan here is to place the limitation upon stock as well as bonds. The method of financing new enterprises would be essentially the same as now, except that the risk of the promoters and the obligations of the community would be clearly established. Simply the speculative element as to public interference would be removed.

Let us assume that J. G. White & Company or Stone & Webster were to agree to the construction of a new electric railway. The problem of promotion and finance would be the same as now, except that they would know that the dividend rate on the stock issued could not be greater than the rate stated (say 8 per cent), but that a free chance would be granted to earn that rate. The amount of cash that the promoters or outside underwriters would be willing to contribute for the par value of the stock would depend upon the risk that seemed to be involved in the project. If the risk corresponded to a 10 per cent return, the stock would be issued for $80 cash per $100 par value. The stockholders' rights for the future would be fixed once for all. The commission could not, subsequently, when the business had become firmly established, lower the rate of return which originally represented the risk element. But later, when the project had proved to be a success and the risk had been greatly reduced, if new capital were received for the extension of business, then additional stocks would be issued at a correspondingly favorable rate, say, 8 per cent. Then $100 par value of 8 per cent stock would bring $100 cash. Still later, with further reduction of risk, the 8 per cent stock might be sold on a 6 per cent basis, $100 par value for $133.33 cash.

The investors taking new securities would always be paid in proportion to the risk of the business at the time of the issue. There would be a fixed bargain between them and the public. This agreement could not be disturbed. If a community wishes a street railway or any utility, or an improvement in service, it must be willing to pay for capital in proportion to the risk connected with the business. This is an economic fact which cannot well be escaped. If this is clearly provided for in the plan of regulation, capital will be forthcoming according to the eagerness with which people want service. The general scheme suggested, while providing definite control, is elastic enough to meet the varying risk in utility enterprises.

HOW EXISTING PROPERTIES WOULD FARE

There would probably be a fairly ready agreement, among students of public utility finance, that the plan outlined would work satisfactorily for new projects or future investments. The real difficulties appear in applying the scheme to existing properties. Here the situation is chaotic; every possible plan for straightening it out will encounter grave obstacles. The present confusion, however, cannot well be permitted to stand permanently in the way of progress. It should be met squarely and intelligently, and reduced to order for the future. More or less heroic measures will be necessary, but they should nevertheless be taken so that we may know where we stand and that utility developments may continue according to public needs.

Reasonable adjustments should be definitely made for all existing properties so as to permit exact regulation for the future. The situation should be met by a clearly formulated legislative policy. If reasonable, it would probably be allowed to stand by the courts. First, it should provide a definite method of valuation that may be applied to all existing utilities. Then it should require an official valuation of every property that is subject to regulation. The results should be taken upon the books of the company, and should be the amount upon which a return would be allowed in the future. The valuation would be a permanent amount, and the rate of return should be fixed. We should then be on clear ground. For the future, any additional investment would be treated as already explained. Regulation would then be an automatic and a simple accounting matter.

To illustrate how existing investments might be treated, we may assume a company with $400,000 of 5 per cent bonds outstanding and with $600,000 of capital stock. Suppose that the official valuation amounts to $700,000. This would be the sum upon which a return would be allowed. If the rate be fixed at 6 per cent, the net annual return would be $42,000. Of this amount $20,000 would go to the bondholders, whose rights would not be disturbed, and $22,000 would go to the stockholders. This would be equal to a fixed dividend rate of 2 2/3 per cent. The existing stock might be given preferential rights. Then for the future, all new stock might be limited to 6 per cent—to correspond more nearly to the probable market rate upon which new issues would be made. All excess earnings above the stipulated interest and dividend payments would go to the public, unless a clear bonus or profit-sharing scheme were provided.

BASIS OF VALUATION SHOULD BE SETTLED

The scheme as outlined would require that the legislature determine definitely the basis of valuation by which the amount of any existing investment should be determined, as well as the rate of return that should be allowed. This is a matter of public policy to be determined by the legislative branch of the government, not by the courts. The latter could exercise veto power only in case the policy established should be unreasonable and should violate some constitutional provision.

It is not intended here to argue for any particular basis of valuation, but to urge a clear formulation of a rule which reasonably intelligent men can understand. Whatever basis be selected, it ought to square with the ideals of future regulation that we wish to establish, and at the same time should conform fairly with our sense of justice toward existing investors. It should have regard for broad public considerations. The purpose should not be to cut valuation to the lowest point that might be permitted by the courts, or to place it as high as the extreme patience of the public would endure. What is needed is definite control in the future, and no question of narrow personal justice should be permitted to stand in the way of a reasonable rule. Full consideration should be given to the inducements that led investors to put their capital into the utilities, and to their reasonable expectations under the indefinite situation of the law.

The basis should be reasonably simple, so that it can be readily understood and can be applied without hairsplitting refinements. The minuteness of many physical appraisals that have been made would be simply ridiculous, if it were not too serious a public matter. Such procedure is inordinately expensive, clogs up the machinery of regulation, and finally produces no more reliable results than would be obtained by rougher methods. Undoubtedly the present valuation of interstate railroads is being carried to absurd extremes. A large proportion of the work will be useless. If the results are finally to be used for the purpose of regulation, with a clearly defined method, the valuation might be made at a reasonable cost and probably with no less fairness to the investors.

Care should be taken that the individual concepts or bases of valuation be clearly distinguished. In the controversy that has been carried on over the actual *versus* the reproduction cost, usually there has been confusion as to what precisely was meant by actual cost. There are several actual cost concepts, and they are not substantially equivalent. The policy should be clear as to the various controversial matters covering definitely all intangible items, organization expenses, going value, property installed at public expense, money or other property contributed by the public, etc. No detail as to principle should be left unclear so that its determination would be left to varying individual judgments of the commissions or the courts. Even with principle completely worked out, there would be plenty of room for difference of opinion in the actual valuation, especially if some form of property appraisal be adopted as the fundamental basis.

SINGLE METHOD WILL GIVE SUBSTANTIAL JUSTICE

However liberal the basis of valuation selected might be to existing investors, there would be some individual hardships incurred through the application of a thorough-going policy. After all, most of the companies have not yet been subjected to regulation. For the most part they have been free to charge such rates as the traffic would bear, making all the profits that they could. Obviously a reasonable basis of valuation would cause loss to investors who had purchased their holdings at prices determined by the unregulated earning power. Such losses, however, cannot well be avoided, although in some cases they may cause serious personal hardships. The rules adopted should be fair, but clearly they cannot protect all vested interests or claims.

The point to be emphasized, however, is that if we wish to get out of the present muddle we must adopt a single method and apply it to all cases. Otherwise, who would say what rule should be adopted in a particular case? How could a valuation of all properties be made? If a single method is worked out along sensible lines, substantial justice will be done, and more cannot be expected, if we really wish to cut through our confusion. If the method is in general reasonable, what the courts have said in the past about value in rate cases would not matter, for they could not interfere with a constitutional legislative policy.

If we do not adopt a single rule, a general valuation would become impossible because of administrative difficulties. Each case would have to be argued on its own special merits. The time required would overwhelm the commissions, and the expense would be too great to undertake. If a definite single method were adopted, however, we should get along better with present rate cases, even if a thoroughly systematic plan of regulation were not undertaken. The administrative machinery would not be choked up with the details of the procedure.

ADJUSTING THE RETURN ACCORDING TO STABILITY

While a single rule of valuation should undoubtedly be applied to all existing investments, probably some elasticity should be provided in fixing the rate of return permitting adjustment according to the stability of the particular business. It would seem unreasonable to apply the same rate, say, 7 per cent, to all cases, when the risk varies greatly from one concern to another. In one case 10 per cent might be earned easily, while in another not even 5 per cent would be obtainable. The rate allowed in any case might be what would have to be paid for new capital. While this would be an indefinite factor, it would be settled once for all, so that the situation would be clear for the future. For simplicity of administration, all properties might be grouped into three or four classes, each class being granted a fixed rate according to the general risk of the class.

If the plan that has been outlined were adopted, many more or less arbitrary adjustments would have to be made as to existing investments in order to bring clearness out of the present confusion. Yet for the future we should know where we stand. If we do not define the terms at which capital is provided, we shall probably not get the funds that are reasonably necessary for future utility developments. The present situation cannot well continue. The alternative to the plan proposed is outright public ownership and management. We are probably not ready for that. The scheme outlined would be fair to investors, would be elastic to meet the varying capital requirements and would provide definite and automatic regulation of return. The commissions would be freed from the time-consuming and irritating details of the present rate cases, and could devote their energies to co-operation with the companies in the improvement of the service.

Return on Railway Investment

Boston Chamber of Commerce Urges Fair Return and Provision for Depreciation on Electric Railways

THE Boston (Mass.) Chamber of Commerce joint committee on transit facilities and public utilities, of which Edwin S. Webster of Stone & Webster is an active signatory member, has issued a report on the street railway situation within Massachusetts. The report sets forth the necessity of a fair return to the investor and of adequate provision for depreciation. The committee advances these views to assist the Public Service Commission in its investigations of electric railway economics and development, holding: (1) That it is vitally essential in the interest of the public that suitable and adequate transportation service be provided at a fair price—service commensurate with the legitimate and increasing requirements of the community served; (2) That the income of a transportation company must be sufficient so that when it is economically, honestly and efficiently managed it will be possible to set aside proper reserves and pay a fair return on its properly invested capital.

FAIR RETURN ON PROPERLY INVESTED CAPITAL

In order that a company should be able to pay a fair return on its properly invested capital, the report states, it should have sufficient income to pay all its operating expenses, to set aside proper reserves, to pay the interest on its bonds and other borrowed money, and to pay a fair dividend to its stockholders—a dividend sufficiently large and stable to attract new money to the enterprise whenever the increasing demands of the community require additional facilities and therefore new capital. The report of Mr. Webster and his associates says that in any growing community a street railway must always be adding to its power, tracks and equipment in order to keep abreast of the legitimate demands of the public; but if the road is not earning enough to pay reasonable dividends on its stock, it is impossible to raise the necessary capital by the sale of new stock, because it is contrary to the policy of the State to allow new issues to be sold for less than par, and if the market price of the old stock is less than par, as it surely will be with insufficient dividends, it will naturally be impossible to sell new issues for higher prices than the old ones are selling at in the open market. The only remaining method is to burden the road by raising the necessary capital through the sale of bonds, but under the Massachusetts laws these properly cannot be issued to an amount greater than the par value of the stock outstanding at the time, and when bonds to this amount have been issued and stock is unsalable, the resources of the road for raising new capital are at an end.

This is exactly the situation, the report states, that confronts some of the important transportation companies in Massachusetts. The situation is very serious and calls for prompt and vigorous action if disastrous results to the communities affected are to be avoided. The improvement of financial condition through expense reduction or income increase, or by both, is a problem that must be solved promptly by the Public Service Commission.

OBSOLESCENCE

The report emphasizes the necessity for accumulating during the life of the property sufficient funds to replace its parts when these are obliged to go out of service. Regarding obsolescence and inadequacy, the report says: "Obsolescence may be defined as a condition resulting from changes in the art whereby the character of the service required is so altered or the efficiency of apparatus providing corresponding service is so improved that, although still physically capable of doing the work for which it was designed, it is no longer able to provide economically the service required. When this condition arises, it is for the interest of the public that the obsolete equipment be replaced with up-to-date equipment, and it is for this purpose that we require a reserve for obsolescence.

"That this is a real and not an imaginary contingency is shown by the tremendous changes that are to-day taking place in the methods of generating power. For example, first-class reciprocating engines in condition to operate for many years to come are being replaced by the modern steam turbine, not because the old engines are worn out and not fit for service, but because they are obsolete or inadequate and uneconomical to operate as compared with the modern steam turbine. These renewals cannot appropriately be paid for from funds charged to capital account, for that would have the ultimate effect of piling up additional capital with only the original plant and equipment to show for it. In fact, the final result would be the same as if stock-watering had been practised in the beginning.

"Some of the leading English railway systems are an example of the evils resulting from this practice. For many years they paid for renewals by issuing new securities, with the result that in spite of cheaper labor their freight rates are much higher than in this country, and even with the high rates they are unable to pay reasonable return on the investments. Thus it will be seen that they suffer a double injury—the stockholders now get no proper return and the public is forced to pay higher rates for the service. Your committee believes that it is essentially for the good of the public service of the street railways of Massachusetts and equally good for the railways themselves, that the State, either by law or by a regulation of the Public Service Commission, should without delay require all of these companies to set aside proper reserves for depreciation, including obsolescence and inadequacy."

RETURN TO THE INVESTOR

The report concludes with the statement that it is not sufficient that the return on the investment should barely equal a legal rate of interest and thus perhaps escape the constitutional limitations against confiscation, for while capital already invested cannot escape, new capital will not seek investment under such conditions. No intelligent investor will subject his property to the risks of a business for a compensation no greater than that which can be obtained by an investment free of risk. The language of the commission in the Middlesex & Boston case emphasizing the necessity for the protection of honest investments in public utilities is cited in conclusion. Henry Howard is chairman of the joint committee.

Economics of Rush-Hour Service

Expert Evidence in Hearing on Bay State Conditions Dispels Common Opinion that Peak-Load Traffic Is a Bonanza

AT a recent continued fare increase hearing before the Massachusetts Public Service Commission, the Bay State Street Railway presented important evidence relative to the high cost of rush-hour service in order to offset the popular view that peak-load traffic is extremely profitable. Prof. Albert S. Richey of the Worcester (Mass.) Polytechnic Institute, superintendent of transportation for the company, stated that according to popular opinion rush-hour service is performed by a street railway at a less cost than the ordinary business, or at a lower cost than the average expense of handling the service, but that any increase in the volume of business can really decrease the cost of production only when the increase is distributed so as to make possible a more efficient use of the existing equipment. Whenever that increase is concentrated so as to require more equipment, the cost of production per unit of service is increased, and hence the cost of peak-load service is greater than that of normal service.

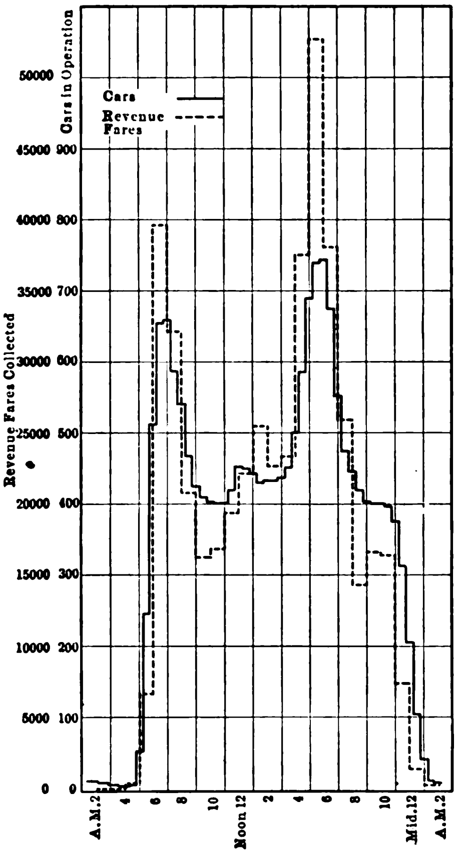


CHART SHOWING NUMBER OF CARS IN WINTER SERVICE AND REVENUE FARES FOR BAY STATE STREET RAILWAY

A rate schedule, to be equitable to all consumers of a public utility should make consumers who need and create the peak-load service pay a price which will be commensurate with the extra cost of the service which they are receiving. This principle is generally appreciated in the making of electric lighting and power rates, but it is rarely recognized in rate-making for street railways. If it is not possible for a street railway to charge a higher rate during the rush hours, it seems reasonable that the company be allowed to charge at least the same rate of fare as during the non-rush period rather than be required to suffer decreases through workingman's tickets, etc.

Professor Richey presented the accompanying chart of the present operation of the Bay State Street Railway car service, showing the number of cars in winter service over the entire system at each half-hour period for twenty-four hours on a week-day schedule. The winter service is in operation two-thirds of the year. The figures are for the number of cars regularly operated daily, which varies little from the records of the last few winters. Extra cars are not included. The chart also shows the number of revenue fares collected over the system by hours, the latter being based on the average of three normal days' operation in October. These three days average within 0.5 per cent of the average daily revenue fares collected throughout the fiscal year 1915.

To determine the additional cost of rush-hour service, Professor Richey stated that it was first sought to ascertain the cost of operation per car-hour of the cars in operation at different times of the day, later reducing that to the cost per passenger. There is a certain proportion of the investment which would be necessary whether the cars ran with an absolutely even number throughout the entire twenty-four hours, and another portion which is dependent upon the maximum number of cars in operation. Thus, the investment in track and roadway is necessary without regard to the concentration of service, and so with trolley wire. Proportional to the maximum amount of service, however, are the investment in rolling stock, the capital represented by part of the power station investment, the investment in feeders and a portion of the operating expense. The minimum pay of platform men, who are compensated for six hours' time, makes up from 22 per cent to 25 per cent of the total revenue, but it is not possible to use all these men during the entire six hours daily. Moreover, signal operation is dependent upon the maximum number of cars required, for many lines will be signaled purely on account of their rush-hour traffic, and a good deal of the telephone expense is properly chargeable to such traffic. Much of the accounting is also properly chargeable in this way, *e.g.*, the conductor's day card, which requires just as much paper and practically as much time in the auditing department for the car that is on the street one hour per day as for the car in service the whole day.

About $1,300,000 or 30 per cent of the permanent investment in electric line construction, Professor Richey felt, is chargeable to rush-hour requirements. The cost of cars and other railway equipment wholly dependent on the maximum service is about $9,250,000, divided $5,250,000 for cars and $4,000,000 for electrical equipment of cars. The cost of power substation buildings and equipment is not wholly proportional to the maximum number of cars operated, because it is possible to draw on the stations' peak-load capacity during rush hours, so that only 75 per cent or about $5,000,000 of this item is chargeable to rush-hour traffic. Then the proportionate amount of engineering, superintendence, interest, etc., during construction amounts to $80,000, making a total cost of $15,800,000 dependent on the maximum number of cars operated. This amount represents about 35 per cent of the total permanent investment of the company.

In the fiscal year 1915 the company's fixed charges were about $1,350,000 for interest and rentals and $650,000 for taxes. Professor Richey stated that about $1,170,000 represents the additional yearly cost of rush-hour service, allowing $470,000 for increased operating expense and taking 35 per cent of the total fixed charges of about $2,000,000. The maximum number of cars ready for operation is 1774, composed of 196 semi-convertible cars, 1002 open cars and 576 closed cars equipped for summer service. On some summer days practically all of this equipment is on the streets.

As $1,170,000 is the cost dependent upon the number of cars operated, the cost per car is $658 per year. The total operating costs and fixed charges independent of rush-hour service are $7,386,000, and the total car-hours are about 3,615,000, thus giving an expense of $2.04 per car-hour applicable to any and all cars whenever they are run. The expense of operation per car then totals $2.04 plus $658 divided by the number of car-hours the unit is annually in service.

On the assumption that a car could operate 365 days per year and eighteen hours daily, the cost of operation per car-hour would then be $2.14. The closed winter car, which is replaced in summer and operates 220 days per year, would have a car-hour cost of $2.21. The all-day summer car, which operates eighteen hours a day but runs only 120 days per year, would cost $2.34 per car-hour. The summer rush-hour car operated three hours a day for 120 days would cost $3.91 per car-hour. On the basis of the winter schedule, the closed winter car in service 240 days a year and run one hour daily would cost $4.78 per car-hour. For two hours a day, it would cost $3.41 per car-hour; for three hours, $2.95 per car-hour, and for four hours, $2.70 per car-hour.

During the time that the one-hour cars are on the street in the rush hour, the average number of revenue passengers per car-hour is 71.4. During the time the two-hour cars, including the power, are in rush-hour service, the number of revenue fares per car is 63.9, while for three hours in service the average number of revenue fares is 62.8. The number decreases gradually down to the four cars in service twenty-four hours daily, when the revenue fares per car-hour are about forty-three. The average number of passengers per car-hour for Oct. 18, 19 and 21, the three typical days, was fifty, and the figure is the same for the entire year. Cars on the street eighteen hours a day average 49.3 revenue fares per car-hour.

Professor Richey explained that the differences in the cost of operation per passenger between cars run varying hours per day are obtained by dividing the cost of operation by the revenue fares per car for the same length of time. Thus, $4.78 per car-hour divided by 71.4, the average number of revenue fares, gives 6.7 cents as the average cost per revenue-fare passenger carried in cars on the street only one hour daily and 240 days a year. For cars on the street two hours daily and 240 days per year, the cost would be 5.34 cents, and for cars on the street three hours daily, 4.7 cents. The cost for an eighteen-hour car is 4.44 cents. The lower costs occur between ten and eighteen hours per day, the cost increasing with the twenty-four hour car to 4.91 cents.

The Bay State Street Railway has only nineteen or twenty cars producing revenue for only one hour, sixty-four in service two hours, seventy in use three hours, forty-five in use four hours, forty-one in use five hours, thirty-two in use six hours, and less than ten in use in all hours up to thirteen. Sixteen cars operate thirteen hours a day, eighty-four cars operate seventeen hours, 162 cars operate nineteen hours, and 108 cars run eighteen hours daily. Forty-two run twenty hours, four run twenty-two hours and one runs twenty-three hours.

Commissioner Eastman inquired whether a line having a flat fare without workingman's tickets would not be wise to make a fare reduction if it were sure of 20 per cent more business with a 20 per cent fare reduction. Professor Richey said that if there were room in the cars to take care of the additional business without additional equipment, it would be desirable to obtain it. He pointed out that it is good policy to increase business as long as it can be handled with existing equipment, but that as soon as additional investment is necessary, one must watch closely to see that the fixed charges are not eating up all the profit and more.

Professor Richey said that the general purpose of his estimate was to show that the cost of service per passenger was at least as great during the rush hours as during the non-rush period. Because of this the workingman's ticket should be abolished, but the estimate was not intended to urge the commission to increase the rush-hour fare above the normal-hour fare. The witness added that on account of overlapping peaks it is difficult to arrange economical power production in combined railway and lighting systems. It would be economy for a street railway to sell its surplus power during the off-peak period, but even here there is likely to be a considerable overlap on account of the withdrawal time required in taking the cars back to the carhouses, after the factory workers have been delivered at their places of employment. The peak overlaps the industrial load in both morning and afternoon.

Jitney Situation on the Pacific Coast

First Anniversary of the Movement Finds the Business Declining, with Still More Stringent Regulation in Sight

THE first anniversary of the advent of the jitney bus in Pacific Coast cities finds the innovation still alive, but in most cities the number of machines is now decreasing and the tendency is decidedly toward stricter regulation. During the first year of jitney operation the novelty of the new mode of traveling has been a factor in securing patronage and popular approval, and the latter has retarded progress toward the regulation which seems certain to be imposed ultimately. But as the novelty wears off and the service becomes less and less efficient there is a noticeably increasing demand for more stringent regulatory measures.

SOUTHERN CALIFORNIA

In Los Angeles the latest move has been the decision to turn over the supervision of jitneys to the Board of Public Utilities, which body, pursuant to the recently adopted policy of improving Los Angeles traffic conditions, promises to see that jitney buses are operated on a safer basis and according to rules that will tend to produce the minimum of traffic congestion. A recent development in this quarter was the decision of Police Judge Crawford of Los Angeles that drivers of interurban buses are subjected to the regulation of each city traversed while within the limits of that municipality. This means that those buses, for example, which now run to San Bernardino and pass through Pomona, Ontario and other outlying municipalities, will have to carry separate bonds in each of the cities that has a regulatory ordinance. Jitney bus operators insist that this amounts to confiscation of their rights. A complete review of the jitney situation in Los Angeles appeared in the Sept. 18 issue of the ELECTRIC RAILWAY JOURNAL. Since that time the changes have been slight, except for those above noted. On Jan. 1, 1916, there were operating within city limits about 350 jitneys, which is about one-third of the number that contested for business last year when the fad was at its height.

In San Diego the ordinance which, in effect, prevented further operations of jitneys on certain main streets has brought about a new phase in the situation. It is reported that practically all the operators who formerly ran jitneys have applied for auto-for-hire licenses. One company announces it will place in operation about twenty-five machines which will not follow any prescribed route and which will charge a 15-cent fare. If a passenger rides but a short distance there may be handed back to him, at the discretion of the conductor, a coupon good for one or two more rides. In this way it will be possible to ride as many as three times for the 15-cent fare. The scheme is designed to evade the provisions of the jitney ordinance at the same time that popular prices are maintained.

SAN FRANCISCO BAY DISTRICT

In the San Francisco Bay district the jitneys fattened on the unusually heavy traffic during the exposition period. Recent agitation in Oakland drove a considerable number of machines from that city into the San Francisco field, so that since the close of the exposition the number of jitneys in San Francisco has actually increased. However, a careful count made by the United Railroads shows that they are now making shorter trips, are covering a greater mileage and are earning less per mile than when the count was made early in December. The count made on Jan. 11, covering the period from 6 a. m. until an hour past midnight, showed the total number of jitney buses passing along Market Street in both directions to be 17,705 with a total of 35,019 passengers, or an average of 1.97 passengers per car. The total number of machines that appeared in service during the day was 603, of which 358 were Fords. The mileage traveled was found to be 62,536, for which the total revenue was $1,750.95, or 2.79 cents per car-mile. The earnings per car-mile were 3.32 cents in the December count, when 576 machines were in operation.

In Oakland jitney interests have made a strenuous fight against regulation, employing legal talent and attempting by every means possible to prevent adverse legislation. The final test came on Jan. 13, when an ordinance to exclude jitneys altogether from the business district of Oakland came up for final consideration. The ordinance was approved by a majority of four to one. The efforts of the jitneys to evade this law have been reported in the news columns of this paper. According to counts of the number of machines in operation in Oakland and Alameda made by the San Francisco-Oakland Terminal Railways, the daily average was 270 in May, 219 in August and 319 in November. On Dec. 31, 346 machines were in operation. There was a corresponding increase in the average number of passengers carried daily by the jitneys from 17,857 in August to 21,684 for November, while on Dec. 31 they carried a total of 26,900 passengers. The Key Route system has suffered a loss during the calendar year of $350,000 which can be directly attributed to jitneys. During the month of December the loss on this account, company officials report, amounted to $1,200 per day.

THE PACIFIC NORTHWEST

In Seattle the development of the various stages of the jitney movement have been very rapid so that it is possible to study an almost complete cycle of the rise and fall of the business since the first bus appeared in that city early in January, 1914. Early in the summer there were about 800 jitney buses in operation, and this has decreased until the number now operating is about 350. The organization of a Seattle jitney drivers' association ended in a split, and the subsequent war between the two factions resulted in the disbanding of both. The passage of a bill by the State Legislature, requiring bonds for the safety of passengers and other protective measures, caused several hundred operators to quit the ranks immediately. At the present time the jitney buses are no longer considered a menace to the traction company in Seattle, because they simply reduce the peak load of morning and evening traffic.

In Portland the situation is notable because of the amount of legislation that has attended the jitney bus agitation. The first jitney appeared there on Jan. 5, and within two weeks the number had grown to fifty-five. In June the number of jitneys operating was about 300, and this number, it is estimated, is still doing business in Portland. The first regulatory ordinance was passed on April 2, was repealed on May 12, and on June 7 was succeeded by another ordinance. The latter was declared void by the Supreme Court on July 27 because it was not passed by the City Council before being voted upon by the people. Public sentiment was shown to be in its favor, however, when the Council passed a new measure on Sept. 3, practically the same as the earlier one; which was at once approved. A temporary restraining order was secured on Sept. 13, but in answer to this a decision handed down by the Oregon Supreme Court on Dec. 28 announced that the city had a right to enact such a measure. This latest decision was followed by the appointment of a jitney inspector, who was to begin within twenty days the enforcement of regulatory provisions. It is notable that the gross and net earnings of the Portland Railway, Light & Power Company for the last quarter of 1915 show a steady and substantial gain in each succeeding month.

On Jan. 10 the city of Bakersfield, Cal., adopted strict jitney bus regulations by a vote of two and one-half to one. In many other small cities of California, Oregon and Washington, jitney ordinances are being contemplated or have been passed very recently. These smaller municipalities have waited to follow the lead of the larger cities, and while the latter have been debating the matter the smaller centers postponed action.

Depreciating Overhead Charges

Bion J. Arnold Presents Supplementary Note to San Francisco Address of Last October—Has Also Compiled Glossary of Terms

WHEN Bion J. Arnold, chairman Board of Supervising Engineers, Chicago Traction, presented his address on "The Foundation Principles of Valuation" [ELECTRIC RAILWAY JOURNAL, Oct. 9 and 16, 1915.] before the American Electric Railway Association on Oct. 7, 1915, in San Francisco, a request was made by Philip J. Kealy that Mr. Arnold elaborate the paragraph in regard to overhead charges and the depreciation of such items. Consequently, Mr. Arnold has prepared for the Proceedings of the Association a supplemental note, which appears in the bound Proceedings just issued. The main points will here be noted.

According to Mr. Arnold, depreciable items in general cover all items of cost which were incurred in producing the physical property and which, after a certain period of use, must be reincurred. This principle should apply to the depreciation of overhead charges in whole or in part—*i.e.* to such items of overhead charges as have to be reincurred in connection with the renewal of the items of physical property, there should be applied an appropriate depreciation. If this is not done, the expense of operation will not include the total cost of furnishing the service.

When there has been included in the original cost certain items of expense that will not have to be reincurred and the renewal fund has been set up on the basis of the estimated expenditures that will have to be reincurred, there will exist in capital an amount exceeding the actual cost of the renewed property by the amount of the expenditures that will not have to be remade. This may be considered as an intangible value since the property as existing after the first reconstruction has not entailed this expenditure. The amount may be retained in capital without injustice, since it is assumed that if the property were reconstructed such expenditures would again have to be made. On the other hand, as a matter of policy, it may be desirable to amortize this amount. In such case it would better be done by a regular amortization charge and not by charging the amount to depreciation.

Amortization, says Mr. Arnold, may be used to retire capital representing two classes of debt: (*a*) Supercharges that wholly or for the most part automatically disappear with the physical property associated therewith and consequently have to be incurred again at each replacement (*e.g.*, a power station that becomes inadequate and is unlikely to be replaced in like kind or in the same location, so that the original overhead charges are likely to disappear and should therefore be amortized); (*b*) supercharges which may not wholly disappear with the physical property, but which may be properly retired out of capital on the score of general policy of keeping as much actual property as possible behind the capital at all times (*e. g.*, carrying charges, bond discount and brokerage, general contractors' profits, costs of promotion, etc.). These items thus naturally group themselves into two classes in which the special treatment of depreciation in the appraisal or the amortization thereafter may be regarded as resulting from actual shrinkage or conservative policy, or both.

Different treatment of overhead charges will probably depend upon whether renewals are made in a piecemeal or bulk fashion. In the former case overhead charges would presumably be absorbed out of income (except as to betterments), as part of the work of the regular operating organization. In the case of rehabilitation, however, much work would probably be done by general contractors and separate charges would be entered to cover the overhead. Such charges should be absorbed out of a renewal fund, as they are already in the capital account once. Unfortunately it is not unusual to find most of such rehabilitation costs added to capital as "extraordinary replacements" when only the betterment portions thereof should properly become a capital charge.

Mr. Arnold mentions the mandatory provision of the Chicago ordinances that a cumulative cash fund be maintained out of gross receipts to provide for renewals and depreciation, and that in renewing the "principal part" of an item of property after the original rehabilitation, only the betterment, if any, should be added to the capital, *i.e.* "the excess amount that the new property cost over the original cost of the property displaced." The logical meaning of "property displaced" is that property for the complete renewal of which expenditures must be made of the same character as originally. This would appear to cover all new overhead charges. If the new work were done for less overhead cost than the old, the difference would then remain in capital as intangible until amortized, but to offset this its equivalent should also be in the renewal fund. In the exact interpretation of "original cost" and "property displaced," it would appear that the intent of the Chicago ordinances was that the renewal fund should renew as rapidly as necessary all worn-out property with such overhead as would be attached thereto, giving the renewal fund the benefit of economies arising out of the renewal work.

Mr. Arnold believes that in general the principal criterion in classifying overhead into depreciable and non-depreciable items is an economic one—so that pyramiding of capital will not take place upon renewals from time to time. Whatever treatment results in continuously piling up intangible values in capital is economically unsound, and amortization eventually becomes necessary. In some special valuation cases, Mr. Arnold states, all overhead charges or intangibles, construction and corporate, have been depreciated at the same rate as the underlying physical property. In other cases, certain items of overhead have been considered non-depreciable. An analysis of each case must be made.

In addition to the foregoing amplification of his convention remarks about depreciating overhead charges, Mr. Arnold has compiled a brief glossary of terms as used in connection with his address in San Francisco. Besides definitions of "utility," "appraisement" and "inventory," he presents the following:

Value: Tangible measure of monetary credit in the open market (assuming fair buyer and willing seller), for property or rights held, *i.e.*, potential ability to command legal tender in a sale or transfer free from coercive or misrepresentative influences.

Physical Elements: Actual existent items of physical property, represented by lands, buildings, plant, etc., in various stages of useful life, as distinguished from all items of value which are not susceptible of physical count or measurement.

Quasi-Physical Elements: Other items associated with the creation of a physical property for which legitimate expenditures have been made but which are not susceptible of physical count or measurement, such as organization, engineering and legal expenses, carrying charges, brokerage and contingent or incidental expenditures, all of which are classed as supercharges or overhead percentage.

Intangible Values: Other items of value of a non-physical nature which are not represented in the existent property but reasonably constitute a definite part of the assets of a corporate enterprise, such as contractual rights (franchise value), expenses legitimately incurred in development of plant or business, damages resulting from condemnation proceedings, etc.

Unit Prices: Cost or estimated value of commodities per unit of measure applied to an inventory to attain the value of all items entering into the construction of a property; such values based on average market quotations, frequently modified by experience or judgment of the appraiser for the particular conditions under which the property is to be appraised.

Appraised Value: The total sum or sums representing, in the aggregate, the amount of money for which a corporate property or business could be exchanged in the open market, assuming a fair buyer and a willing seller and current (or average) prices for commodities entering into the construction of such property.

Base or Contract Cost: Product of inventory quantities and unit prices, *i.e.*, total cost of material and labor, including manufacturing and sub-contractors' profit, exclusive of general overhead or supercharges.

Cost to Reproduce New or "Cost New" (as applied to the physical property): The sum of the contract costs (as defined above) and appropriate supercharges or overhead, *i.e.*, the amount for which the physical property could be reproduced (as of the date of the appraisement) including all supplemental expenditures incurred in the creation of the property.

Depreciation: Cumulative loss or shrinkage in value of all elements of physical property occurring with the passage of time due to wear, tear, action of elements, change in the art, etc., which shrinkage in value is counteracted in a continuing property by normal maintenance and periodic renewals. Depreciation as thus defined is a physical fact as distinguished from the particular method or methods that may be employed in providing funds to replace the shrinkage in value due to such depreciation.

Present Value (as applied to physical property): Cost to reproduce new less depreciation accrued upon all existing depreciable elements of physical property, from the installation of all such elements up to the time of appraisement.

Amortization: The process of progressively retiring a debt or evidence of liability through a given period by means of consecutive or periodic payments, which process may operate by direct cancellation of the principal in whole or in part through partial payments or by accumulation in a fund drawing interest. This process may be applied as a means of retiring from capital account, through a term of years, such elements of value as will not be represented by physical property and which will automatically disappear with time, or to such other portions of capital value as it may be thought best to retire as a matter of policy.

Short Strike in Washington

Companies Continue Service with Loyal Employees —Conference Now Adjusting Differences

ON Wednesday, March 1, formal demands calling for changes in hours, working conditions and increase in pay were made upon the Washington Railway & Electric Company and the Captial Traction Company, of Washington, D. C., by committees composed of four men in each, three of whom in the Washington Railway & Electric committee and one in the Capital Traction committee being trainmen dismissed from the service of each company for cause prior to the presentation of the demands. The demands made were in the form of a contract desired by a certain division of the Amalgamated Association of Street & Electric Railway Employees of America.

Shortly after receiving a copy of the demand, President King of the Washington Railway & Electric Company, and President Hamilton of the Capital Traction Company issued statements to the press in which they said, in substance, that the communication was the first intimation which they had of any complaint or causes of complaint and that they were always ready to discuss with their employees any question relating to the terms of their employment.

On Friday, March 3, a letter directed to the committeeman who remained in the employ of the company and who was one of the four presenting the demands in contract form, was sent by the Washington Railway & Electric Company. In this communication the company expressed a willingness to discuss with its employees any grievances they might have but stated it could not discuss such matters with men not in the employ of the company. This letter further said that the company would gladly confer with a committee of employees if an appointment was made, but no acknowledgment of the receipt of the communication was received. On the same day President Hamilton of the Capital Traction Company arranged for two meetings of employees of his company to be held at the Georgetown carhouse on Monday, March 6, and posted in all carhouses a notice saying that the communication would be considered at the meetings and that the cards of admission, limited to employees, would be furnished by the department heads and division superintendents. All employees of the company were urged to attend. At meetings held at the carhouses of the Washington Railway & Electric Company on Friday evening, March 3, President King addressed several hundred conductors and motormen, reviewing the conditions under which the men work, the wages, hours and shifts. He commented on the company benefits and told the men that if a union existed and they belonged to it they would naturally surrender many of the benefits now enjoyed by them in the way of bonuses. Vice-President William F. Ham of the Washington Railway & Electric Company also visited several of the carhouses, addressing the men along the same lines in an endeavor to impress upon them the many benefits they received from the company.

On Saturday, March 4, those active in the newly organized association called a meeting of the members already enrolled and inviting all other platform men of both companies to attend, this meeting to be held at midnight to insure larger attendance than if held during the day. Despite the offers of both companies to meet employees, this meeting stampeded and voted to strike, their action to be effective immediately.

Both companies, however, were able to operate service on Sunday, and issued statements which were published in the one afternoon newspaper issued on Sunday. That of the Washington Railway & Electric Company said in part as follows:

"Following our offer to discuss any grievances with our employees, suddenly and without warning a strike was called at 2.30 this morning. We are doing everything possible to maintain street car service and cars are running on all divisions. Our first thought is the safety of passengers. Therefore cars will be manned only by competent crews. While we anticipate some difficulty maintaining full schedules, it is expected that reasonably adequate service on all lines will be maintained until such time as we are able to again operate the regular schedules. Under the existing conditions caused by this unwarranted strike, called without giving any consideration to our offer to confer with our employees, we hope the public will be patient."

That of the Capital Traction Company explained that the strike had been called without warning that such action was to be expected at this time and then gave the principal facts of the negotiations. It concluded as follows:

"The company feels that the present situation, unnecessary and hurtful alike to the public, the company and its employees, is one for which it is in no way responsible and which it has taken every reasonable step to prevent."

Slight disorders began to manifest themselves during the late afternoon on Sunday, resulting in the officials of both companies deciding to discontinue all service after 7 p. m. Shortly after noon on Sunday, March 5, the Commissioners of the District of Columbia voluntarily offered to confer with the traction company officials, Department of Labor representatives and the organizers of the association which the companies declined to recognize. This offer was accepted, and at 3.30 o'clock the joint conferences started, continuing until 3.30 o'clock Monday morning.

On Monday, service was resumed by both companies over all divisions, approximately 60 per cent of the schedules of both companies being maintained with loyal employees and extra men volunteering from other departments of the companies.

As a result of the twelve-hour conference held on Sunday, there was drafted an agreement in which it was proposed that all employees of both companies meet for the purpose of considering the propositions covered in the memorandum of agreement submitted to the companies on Wednesday, March 1.

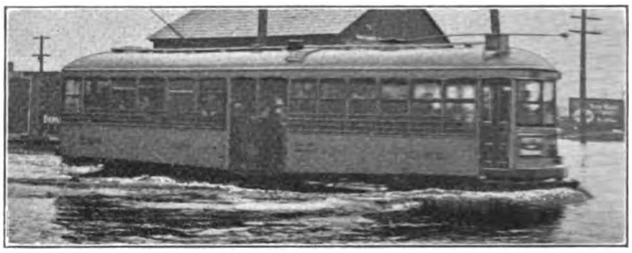
At 3.30 o'clock Monday afternoon, the agreement was read at a meeting of those employees who struck and was accepted by them. The first clause of this agreement provided that committees should be selected from the employees of each of the companies to meet with the officials of the companies and settle the question of hours of labor, rate of pay, seniority and other points mentioned in the original memorandum. It also provided for the creation of a permanent grievance committee to discuss matters with the officers, and also of an arbitration board to settle disputes where the employees and the officials could not agree. The other clauses of the agreement provide for meetings between the committees selected from the employees and the officials of the company to settle the points at issue at the present time, with arbitration if a satisfactory conclusion cannot be reached.

To permit all trainmen employed by both companies an opportunity to vote on the selection of committees, including those trainmen who did not go on strike, a meeting was called for 8 o'clock Monday evening, all street car service being discontinued so that all trainmen who were operating cars could attend. After this meeting adjourned, "owl" service was provided, and the regular schedules of both companies again went into effect on Tuesday, March 7.

The conferences between the railway representation and the employees' committees appointed by the employees, as covered by the terms indicated in the accepted agreement to mediate, are now in progress, each company conferring with its own employees' representatives.

San Diego Operation Uninterrupted by Floods

OPERATION of the city lines of the San Diego (Cal.) Electric Railway was not interrupted by the recent floods that occurred in that district. The floods were the highest ever recorded in that part of the State, but except for the deposition of silt and gravel on the tracks, which was easily removed, the system suffered no damage. The accompanying illustration, however, indicates that the skip-stop plan was in favor in those parts of town where the water reached depths up to 18 in.



WHEN THE SKIP STOP PROVES POPULAR.

Electric Railway Express Service and Internal Revenue Stamps

The necessity for affixing internal revenue stamps on express packages may cause the elimination of that business by interurban electric railroads that do not run special express cars for such business. The companies were able to maintain schedules fairly well, and make a profit on the express business, even though the conductors had to receive the packages, collect the charges, and care for the goods; but the extra minute or so required to announce the amount of the stamp tax, provide the stamp, and see to the cancellation of it, is taking too much time from the schedules, and interfering with the maintenance of the schedules expected of the passenger traffic. The interference with the running time is likely to prove serious, especially on lines where provision is made for a maximum of stops for passengers, and where express business is developing an additional number of stops. One of the roads that is confronted with this problem is the Southwest Missouri Railroad. This company has maintained an express service on its passenger cars as an accommodation to its patrons. Mine and mill owners of the Webb City district have been following the practice of ordering repair parts by telephone and having them delivered by the electric line, sometimes within an hour.

During the year 1915 thirty trespassers were killed on interurban roads in Ohio. This compares with thirty-seven in 1914. Employees on duty killed on interurban roads in 1915 numbered eight, as against ten the previous year. Five passengers were killed in 1915 as compared with four the year before. At highway crossings seventy-three persons were killed in 1915, while in 1914 thirty-one met death in the same way.

American Association News

President C. L. Henry Visited Connecticut Company Section on March 9—American and Manufacturers' Associations' Executive Committees Held Important Meetings in New York This Week—Secretary Makes Early Distribution of San Francisco Proceedings

General Association Activities

AMERICAN ASSOCIATION

A meeting of the convention location committee of the American Association was held in New York on March 9. The advantages of various cities were considered, and it is hoped that a definite announcement can be made soon.

The proceedings of the San Francisco meeting have been distributed during the past week, beating last year's excellent record by one week.

As this issue goes to press the American Association executive committee is in session in New York.

MANUFACTURERS' ASSOCIATION

The executive committee of the Manufacturers' Association met in New York on March 8 with the following members in attendance: Thomas Finigan, San Francisco, Cal., president; C. C. Peirce, Boston, Mass.; Daniel W. Smith, Detroit, Mich.; L. E. Gould, Chicago, Ill., and E. F. Wickwire, Mansfield, Ohio, vice-presidents; H. G. McConnaughy, New York, secretary-treasurer; and E. H. Baker, New York; Bertram Berry, New York; W. F. Cutler, St. Louis, Mo.; Charles R. Ellicott, New York; F. A. Elmquist, New York; Henry C. Evans, New York; M. B. Lambert, Pittsburgh, Pa.; George Stanton, Cleveland, Ohio, and A. H. Woodward, Chicago, Ill., members of executive committee other than officers. B. A. Hegeman, Jr., New York, and James H. McGraw, New York, also attended by invitation.

Chairman Finigan first called for reports of committees. Among these was the report of the mid-winter dinner committee, signed by Mr. Peirce. It showed that 179 dinner tickets were sold by the American Association and 408 by the Manufacturers' Association, a total of 587. This was an increase of ninety-four over the number in attendance at the Washington dinner. After the accounts are balanced there will be a deficit of about $200 to be paid by each association.

Mr. Peirce also reported that he had represented the association at the meeting of the United States Chamber of Commerce.

The secretary read the resignation of E. H. Baker as a member of the executive committee and this was accepted with regret. L. J. Drake, Indianapolis (Ind.) vice-president of the Galena Signal Oil Company, was elected to succeed Mr. Baker.

Details of the coming annual convention were discussed, and the secretary was instructed to send to all members copies of a letter setting forth the results of this discussion and the other features of the meeting.

Activities of the Company Sections

DENVER TRAMWAY SECTION

The February meeting was held on the 17th, the thirty-third in the series, with an attendance of 100 persons. The session was opened with a number of moving pictures secured from the United Railways of St. Louis, which were particularly instructive along safety lines.

The topic of the paper was "Selling Transportation." T. W. Topping of the east division represented the conductor's side of the question, and H. N. Hilling of the central division gave his version of the motorman's duty in following the course in good salesmanship, which is being conducted among the men of this company. An interesting discussion participated in by large numbers was led by I. M. Wickham of the east division and J. W. Dawson of the south division.

PORTLAND SECTION NO. 9

At a recent meeting of the executive committee of the Cumberland County Power & Light Company section a number of committees were appointed as follows: Program committee, G. S. Brush, superintendent of railway department, chairman; hall and supper committee, C. H. Houghton, division superintendent, chairman; membership committee, J. H. Lombard, motorman, chairman. The following were elected to honorary membership in the section: E. B. Burritt, secretary of the association; Harlow C. Clark, editor *Aera;* H. H. Norris, associate editor ELECTRIC RAILWAY JOURNAL; C. C. Peirce, manager railway department Boston office, General Electric Company, and Martin Schreiber, engineer maintenance of way of the Public Service Railway, Newark, N. J.

PRESIDENT AND SECRETARY OF PORTLAND SECTION

T. H. Knight, president of the Cumberland County Power & Light Company section, has been superintendent of track for the past five years. He began continuous work with the Portland Railroad, now a part of the present property, nineteen years ago as a conductor. After five years on the rear platform he became timekeeper in the track department, and nine years later was given his present position. He was

F. H. KNIGHT
President Company Section No. 9

F. J. O'NEIL
Secretary Company Section No. 9

born and raised in Portland, being trained in the public schools and with a local consulting civil engineering firm. The two years spent with the latter in transit and rod and office work interested Mr. Knight in civil engineering and he entered the class of 1900, University of Maine. He returned to college after working, during the summer vacation of 1897 for the Portland Railroad, but left after the fall term and has since been with his present employer.

F. J. O'Neil, secretary of the section, is also a Portland product. He has been with the company since 1912, first as secretary to W. J. Ivers, then superintendent of equipment. Later Mr. O'Neil served as clerk of the mechanical department. He graduated from a local business college in 1910 and for two years thereafter was a clerk in the cashier's department of the Maine Central Railroad.

CONNECTICUT COMPANY SECTION

A dinner meeting of the Connecticut Company section, No. 7, was held in New Haven on March 9, with an attendance of more than 130. President Charles L. Henry was the guest of honor, and he gave an inspiring address. Brief talks were also made by E. B. Burritt, H. C. Clark and H. H. Norris. The Connecticut Company orchestra played during the dinner and vocal selections were interspersed with the addresses.

Mr. Henry moved a vote of thanks to the man who first thought of the company section plan and complimented C. N. Duffy for the pioneer work in Milwaukee. He outlined the principles which make for company section success, illustrating his points by humorous anecdotes. His main point along this line was that the section gets only what it goes after. The greater part of the address was devoted to the subject of courtesy which he advocated as the remedy for many evils in the railway business and out of it. He said that the only justification for the public utility corporation is that it can serve the public better than the public can serve itself. From his experience in public life he was able to show that this is true, and he instanced the case of the municipal waterworks. In communities served by municipal plants it is much more difficult to have complaints heard and grievances redressed than it is when the complainant can get directly at the management of the utility. He pointed out that as soon as the employees of the Connecticut Company lose sight of their positions as public servants they become much less useful to their employer.

Several reports were read at the business session of the section held immediately after dinner. The membership committee reported that on Jan. 1 the membership was 107, on Feb. 1 151, and and on March 1 172, with a number of applications still on file. The secretary stated that at the meeting held on Feb. 8 141 members were in attendance. At that meeting the discussion on snow removal begun in January was continued, a number of members presenting brief papers. H. A. Bullock, secretary New York Municipal Railway Corporation, was present and gave an illustrated talk on the organization of safety work. Other speakers discussed the accident problems and costs on the local property.

The employees of the Morris County Traction Company, Morristown, N. J., have formed a mutual benefit association, carrying a sick and accident benefit of $1 a day not to exceed sixty days in one year and a death benefit of $100. The dues are 50 cents a month. The company contributes to the fund. More than 80 per cent of the motormen and conductors have joined the association.

COMMUNICATION

Another Criticism of "Post" Editorial

GEORGIA RAILWAY & POWER COMPANY
ATLANTA, GA., March 1, 1916.

To the Editors:

Your reproduction in the JOURNAL of Feb. 19 of John A. Beeler's letter to the editor of the *Saturday Evening Post* about the *Post's* editorial on "City Travel" reminds me that I, too, called the *Post's* attention to another side of the matter. I am inclosing copy of my letter (which received no answer), with the suggestion that this incident gives point to effective practice which should be followed more generally by all corporations —*i.e.*, the patient and persistent answering of all unjust criticisms that appear. I can imagine that with Mr. Beeler's letter and mine, and perhaps others on the same subject, before him the *Post's* editorial writer wondered whether perhaps he hadn't been too casual.

As you and all other editors know very well indeed, the topic that evokes answers invariably is the topic taboo—unless, of course, an issue is up and a fight in good earnest is on. Electric railway men well may take advantage of this. Time spent in answering careless statements, unfounded and unreasonable criticisms and vicious attacks, is invested well indeed if after a time editors are unwilling to publish such statements and criticisms and attacks. The surest thing under the heavens is that they will grow weary before we do, if we stick to that method.

W. T. WATERS, Advertising Manager.

[*Letter of Mr. Waters*]

To the Editor, *Saturday Evening Post*,
Philadelphia, Pa.

Dear Sir:

In the course of your editorial, "City Travel," Jan. 8, you surmise what might happen if street car seats were provided for all members of rush-hour crowds. Is the assumption permitted that in some instances, at least, sufficient seats are provided and are left unused?

In the light of your own observation, is it true that into the first car going his way the typical individual insists upon burrowing? Does its crowded condition deter him? Does his knowledge that other cars are following make the crowded car-on-the-spot less desired by him? Does he himself choose between slight discomfort and slight delay?

Would he concede that the crowded elevator that leaves him waiting, the crowded box office or stamp window or weighing table or ticket window or shipping desk before which he must await his turn, the crowded store or the crowded restaurant—would he concede that any of these exemplifies a condition essentially the same as that of the crowded street car?

Would he admit that the rush-hour street car crowd is a phenomenon not different from the rush-hour ticket window or elevator or restaurant crowd, not different from the Christmas rush-period shopping crowd?

Would he make no objection if entrance to a street car already crowded were refused him by company rule or community law?

Those are queries for the psychologist.

Now for a practical question in mathematics.

Human nature being what it is, how can all the cars bound to a given destination be fitted to its demand by being made to proceed with none following another? What method is there for thrusting beneath those riders who have preferred to stand in order to hurry, the seats unoccupied that have followed them?

I do not criticise the editorial. On the contrary, I think it is true to the poise and clear vision and dignity of your admirable page. W. T. WATERS.

A safety-first phrase has been painted by the International Railway of Buffalo on all of its poles. Those between corners carry the words "Safety First," while those at the street corners have the words "Stop, Look and Listen" painted upon them.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices
in Every Department of Electric Railroading

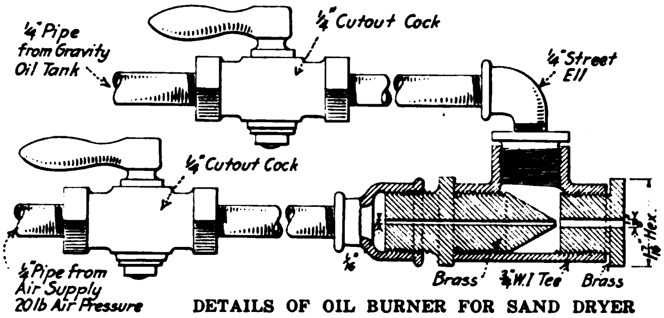
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

An Oil-Burning Sand Dryer

BY F. G. LISTER
Mechanical Engineer El Paso & Southwestern System,
El Paso, Tex.

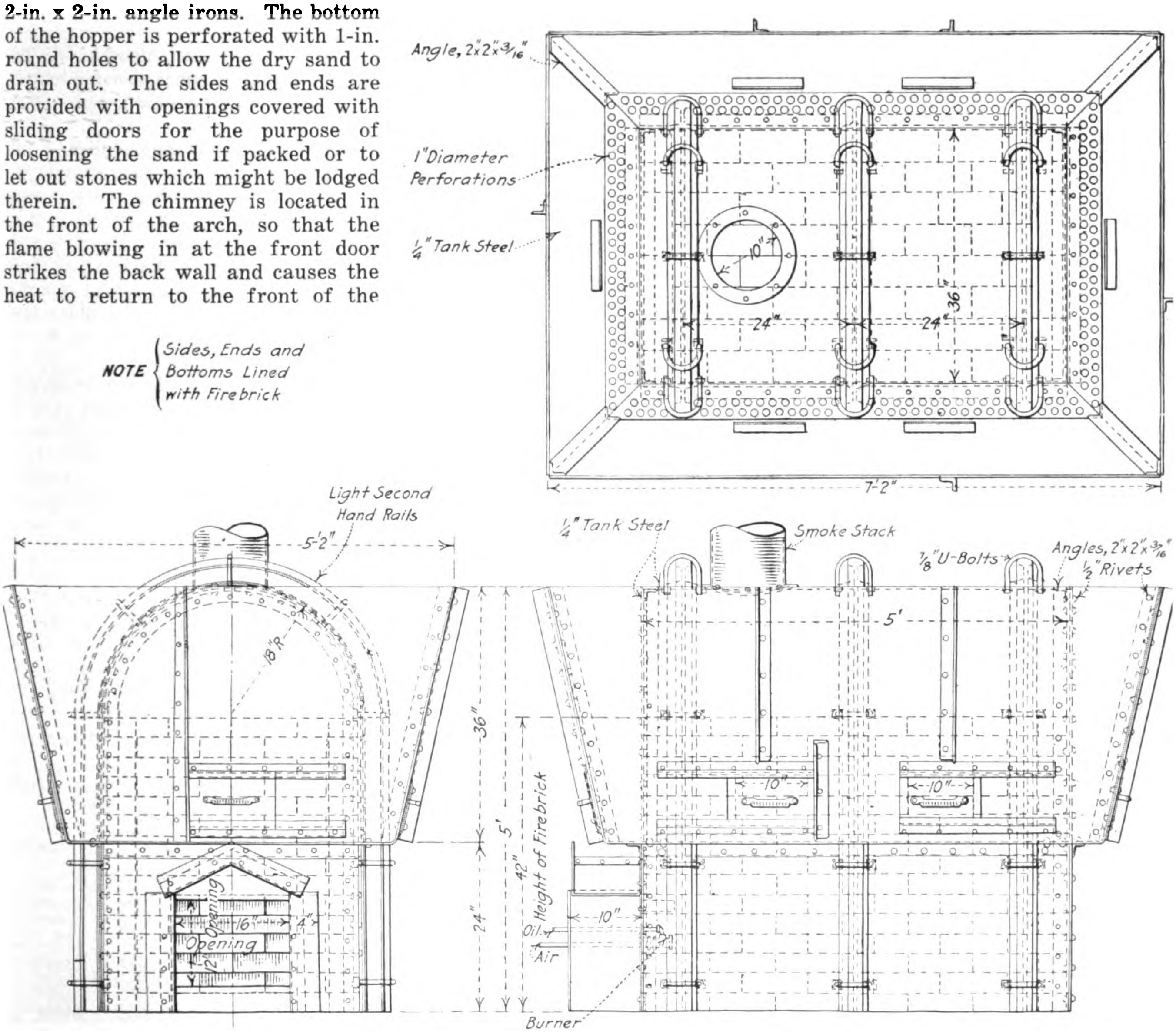
A sand dryer, which is very inexpensive to build, which is giving excellent satisfaction, and which has outlived three ordinary cast-iron sand dryers, is being used by the Spokane, Portland & Seattle Railway at its shops in Vancouver, Wash. Oil is used for fuel and is a great improvement over coal or coke in that a steady heat can be maintained and regulated to suit the conditions.

The dryer is built up with a framework of three light rails bent to suit, lined on the inside with ¼-in. tank steel. The walls and bottom are lined with one layer of firebrick to 42 in. above the floor line. The hopper is made of ¼-in. tank steel joined at the corners with 2-in. x 2-in. angle irons. The bottom of the hopper is perforated with 1-in. round holes to allow the dry sand to drain out. The sides and ends are provided with openings covered with sliding doors for the purpose of loosening the sand if packed or to let out stones which might be lodged therein. The chimney is located in the front of the arch, so that the flame blowing in at the front door strikes the back wall and causes the heat to return to the front of the box and out the chimney, thus providing a complete heating surface in the firebox.


¼" Pipe from Gravity Oil Tank
¼" Cutout Cock
¼" Street Ell
¼" Cutout Cock
¼" Pipe from Air Supply 20lb Air Pressure
1/16"
Brass
¾" W.I. Tee
Brass
1½" Hex.

DETAILS OF OIL BURNER FOR SAND DRYER

The burner is very simple, being made of standard pipe fittings, except the nozzle and two reducers which are made of brass rod.


Angle, 2"x2"x3/16"
1" Diameter Perforations
¼" Tank Steel
10"
24"
24"
36"
7'-2"
NOTE { Sides, Ends and Bottoms Lined with Firebrick
Light Second Hand Rails
5'-2"
18"R
36"
5'
42" Height of Firebrick
24"
16"
4"
12" Opening
Opening
Oil
Air
10"
Burner
¼" Tank Steel
Smoke Stack
⅞" U-Bolts
Angles, 2"x2"x3/16"
½" Rivets
5'
10"
10"

PLAN AND ELEVATIONS OF OIL-BURNING SAND DRYER

The dryer is operated eight hours per day, three hoppers being dried in this length of time. Eight gallons of fuel oil are consumed for each hopper full of sand. Air is supplied at a pressure of 20 lb. per square inch.

About four hours per day are consumed by the operator in handling the dryer and sanding on an average of twelve engines. The remainder of his time is spent in helping the hostler turning engines, etc. The sand dryer was designed and built by C. A. Landberg, general foreman in the Vancouver shops.

Value of Ties Treated and Untreated

BY E. W. BRIGHT
Tie and Timber Agent Boston Elevated Railway

The number of cross-ties purchased each year by steam and electric roads runs into the millions, involving the cutting away of tracts of forest land at a rapid rate. Increasing care must be exercised by consumers in selecting the specie of wood for ties, if they expect to keep tie prices within bounds. In this article I shall deal wholly with ties used generally by electric roads, as steam roads have different conditions to contend with.

A few years ago oak and chestnut were the woods used most generally for tie purposes. They gave very good results, but to-day it is difficult to procure chestnut and oak ties with good faces, at a satisfactory price. The result is that, in the future, most electric roads will have to depend on Southern pine or Douglas fir to take the place of oak and chestnut.

The estimated life of untreated ties under normal conditions is as follows:

Specie of Wood	Estimated Life, Years	Specie of Wood	Estimated Life, Years
Black locust	15 to 20	White oak	7 to 9
Redwood	10 to 12	Chestnut	6 to 8
Cedar	9 to 11	Long-leaf pine	6 to 8
Cypress	8 to 10	All other woods	3 to 6

A question that is often asked is, "Why don't you use steel cross-ties if there is such a scarcity of good tie timber?" In answer to this I would reply that no doubt steel ties should be considered in some places, such as on bridge work, etc. But there are many objections to the use of steel ties in general. Some of these objections are as follows:

Rigidity of the track structure which eliminates that elasticity which facilitates train movement, and which must be hard on rolling stock by reason of the extreme wear and tear produced by the attendant jar and pounding while cars are in motion and are being started and stopped.

The greater noise produced by vibration in a solid steel track structure as compared with a flexible structure.

The corrosion of the tie, which can be overcome more or less by painting.

An early illustration of rigid structure is furnished by the Boston & Lowell Railroad, which was the second steam road to be built in this country. Granite sleepers were used when the road was first built, but they proved to be a failure.

The life of a tie depends upon the following conditions: (1) Kind of soil and foundation on which tie is to be placed; (2) size of tie and specie of wood from which it is made; (3) whether tie is treated with preservative or not; (4) whether tie plates are used or not; (5) kind of spikes used; (6) care taken of ties while in service, and (7) mechanical wear on ties due to traffic.

I have often been asked to state what kind of wood makes the best tie. This is rather a difficult question to answer except in a general way, as in one section of the country a cypress tie might be better than an oak or chestnut tie; in other words, local conditions must be considered in selecting the specie of wood to be used. For general use, it is my opinion that the Southern long-leaf pine tie treated with some good preservative will give very satisfactory results, and should last from twelve to twenty years in service.

It is a recognized fact that the preservation of wood is a step in the right direction, and the managements of electric roads should give this subject due consideration properly to realize the economic importance of the treatment of ties, bridge timbers, etc. The service of these is double and treble that of untreated wood. I am convinced that it would not pay the small electric roads to build pressure treating plants for their own use, and it would be better for them to turn this work over to some commercial plant near by. But for roads using, say, 100,000 ties a year and 1,000,000 ft. of lumber, a pressure-treating plant will more than pay for itself provided that it is operated in an economical manner, and that the plant is so located that oil can be obtained at a reasonable price.

The Boston Elevated Railway, realizing the above facts, has decided, after thorough study and investigation by the writer, to build its own treating plant. This will be located at the general yard in South Boston. The plant will be modern in every respect and will be equipped either for the "full-cell" or the Rueping process.

Plans and specifications have been drawn up by Grant B. Shipley, consulting mechanical engineer, and it is expected that the plant will be completed about May 1 of this year.

The treating cylinder for this plant will be 7 ft. 6 in. in diameter and 51 ft. 2⅜ in. long, so that standard-gage tramcars loaded with ties or lumber can be run into it. There will be two storage tanks for oil, and a working pressure tank mounted on scales to record the amount of oil used in each treatment, with all of the other equipment necessary for the successful operation of such a plant. In the operation of the plant the writer will have the assistance of his colleague, E. S. Lent.

Returning to the general subject of timber treating, I shall not go into the different processes used in the treating of timber, but will merely note that it is a waste of money to inject more oil into the wood than what is actually required before mechanical breakdown takes place. Of course, this limit cannot be determined until a careful study has been made of conditions where treated material is being used.

Small electric roads, which are not located conveniently near a commercial treating plant and where conditions do not warrant the building of a pressure plant can secure very good results by using the open-tank method of treating. No matter what method is used, however, it must be borne in mind that the best results are obtained only by using well-seasoned wood and by insuring the removal of all inner and outer bark before treatment.

The estimated life of ties treated by various processes under normal conditions is as follows:

Specie of Wood	Estimated Life with Various Treating Processes, Years	Specie of Wood	Estimated Life with Various Treating Processes, Years
Long-leaf pine	12 to 20	Hemlock	10 to 15
Chestnut	10 to 15	Red oak	12 to 20
Douglas fir	10 to 16	Beech	12 to 20
Spruce	9 to 14	Birch (yellow)	10 to 18
White pine	10 to 13	Maple	10 to 20
Tamarack	10 to 15	Gum	10 to 16

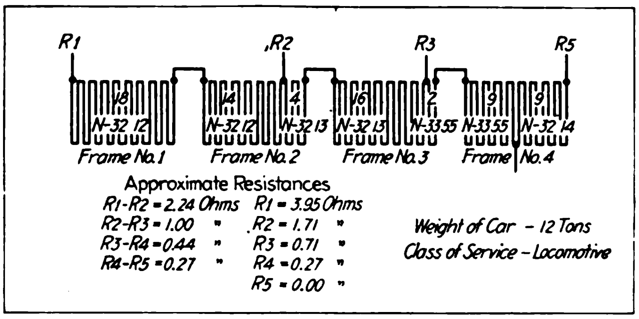
Electric roads that are located in territory where there is beech, birch, or maple, will find these species of wood very desirable for ties, if a preservative treatment is given.

Finally, I would state one of the most important things in obtaining good ties is to have specifications fully covering the class of tie to be used, with rigid inspection. Many failures of ties in service are due to lack of proper inspection.

Grid Resistor Tests and Standardization Found Important

BY AN EQUIPMENT ENGINEER

Tests made on the older types of equipment for certain service conditions led to the discovery of numerous discrepancies in the step resistances and capacities of grid resistors. Following these tests certain methods were adopted to standardize the design, construction and methods of testing grid resistors, primarily to reduce to a minimum the variety of component parts involved in the various assemblies for different motor equipments. The current tests indicated the capacities of the resistor steps, which when either insufficient or excessive for the service requirements, were corrected by calculation and checked by performance tests. After the correct capacity was established, drawings were prepared to cover each different type of motor equipment. A typical one of these drawings for two Westinghouse No. 93-A2 motors with K-11-A control, is shown in the accompanying illustration.



RESISTOR STANDARDIZATION—CONNECTIONS OF 8-IN., THREE-POINT RESISTOR FOR TWO WESTINGHOUSE 93-A2 MOTORS AND K-11-A CONTROL

Variations in the capacities of grid resistors in the older equipment were due to the different ohmic resistances of grids taken from different heats of iron. In order to correct any possible errors in the final assemblies following construction or repairs, a 10-amp. constant testing current is used and the corresponding voltage drop is checked by means of a table of correct drops. This current is low enough to make the temperature rise in the grids insufficient to alter radically their cold resistance. As indicated in Table I on grid

TABLE I—GRID RESISTOR MEASUREMENTS

Weight of Car	Motors			Type of		Dwg. No.	Connections		Approx. Volts
	No.	Make	Type	Con-trol	Grids		From	To	
11-Ton Pass.	2	Westg. Westg. GE.	3 49 800 B	K-2-A or K-10-A	CG	746-A	R1	R5	65
							R1	R4	61½
							R1	R3	52½
							R1	R2	34
20-Ton Pass.	2	Westg.	56	K-11-A	CG	747-A	R1	R5	37½
							R1	R4	34½
							R1	R3	29
							R1	R2	20
20-Ton Pass.	2	Westg.	93-A2	K-11-A	6½ in.-2 Pt.	735	R1	R5	37½
							R1	R4	34½
							R1	R3	30½
							R1	R2	24
20-Ton Pass.	2	Westg.	93-A2	K-11-A	8 in.-3 Pt.	748-A	R1	R5	38
							R1	R4	35
							R1	R3	31
							R1	R2	24
20-Ton Pass.	2	Westg.	310 E2	K-51-A	8 in.-3 Pt.	1758	R1	R4	49
							R1	R3	35
							R1	R2	20
37-Ton Pass.	4	Westg.	304 C	K-34-D	8 in.-3 Pt.	1766	R1	R5	13½
							R1	R4	12
							R1	R3	9
							R1	R2	5
							R6	R9	8½
							R6	R8	6½
							R6	R7	4
12-Ton Loco.	2	Westg.	56	K-11-A	CG	836	R1	R5	39½
							R1	R4	37
							R1	R3	32½
							R1	R2	22½

Weight of Car	Motors			Type of		Dwg. No.	Connections		Approx. Volts
	No.	Make	Type	Con-trol	Grids		From	To	
20-Ton Loco.	4	GE.	800 B	K-6-A	CG	1306	R1	R7	40
							R1	R6	38½
							R1	R5	36½
							R1	R4	33½
							R1	R3	28
							R1	R2	18½
12-Ton Loco.	2	Westg.	93-A2	K-11-A	8 in.-3 Pt.	837	R1	R5	39½
							R1	R4	37
							R1	R3	32½
							R1	R2	22½
20-Ton Pass.	2	Westg.	323 V3	K-51-A	8 in.-3 Pt.	1754	R1	R4	50½
							R1	R3	40
							R1	R2	26
30-Ton Loco.	4	GE. Westg.	57-H 56	K-14-A	CG	634	R1	R7	34½
							R1	R6	33
							R1	R5	31½
							R1	R4	29
							R1	R3	24½
							R1	R2	15
30-Ton Pass.	4	GE. Lorain	57-H 34	K-14-A	CG	640	R1	R	34½
							R1	R6	33½
							R1	R5	32
							R1	R4	29½
							R1	R3	25
							R1	R2	16½
40-Ton Pass.	4	Westg.	121 A	U.S.-A.B.	8 in.-3 Pt.	1760	S	S1	14½
							GR	R3	7
							GR	R2	5½
							GR	R1	3
							YR	RR3	7
							YR	RR2	5½
							YR	RR1	3

Weight of Car	Motors			Type of		Dwg. No.	Connections		Approx. Volts
	No.	Make	Type	Con-trol	Grids		From	To	
42-Ton Pass.	4	Westg.	303 A	U.S. H.L.	8 in.-3 Pt.	1767	S1	S2	6
							R3	R1	6½
							R3	R4	4
							R3	R2	3½
37-Ton F'ght	4	Westg.	121 A	U.S.-A.B.	8 in.-3 Pt.	763	S	S1	3½
							GR	R3	7
							GR	R2	5½
							GR	R1	3
							YR	RR3	7
							YR	RR2	5½
							YR	RR1	3
36-Ton Pass.	4	GE.	73-C	C-6	CG	1759	R1	R5	20
							R1	R6	16½
							R1	R7	15
							R1	X	13½
							R1	R4	9
							R1	R3	5
							X	R2	5½
33-Ton F'ght	4	GE. Westg.	73-C 121 A	L-4	CG	1761	R1	R10	42
							R1	R11	38
							R1	S	36½
							R1	R3	16½
							R1	R2	8½
							R4	R7	49½
							R4	R8	40½
							R4	R9	37
							R4	RS	31½
							R4	R6	22
							R4	R5	16½
30-Ton Loco.	4	Westg.	93-A2	U.S.-H.L.	8 in.-3 Pt	1762	R3	R1	33½
							R3	R4	26½
							R3	R2	21

Table II—Classification of Grid Resistors

Cars			Motors			Type of		Dwg. No.
Div.	Type	Class Nos.	No.	Make	Type	Control	Grids	
City	Sand Sweeper Pass.	32, 33 35, 36, 37, 38, 39 200-240, 250-288 501-565, 575-580 581-600, 701-765	2	Westg. Westg. G. E.	3 49 800-B	K-2-A or K-10-A	C G	746-A
City	Pass.	400-484, 601-635 800-834	2	Westg.	56	K-11-A	C G	747-A
City	Pass.	835-864	2	Westg.	93-A2	K-11-A	6½ in.- 2 Pt.	735
City	Pass.	636-645, 865-908 909-933	2	Westg.	93-A2	K-11-A	8 in.- 3 Pt.	748-A
City	Work Pass.	14, 15 934-958, 959-983	2	Westg.	310-E2	K-51-A	8-in.- 3 Pt.	1758
City	Work Sand Sweepers Snow plows	6, 7, 9, 10, 11 and 12 29, 30 and 31 40, 41, 42 and 43 120 and 121	2	Westg.	56	K-11-A	C G	836
City	Relief Sand	26 28	2	Westg.	93-A2	K-11-A	8 in.- 3 Pt.	837
City	Crane	23	4	G. E.	800-B	K-6-A	C G	1306
City	Pass.	(Trial equipment)	2	Westg.	323-V3	K-51-A	8 in.- 3 Pt.	1754
City Intr.	Locom. Work	2 100	4	Westg. G. E.	56 57-H	K-14-A	C G	634
Intr.	Pass.	79-93	4	G. E. Lorain	57-H 34	K-14-A	C G	640
Intr.	Freight	131, 132 and 136	4	Westg.	121-A	U.S.- A B	8 in.- 3 Pt.	763
Intr.	Pass.	20-38, 40-58	4	G. E.	73-C	C 6	C G	1759
Intr.	Pass.	21-39, 41-49 60-74, 67-77	4	Westg.	121-A	U. S.- A B	8 in.- 3 Pt.	1760
Intr.	Freight	126, 127, 130 and 134	4	Westg. G. E.	121-A 73-C	L-4	C G	1761
Intr.	Locom.	106	4	Westg.	93-A2	U. S.- H L	8 in.- 3 Pt.	1762
Intr.	Pass.	51-65	4	Westg.	304-C	K-34-D	8 in.- 3 Pt.	1766
Intr.	Private	600	4	Westg.	303-A	U. S.- H L	8 in.- 3 Pt.	1767

resistor measurements, the resistance in ohms for various connections is obtained by measuring the drop in voltage between connections, and noting the variation from the approximate standards shown in the table.

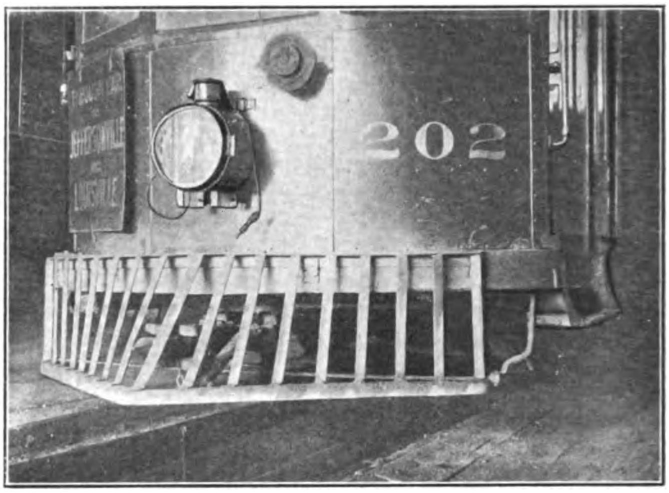
The method of classifying the various assemblies of grid resistors for car equipment is indicated in Table II. This also gives the number of the drawing showing the resistor connections for any particular equipment. The classification of grid resistors also serves as an index to the drawings of the various resistor assemblies, and all are bound in a single book, which puts all the information in handy reference form. On the other hand, the tests and standardization of resistor assemblies have resulted in practically eliminating resistance trouble, as well as difficulties in other parts of the equipment which arise from this source. They also facilitate the making of changes that may be required to meet certain service conditions. In other words, it is possible to fit the grid resistor capacity to the road service under which the electrical equipment is required to operate. Testing current is taken from a central control board through special test cables which are fed from a 600-volt busbar. A 15-amp. ammeter and a 75-volt voltmeter are the only measuring instruments employed in making these tests.

The decline of the jitney bus in Evansville, Ind., is evidenced by the fact that six months ago there were fifty such machines in operation, whereas on Feb. 1 there was only one in service.

Removable Pilot Used with Couplers

BY H. H. BUCHMANN
Master Mechanic Louisville & Southern Indiana Traction Company, New Albany, Ind.

Home-made, removable steel pilots that weigh 98 lb., conform to ordinance requirements and, at the same time, are readily removable for trailer operation, have been adopted as the standard by the Louisville & Southern Indiana Traction Company, New Albany, Ind. These pilots are so designed that they fit over the standard couplers used on the interurban cars of this company. Although the pilot is comparatively light, it has been found to meet service requirements as completely as those of much heavier construction. This is attributed to the spring action which absorbs the shocks that frequently destroy the usefulness of more rigidly constructed pilots. The top and bottom members of the pilot are formed of ¼-in. x 2-in. x 2-in. angles, one bent to a 5-ft. 7-in. radius and resting against the buffer, and the other forms the bottom of the nose-type pilot. Fourteen bars ¼-in. x 1½-in. in size are riveted to these two members with 5/16-in. rivets. One-inch round iron, combined knee braces and hangers fasten to the bottom and hold the pilot rigidly in position, while a ½-in. thumb screw passing through a clip at the center of the upper member holds the pilot against the buffer. A view of one of these standard pilots attached to a car is shown above.



REMOVABLE PILOT ATTACHED TO A CAR

Reclaiming Worn Axles

BY DANIEL DURIE
Master Mechanic West Penn Railways, Connellsville, Pa.

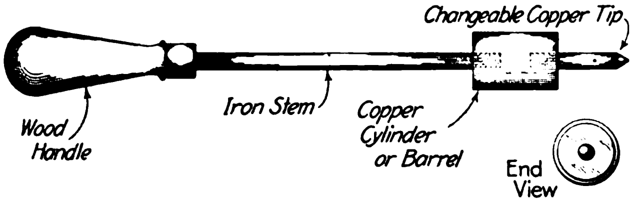
Successful results have attended the restoration of 5-in. axles to their original size by shrinking ¼-in. high-carbon, cold-rolled steel tubing on the old journals. This method of reclaiming axles is employed by the West Penn Railways Company when the 4-in. journals have worn to 3½ in. in diameter. The high-carbon, cold-rolled steel tubing used for this purpose shows a scleroscope hardness of 40 to 45, and it is applied to the worn journals with a 1/32-in. shrink. After the tube has been shrunk in place, one end is electrically welded to the wheel hub. Quite a number of the 5-in. axles used on this road had been in service for a number of years and they had become badly worn. Except for the decreased diameter of the journals these axles were in perfect condition. The application of the high-carbon sleeve restored the journal practically to its original condition, and it is contemplated that the life will be increased 100 per cent.

Small Heat-Retaining Soldering Iron

BY R. H. PARSONS
Electrical Foreman.

All who have had experience in the use of soldering irons will recollect that often, when the point in the operation was reached that it was inconvenient to stop, the iron got cold and it became necessary to change irons or wait for the one to become heated. It is impossible to accomplish small work with a large iron, and it is equally difficult to keep a small iron hot long enough to do a soldering job.

The accompanying sketch illustrates an iron which is designed for small work, such as lamp receptacles, wiring inside of small junction boxes, etc., and which will retain its heat much longer than the ordinary iron. Attached to the stem is a copper barrel or cylinder approximately 1½ in. long and 1 in. in diameter. A removable copper soldering tip is screwed into this barrel. Tips of several sizes can be used according to the nature of the work.



SMALL HEAT-RETAINING SOLDERING IRON

To use the iron, the barrel is heated in the flame of a blow torch or gas lamp. This retains the heat for a long time and transmits it to the tip. The tool thus gives all the advantages of a small tip for soldering, and at the same time has all the heat-retaining properties of a larger iron.

Experimental operation of four electric freight trains on the Bardonecchia-Modane trunk line, between the French and Italian frontier, including the Frégus tunnel, has given most satisfactory results and in consequence regular electric freight train service will be established in and out of Italy.

Interurban Cars for Binghamton Railway

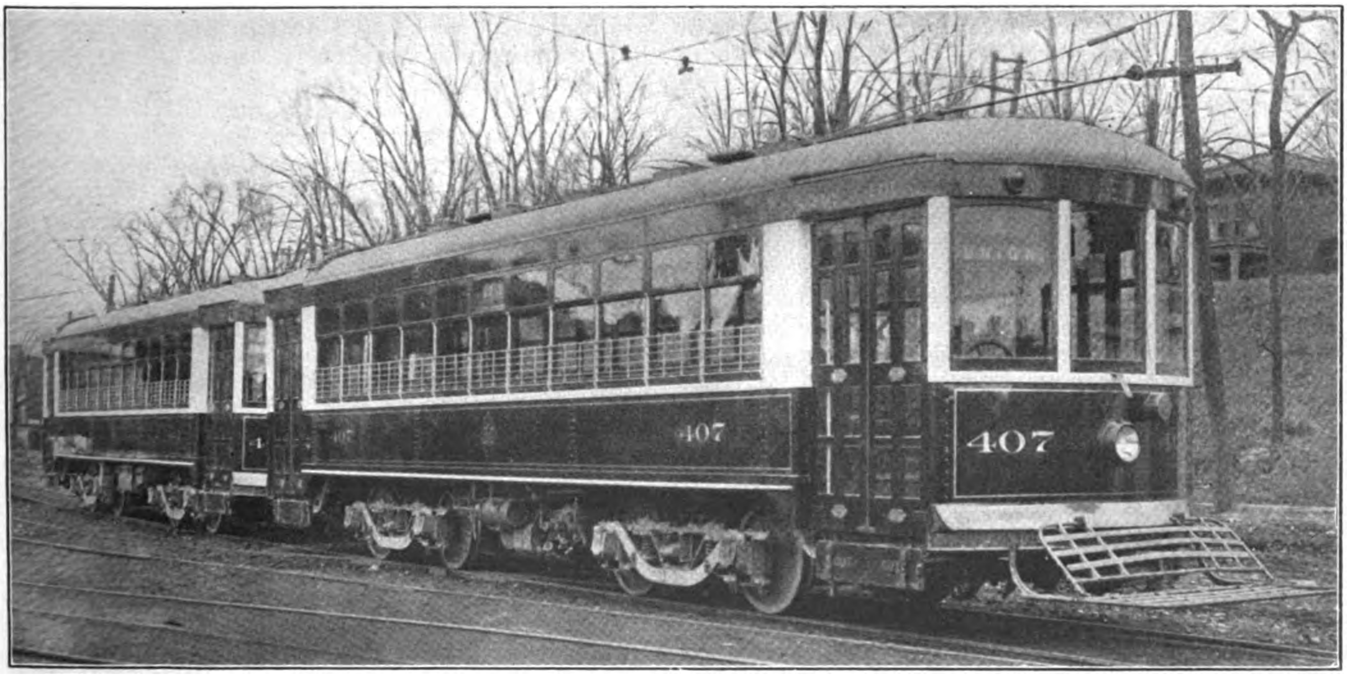
The Binghamton (N. Y.) Railway has recently placed in service a number of interurban cars which are being operated between the city of Binghamton and the towns of Endicott and Union, about 9 miles west of the center of the former city. Throughout much of its length the route passes residential districts, so that the service is more suburban in character than interurban, and for this reason the cars have general features which are commonly found in city cars, although the construction and equipment are designed to permit high-speed, multiple-unit operation.

The general dimensions of the cars are as shown in the following table:

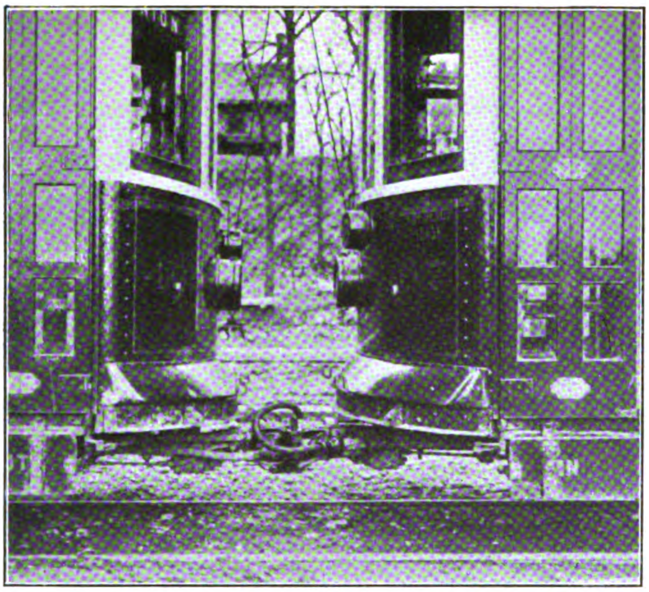
Length over all	42 ft. 0 in.
Length over vestibule	41 ft. 0 in.
Length over body	30 ft. 0 in.
Height from rail to roof	11 ft. 7 in.
Width over side sheathing	8 ft. 6 in.
Side post centers	30 in.
Truck centers	17 ft. 6 in.
Diameter of wheels	34 in.
Truck wheelbase	6 ft. 1 in.
Seating capacity	52

The entire bottom framing, body and roof are of steel construction, countersunk head rivets being used in assembling the framing so as to afford a smooth painting surface. Sheet-steel sheathing ⅛ in. in thickness is used for the sides and for the vestibules below the dash. The floor framing is covered with sheet steel and upon this is laid 13/16-in. yellow pine boards. The roof is of the plain arch type and is covered with No. 18 gage steel which is insulated on the outside with 1 in. of compressed cork, this being covered with No. 8 canvas. The wainscotings below windows are also formed of compressed cork 1 in. thick and this is covered with linoleum. The side-post cappings are made of special steel and are readily removable. The bumpers are formed of 5-in. steel channels and are protected by No. 16 steel shields to prevent anyone from riding on them.

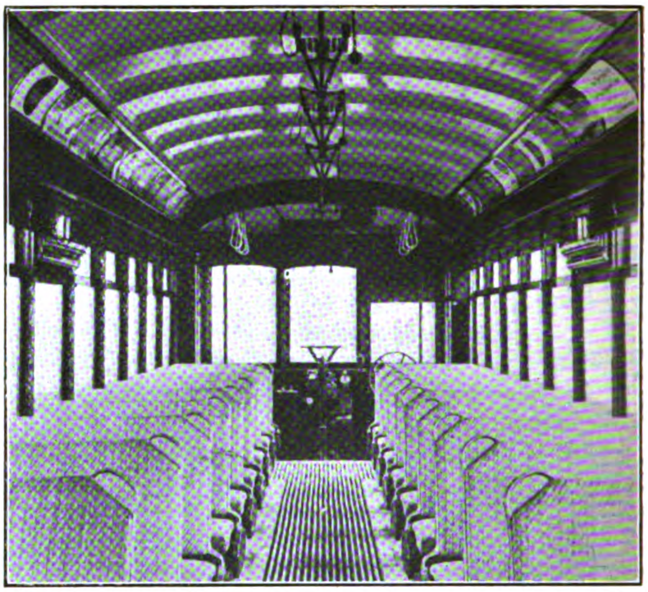
Special attention has been paid to the interior fittings so that the cars will be comfortable and at the same time will present an attractive appearance. The interior finish including sash, doors, mouldings, etc., are treated with Sherwin-Williams interior green and the



BINGHAMTON INTERURBAN CARS COUPLED TOGETHER FOR TRAIN OPERATION



COUPLER AND JUMPER CONNECTIONS BETWEEN THE CARS



INTERIOR VIEW OF BINGHAMTON CAR

ceilings are finished with Sherwin-Williams flat white enamel, the steel carlines being exposed.

There are eighteen 37-in. transverse seats with 19-in. backs, these being of the Heywood Brothers & Wakefield Company's make. All of them are provided with the double foot rests. The aisles are 24-in. wide. Longitudinal seats are provided in each corner of the car, these being upholstered in canvas-backed rattan like the transverse seats, and there are also folding slat seats in the vestibule at the entrance-door openings. As beforementioned, the main floor is made of yellow pine boards. These are finished with maple floor-mat strips ⅝ in. wide at the top, reaching for the entire length of the car body except for a space of 2 in. at the ends to allow for sweeping. These floor strips are jointed 2 ft. from the ends of the car, and the side floors are raised flush with the aisle strips. The platform floors are made of maple.

Eleven windows are provided on each side of the car body, the lower sash of each being fitted with the Cincinnati Car Company's standard flush barrel sash lock, engaging with holes in the two sides of the T-bar posts to hold the window at various heights. The upper sash is stationary with an arched head. All side windows are provided with Pantasote curtains and Curtain Supply Company's No. 88 ring-type fixtures with Rex rollers. Five ¼-in. hard-drawn steel window guards placed 2½ in. on centers are installed outside of the side windows on each side of the car. These are of the removable type and they are hung on a vertical rod secured to the post so that they can be raised or lowered to permit washing the window.

The vestibules at the ends of the car are arranged for pay-within operation and they have double folding doors on both sides which are operated in conjunction with the folding steps by the motorman and conductor. The risers of the three steps between the street level and the car floor are respectively 15 in., 13 in. and 12 in. in height, and the first step is of the folding type, the edge of the tread being covered with a 3-in. anti-slip surface which is provided also over the edge of the platform floor above the step. In each vestibule there are three drop sashes, the center one having stops so that it can be lowered part way and held in that position when desired, and being fitted with a sleet cleaner made by the Standard Accessories Company, New York. Adjoining each vestibule at diagonal corners of the car are Binghamton Railway Company's standard flush-type motormen's steps and roof mats to permit the crew to get upon the car roof in safety whenever that is necessary.

Included in the car-body equipment are Consolidated Car Heating Company's electric heaters with deflectors and thermostatic control. There has been installed also an Ohio Brass Company's Style B electric signal system, and each car is equipped with two Golden Glow headlights in the dashes. The latter have 94-watt lamps and are supplied with a dimming resistance which can be used when the car is operating through thickly-populated districts. Over the longitudinal seats in each corner of the car there is a hand-strap pole fitted with three Rico sanitary straps 5 ft. 10 in. from the floor.

Ventilation is provided by five combination ventilator, register and lamp fixtures made by the Dayton Manufacturing Company. The lamp fixtures are provided with Alba shades and 94-watt lamps, the lighting circuit being supplied with one extra lamp fixture that is controlled by a Nicholls-Lintern selector equipment. The folding door and step mechanism is of the Cincinnati Supply Company's standard design, and the doors are connected to the main switch through a contactor line-switch relay so that the car cannot be started when the doors are open.

Among the other equipment that has been supplied are Peacock staffless brakes. Consolidated buzzers, Westinghouse air sanders, Johns-Manville sand hose, Ohio Brass air traps, Earll trolley catchers, Dayton Model DB fare boxes and Sterling-Meeker double registers. There are also Hunter route signs at the front and sides, Berg fenders, Utility honeycomb ventilators, Root track scrapers, and transfer boxes of the Binghamton Railway Company's standard design.

The propulsion equipment consists of four Westinghouse 323-V motors with Baldwin trucks. The control is of the light-weight Westinghouse HL type permitting multiple-unit train operation when desired. For this reason the brakes have been designed for combined automatic and straight air operation, being of the Westinghouse A. M. M. type. There is a D-1-F air compressor with a Lord screenless air strainer and an American automatic slack adjuster.

To facilitate the quick separation of the two cars making up a train at the junction of the branch lines leading to the towns of Endicott and Union respectively, and their prompt connection on the return trip to Binghamton, there has been adopted the Westinghouse automatic car and air coupler with an electric jumper attachment. This coupler is of the tight-lock type with a pocket and pin on one side for making connections by means of a link to cars not having automatic couplers.

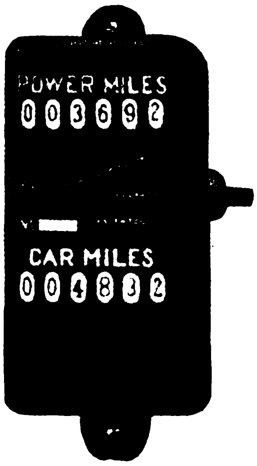
In the base of the coupler are two air connections for brake and control pipes, respectively, each of which is provided with a self-closing check valve having a tappet for opening it when two couplers come together. Fastened to one side of the head is a standard seven-point jumper receptacle. When two cars are brought together, the car and air couplings are automatically made and no valve has to be opened. There remains only the one electric jumper to be inserted in the two receptacles, and only twenty seconds are required for the completion of this operation. When cars are uncoupled the electric jumper is the only thing to be handled, as the unlocking of the two couplers and the closing of the four air-pipe outlets are accomplished automatically in twelve seconds by turning a valve in either cab and then separating the cars.

Special care has been given to the car wiring, all of which is run in conduit. The cables are run under the car bodies with junction boxes and condulets at motor and resistance leads. Where conduit enters the junction boxes it is fitted with T. & B. bushings and jam nuts, the boxes being fitted with rubber gaskets to make them waterproof. All conduit is electrically connected with the metal bolsters to provide a ground for connection. The electrical splices are well soldered and then insulated with a double layer of rubber tape, one layer of friction tape and painted with P. & B. paint. Lighting and air-brake compressor switches are placed on an enamel-plate base installed in a cabinet with a spring door.

The cars, which were built by the Cincinnati Car Company, were designed in accordance with specifications prepared by C. S. Banghart, vice-president Binghamton Railroad, and they are reported to have been received with very great favor by the patrons.

New Car Meter

The Electric Railway Improvement Company, Cleveland, Ohio, will shortly place on the market a car meter illustrated in the accompanying engraving. Its principle of operation is the comparison of the travel under power with the total travel of the car. The meter contains two counting heads, electrically actuated by a car wheel, one indicating power-miles and the other car-miles. A record is thus made not only of the coasting but also of the mileage of the equipment. The latter feature makes the computing of car-miles from the conductor's report unnecessary. The new meter is claimed to be the first to give on a mileage basis a record both of one part of the cycle—acceleration, coasting and braking—and the total cycle. In this way the number and length of stops do not affect the record and a comparison can easily be made between motormen.

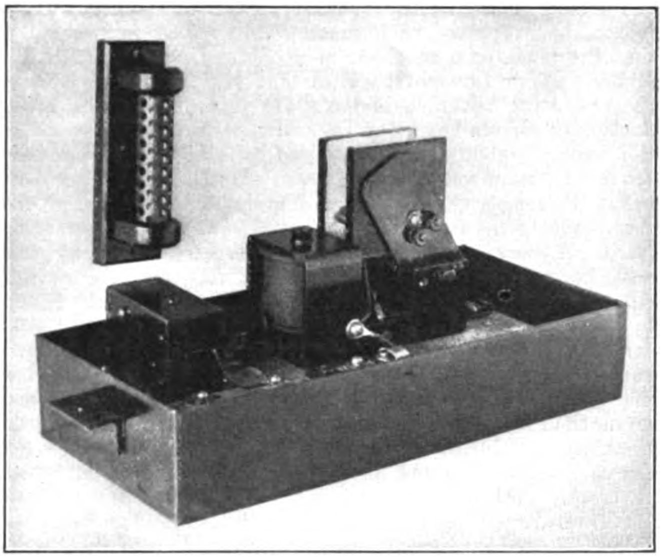


NEW CAR METER

The British Columbia Electric Railway's first-aid class of the St. John's Ambulance Association was examined by Major Paulin, president of the association, recently and first-aid certificates were granted to eleven employees of the company.

Underwriters Approve Thermostat Control

The Underwriters' Laboratories have rendered a report on the new system of thermostat control for electric heaters introduced during the past year by the Consolidated Car Heating Company. This control comprises a mercury thermometer which, through a rugged relay, operates a magnetic switch. The thermostat and the switch, with cover removed, are shown in the accompanying halftone.



MERCURY THERMOSTAT AND MAGNETIC SWITCH, WITH COVER REMOVED, FOR ELECTRIC HEATER CONTROL

The conclusions that were reached by the investigators who reported on the device for the Underwriters' Laboratories are as follows:

"1. *Construction.* The parts of this system are of rugged construction, and are judged to be so designed as to be properly safeguarded for use in automatically controlling the temperature in street cars. The design provides for the use of standard materials and the inclosure in metal of the controlling operating parts throughout.

"2. *Operation.* The circuit breaker is capable of carrying and breaking successfully and without undue hazard, current of the value for which it is rated. This conclusion is based upon the result of an operating test quoted in this report."

This new control is now operating successfully on more than 2000 cars, which is evidence of the indorsement by railroad officials of the manufacturer's claim that the use of the control results in economic use of energy and satisfaction to passengers through the uniformity of car temperature.

According to the annual report of the Victoria (Australia) Railway Commission, the electrification of the Melbourne Suburban Railways has been considerably retarded by the abnormal conditions created by the war. In some instances the workshops of contractors for supply of machinery and equipment have been requisitioned by the Imperial Government for the production of war munitions, and although every effort has been and will continue to be made to expedite the undertaking, the vital needs of the empire are paramount and everything must therefore be subordinated thereto. It is not possible at this time, because of the prevailing conditions as mentioned above to forecast the probable date of the introduction of electric traction.

NEWS OF ELECTRIC RAILWAYS

READING TRAFFIC REPORT PRESENTED

John P. Fox Makes Suggestions for Improvements—Company States Its Case

The report on the transit conditions in Reading, Pa., made by John P. Fox, transportation expert of the City Club, New York, at the request of the Chamber of Commerce, has recently been made public. The report states that the track as a whole is in good condition, although the amount spent for maintenance last year, 5.72 per cent of the operating revenue, is low. He recommends the introduction of double tracks on several streets, and believes that the company should not be obliged to install such expensive paving as required by the city. A waiting room for suburban passengers should be erected on Penn Square, or else raised platforms in the street, as in Newark and San Francisco. A new carhouse should be erected promptly, not only because the present one is not modern or fireproof, but because it is dark and cars cannot properly be cleaned in it. The track outside the carhouse should be put in good condition. Twenty-five new cars are needed, as the present rush-hour schedule allows for only one car in the shops and many of the present cars are old. Near-side cars are recommended with possible consideration of trailers. Better lighting and larger destination signs are needed. When the cars are overhauled the ceilings should be painted white. A trolley freight service should be installed on some of the interurban lines. The company's traffic has been unfairly affected by jitneys, and some regulation of the jitneys should be adopted. The management has shown efficiency in operation, and the damage cost has been low. A telephone dispatching system for city service is worth consideration. Records of car loading show little overcrowding. According to the report, "where the number of passengers on a car is 125 per cent of the seats, the overcrowding is moderate; 150 per cent is all that a car really ought to carry, and is the maximum set by some companies; 175 per cent is uncomfortably overcrowded, and anything over 200 per cent is excessively overcrowded." An improvement in speed can be made by omitting the half square stops, and making stops 540 ft. apart. The city can well afford to be more liberal in granting permission for short extensions, in view of the fact that the main franchises are perpetual. On this point the report says:

"If the Reading Traction management to-day were corrupt or incompetent, if the service were poor and the cars badly overcrowded, there might be some reason for the city to hold up all applications for new privileges until the company was willing to change its policy, or methods or its service. But the company has been for the last two years well managed by an executive noted for a broad public policy, who has given the best possible service with old equipment and done more for the public than any previous official.

"Where a traction monopoly is a good one and asks for privileges which will be of real public benefit, and where no serious principle is involved, the city can do no harm in granting new rights on the same conditions as have prevailed in the past. The company, on the other hand, should realize that times have changed, that franchises cannot be given away freely and for nothing as in the past, and that city officials are more or less bound to stand up for the new principles of making grants. If both parties will then come together, with a willingness on the part of each to waive something, there should be no reason why an agreement could not be quickly reached."

From reports filed with the Public Service Commission for the year ending June 20, 1915, Mr. Fox finds the following figures, based on the operating revenues: operating expenses 59.8 per cent; net revenue, 40.2 per cent; taxes assignable to railway operations, 3.1 per cent; operating income, 37.1 per cent; non-operating income, 14.7 per cent; gross income, 51.8 per cent; deductions from gross income, 47.3 per cent; income balance 4.5 per cent. Of the deductions from gross income the rent for leased roads amounted to 42.7 per cent. The charges against maintenance of way and structures and of equipment, totaling 11.8 per cent, he considered low, and the power cost, 20.6 per cent, both of operating revenues, high. For the latter an improved return circuit and coaster clocks or some similar device are recommended. The report estimates the cost of the road and equipment up to Nov. 1, 1915, as $5,203,200, which is $3.59 for every $1 of income. In conclusion, he recommends the gradual improvement and extension of the property by the owners, with co-operation and patience on the part of the public.

The Reading Transit & Light Company, which controls the lines in Reading, has issued a statement in regard to the report in part as follows:

"The report is so extensive and exceedingly comprehensive in most respects that it has been impossible to do anything but read it through hurriedly. In general it seems to be very fair, as most of the points of criticism are covered by an explanation of what the transit company has done or is doing to improve the conditions. A great many improvements have been carried out since Mr. Fox was here and the company has many plans in mind for future improvements which will benefit the service.

"The report calls attention to the improvement which is being made in the upkeep of the cars and new efforts that are being made to have the cars properly cleaned. Considerable has been accomplished since Mr. Fox's visit in the way of bettering the condition of the cars and service, and the company is anxious that the public should assist in every way possible to keep the cars clean.

"The report points out that fifteen additional cars are necessary and twenty-five will be desirable. Since Mr. Fox's visit twelve cars have been added to the system and three more are expected to be delivered during March. The company has plans for increasing the car equipment continuously to meet the requirements of the traffic.

"Additional lighting is being installed and an entirely new system of illuminated destination signs will be placed on the cars within a very short time.

"The company's shops have been rearranged recently and made more efficient in every way, the aim being to concentrate all the car work at one place where it can be better supervised. New trolley express service has been inaugurated.

"It is to be regretted that the financial matters could not have been given as much thought and consideration by Mr. Fox as the physical conditions of the property. Mr. Fox's study, as he stated in his letter of transmittal, was 'necessarily limited in its scope,' which did not enable him to become thoroughly familiar with the financial situation of the Reading properties and has led to many erroneous conclusions. This is evident from the contradictory points of view presented in the report, in which in one instance it is made to appear that the company is operating at a deficit and is not able financially to stand upon its own feet, as compared with the inference in another part of the report that the company is obtaining an abnormal return from operations on the value of its property. This is evidently due to his having taken the value of the railway property only on the one hand, and the revenue from the railway property and the electric property combined on the other hand. This has resulted in showing a return of twice as much as it actually is.

"The company appreciates the attitude taken by the Chamber of Commerce in presenting the traction situation to the public, as the general intention apparently has been to treat it fairly by following out a constructive rather than a destructive policy. With this same attitude on the part of the public in general, the public and the transit company will be of benefit to each other and their efforts united to produce the best results for the growth and prosperity of the community."

LEGISLATIVE INQUIRY SCENE SHIFTED TO ALBANY

On Saturday, March 4, on which day the Thompson legislative investigating committee adjourned its hearings until Thursday, March 9, the scene of activity was shifted to Albany. There on March 6 the Assembly passed the joint resolution extending the time for the investigation of the Public Service Commissions by the committee until July 1 and giving the committee until Jan. 10, 1917, to make its final report to the Legislature. The resolution was passed on Feb. 29 by the Senate. The vote was unanimous.

On March 7 the matter of confirmation of the nominations of Travis H. Whitney and Charles S. Hervey by Governor Whitman for appointment to the first district commission came up. Senator Thompson, chairman of the committee which has been investigating the Public Service Commission, told the Senate finance committee that there existed in the Public Service Commission for the First District an "inside machine, or system," of which Mr. Whitney was the head and front and through which the corporations had been enabled to dominate the commission. Senator Thompson named as other cogs in this machine Le Roy T. Harkness, assistant counsel, and D. L. Turner, one of the principal engineers in the service of the commission. The confirmation of Mr. Hervey was also opposed. The Senate finance committee was to have considered the nominations in executive committee on March 8, but the meeting was put over for a week. Senator Thompson said that he would urge the appointment of a subcommittee to call on Governor Whitman and ask him to withdraw the nominations. The Governor said that he believed as firmly as ever that Mr. Whitney was the right man for the place. Oscar S. Straus, present chairman of the Public Service Commission, on March 8 denied the charges of Senator Thompson that Travis H. Whitney, Leroy T. Harkness and D. L. Turner forced their opinions on the commissioners. Chairman Straus declared that if he were to be deprived of the services of the men named he should refuse to continue in office. He said:

"I would regard it as a calamity if the commission should lose the benefit of the ability and devotion to duty of these assistants. I accepted most reluctantly the appointment of the Governor to the chairmanship of the commission, but it came to me as an urgent call to render a public service and to aid in rehabilitating the commission in public confidence. I have given to it the best abilities that I possess, and if I am to be deprived of the services of the men named I should certainly refuse to continue in office."

John C. Wilson, characterized previously by H. M. Fisher, secretary of the Interborough Rapid Transit Company, as a chronic kicker, has announced that he proposes to sue for the restitution of certain sums which he thinks were paid out illegally.

VOTE ON $6,000,000 OF BONDS IN CINCINNATI ON APRIL 25

On March 3 the Rapid Transit Commission of Cincinnati, Ohio, adopted a resolution requesting the Council to submit to the voters a bond issue of $6,000,000 for the construction of the rapid transit belt line. Nothing was said regarding the date of the election, but it has already been decided to hold it in connection with the Presidential preferential primaries on April 25.

The Interurban Railway & Terminal Company has submitted two plans for the joint entrance of its line and that of the Cincinnati, Georgetown & Portsmouth Railway. It has also submitted a plan for the entrance of the "Rapid" division, which passes through Norwood.

The Cincinnati, Milford & Loveland Traction Company has reported that the only feasible route for its connection with the belt line is through Ault Park, and that if the park commission refuses to sanction this plan it will retain its present terminal at Madisonville.

The Cincinnati & Columbus Traction Company has informed the commission that no definite assurance can be given at present as to what will be done by the company.

Chief Engineer Krug has completed the details of the various stations for the belt line. The main station will be under the canal boulevard between Vine and Elm Streets. A freight terminal will be located on the site of the old city hospital.

APPEAL TO CALIFORNIA COMMISSION

Jitneys, Antique Franchises and Inequitable Taxation Cause Excessive Burdens—The Commission's Reply

Nineteen electric railways, comprising the principal city systems in California, have sent a communication to the Railroad Commission describing the deplorable financial condition of the properties and petitioning for relief. The three principal problems for which a solution is required are enumerated as follows:

First, and probably of most immediate importance to street railways generally, is the question of auto-bus competition, now either wholly unregulated or where regulated, by means which are unsound from an economic standpoint and most unsatisfactory to the public, to the railways and to the auto-bus operators.

Second, the advisability from all viewpoints of substituting for the present obsolete and burdensome form of franchise a modern form under which the companies may, with safety, finance extensions and make reasonable improvements in service where the public interest requires.

Third, the method of taxation applicable to street railways, which imposes burdens upon that class of utilities not borne by utilities generally, and which, by reason of considerations at present controlling the revenue of street railways, is more onerous on that class than would be similar methods applied to others.

While the railways realize that a suit is now pending in the Supreme Court to determine the commission's jurisdiction on the jitney-bus situation, it is admitted that more jurisdiction than now obtains can be conferred by the legislature, and the railways believe that a report from the commission, based on a careful investigation of the subject, will be received by the people and the legislature as authentic and would form a basis for the enactment of necessary laws. Under the present plan extensions of lines and improvements in service have practically ceased, and many companies are operating at an actual loss. It is believed that these losses aggregate $2,500,000 and that the loss to the State alone from the gross earnings tax payable by the companies amounts to at least $130,000. While some cities have "solved" the problem by a purported exercise of the police law, the means used are of such doubtful legality in some cases as to be the source of threatened and actual litigation, and they do not reach the fundamental principles involved.

In regard to franchises, the companies think the present form is archaic. It imposes unnecessary burdens upon the street railways and yields no substantial benefit to the public. One trouble is their limited term. Toward the end of a franchise there is no inducement to a company to extend its lines or make improvements in service. But if the franchises were indeterminate and contained adequate and equitable provision for the acquisition of the system by the city, bonds could be sold for extensions and betterments, and the system would be maintained at approximately 100 per cent efficiency.

Finally, there are gross inequalities as regards taxation between the steam railroads and the street railways, and while the problem of taxation is being studied by other departments of the State government, the commission should have the facts brought before it. Among the most burdensome requirements is that for paving at a cost far in excess of anything contemplated when the original franchises were accepted. It is believed that the cost solely for laying and maintaining the pavements represent from 4 per cent to 10 per cent of the gross receipts in the companies. In this connection the communication refers to the passage of an act by the Massachusetts legislature in 1898, relieving the railways of paving obligations imposed upon them by their franchises, an act which was subsequently upheld by the Supreme Judicial Court of Massachusetts.

In conclusion, the railways suggest a study of all of these subjects by a committee including in its membership, if possible, a commissioner and such of the commission's experts as are specially qualified for the undertaking. The communication is signed by G. H. Weeks, Charles N. Black, C. P. Cutten and W. A. Sutherland.

Replying to the committee, Max Thelen, president of the commission, said that the street railway question was a difficult one, complicated by the fact that the local authorities as well as the utilities and the commission are all interested. The commission intends to continue its jitney-bus investigation, but in the matter of taxation, Mr. Thelen pointed out that the commission has no jurisdiction and suggested that the matter be taken up with the State tax commission. He added that the commission would probably enter upon a study of the franchise question for its own information and would be glad to have any data or views which the companies could supply.

PHILADELPHIA TRANSIT PLANS MODIFIED

W. S. Twining, director of transit of the city of Philadelphia, has made public the revised plans of rapid transit work decided upon by the new city administration. These modify the original plans made by A. Merritt Taylor, Mr. Twining's predecessor.

The plan now calls for a subway from Erie Avenue on the north to Spruce Street on the south, along Broad Street, and not from Olney Avenue to League Island, as originally laid out. There will be only a four-track system from Erie Avenue to Ridge Avenue, and only two tracks from Ridge Avenue to Spruce Street, south on Broad Street. Mr. Taylor had planned a four-track line from Olney Avenue to Arch Street and then the same number of tracks diagonally under the westerly foundations of City Hall and down to Spruce Street. Now only two tracks will run under City Hall and beneath only a small section of the southwest corners of the foundation walls.

The much-discussed delivery loop will really be no loop for the present. It will run in two tracks south on Ridge Avenue from Broad Street to Eighth and Market, thence south to Walnut and west to Sixteenth Street. At the latter point it will dead-end for the present and trains will be switched back from there, as they will do at both the northerly and southerly terminus of the Broad Street line. The loop and the Broad Street line will not be connecting save from Ridge Avenue north and by a different level at Broad and Walnut Streets. The ends of the lines, which are independent and not essentially co-operative under the new plan, are designated by Director Twining as stubs until the city is financially able to push the work further. This means that the connection for the Parkway extension and the Roxborough elevated is a matter for the future. The Frankford elevated will run only to Bridge Street in that section. League Island will have to wait as will the section north of Erie Avenue and the Darby and Woodland Avenue lines.

The Keystone State Construction Company, which was awarded the contract for the work around City Hall and had made considerable progress until work was ordered stopped a few days ago, will be retained, but with the department of city transit having supervision over its allowance. The company will have to do under the new plan only a small part of the work which was originally contracted for at $1,700,000.

WILKES-BARRE STRIKERS ASK $90,000 DAMAGES

Denying all averments of the Wilkes-Barre (Pa.) Railway as to acts of lawlessness, the employees of the company who are on strike have filed an answer to the injunction suit and demand $90,000 for loss of wages, claiming the company refused to continue its agreement to arbitrate the wage question. The strikers contend that they did not violate the agreement concerning arbitration and say that they were prepared to negotiate a contract when the company refused to confer further with the committee representing the strikers.

The company has demanded damages of $200,000 from the strikers, alleging violation of contract, but the strikers answer that the company has suffered no loss through any act of the men. The men also claim that it was understood at the time arbitrators were named that a flat rate wage and not a sliding scale was to be fixed. It is claimed that the men protested at once, and that they received their pay under the award of the arbitration board under protest. The strikers answer that the arbitration board has not completed its duties and that the award that was filed has been rescinded by an act of a majority of the board.

PENNSYLVANIA REPORT REFERS BRIEFLY TO ELECTRIFICATION

The pamphlet report of the Pennsylvania Railroad for the year ended Dec. 31, 1915, contains the following paragraphs dealing with electrification:

"The electrification of the main line suburban zone from Broad Street Station to Paoli, explained in previous reports, was completed, and the operation of multiple-unit electric trains was inaugurated on Sept. 4, 1915.

"The proposed electrification of the main line across the Allegheny Mountains, between Altoona on the eastern slope and Conemaugh on the western slope, referred to in previous reports, received further consideration. Electric traction would facilitate the heavy traffic movement on this difficult section of your main line and effect a saving in operating expenses, but the company prefers to obtain the benefit of the experience of other lines in the use of electric traction for heavy freight trains, and to see a further expansion of its own revenues before procuring the new capital required for this important project."

60 IN. OF SNOW IN VANCOUVER IN TWO MONTHS

Record Snowfall in Coast Cities—British Columbia Electric Railway Abandons Eight-for-a-Quarter Tickets

The severe weather conditions experienced recently at Vancouver, B. C., are believed to be without precedent in the annals of the coast cities of British Columbia. The records of the meteorological office date back to fifty-five years, but they do not disclose conditions similar to those which prevailed during January and February of this year. The recorded snowfall in the city of Victoria during the months mentioned was 76.6 in. and in the city of Vancouver about 60 in. During the first week in February about 33.6 in. of snow fell in Vancouver, while during the month of January 26.4 in. fell.

Notwithstanding these severe conditions the British Columbia Electric Railway, Ltd., maintained city and interurban service on the mainland practically without interruption. The company was not so fortunate, however, in Victoria, where the service was tied up for two days. This was due primarily to the breaking of one of the transmission lines under the heavy snowfall. It resulted in a service interruption of one hour. During this space of time the snowfall was exceedingly heavy and on the resumption of the power supply the cars were completely snowed in. The company has been congratulated by the civic and municipal authorities, boards of trade and other public bodies for its efforts to contend successfully with the unprecedented conditions.

A number of jitneys resumed operation immediately on the disappearance of the snow, but not to the same extent as in 1915. On Jan. 1, when the municipal and provincial licenses became due, 190 jitneys took out licenses and furnished the necessary bonds in the city of Vancouver. Since that date, however, sixty of these licenses have been cancelled because of the failure of the applicants to meet the payment due in respect of indemnity bonds. This number compares with 670 jitney bonds filed in 1915.

As stated in the ELECTRIC RAILWAY JOURNAL of May 15, 1915, page 959, the company introduced a system of cheap tickets on May 10 of last year, selling eight for 25 cents without transfer privilege. This was advertised by the company as an experiment until Dec. 31, 1915. This radical cheapening of fares increased largely the number of passengers carried on the cars in the cities of Vancouver and Victoria without, however, any compensating increase in revenue. The sale of this class of ticket was discontinued at the close of the year and six tickets for 25 cents with transfer privilege were substituted therefor. This change has been favorably received by the traveling public and up to Feb. 25 the number of passengers carried on the cars was considerably in excess of the number carried during the same period in 1915, notwithstanding the fact that there has been no increase in the population. This indicates that the company is now carrying many persons who previously patronized the jitneys.

The company operates 169 miles of city railway and 181 miles of interurban railway.

CONFERENCES ARRANGED ON DALLAS FRANCHISES

Conferences have been arranged between the City Commissioners of Dallas, Tex., and the representatives of Stone & Webster at which the differences with respect to the proposed franchises of the street railway and the lighting properties will be considered. Meanwhile the summary sheets of the report of E. W. Bemis, referred to in the ELECTRIC RAILWAY JOURNAL of Feb. 26, page 417, are being received in Dallas. The itemized report is expected to follow shortly. In order that the voters may acquaint themselves thoroughly with every proposition before voting on April 4 the book containing copies of all proposed charter amendments to be voted upon at the coming city election and of the franchise ordinances which the city proposes to pass for the regulation of street railway and lighting companies will be published at once by the city and a copy mailed to every voter.

SINGLE-PHASE FOR NEW YORK CONNECTING RAILWAY

It is understood that the committee of engineers to which was referred the question of the type of electrical equipment to be used on the New York Connecting Railway has reported in favor of the single-phase system for the entire line. The route extends from Port Morris, north of the Harlem River, over a bridge to Long Island, extending southward to Bay Ridge, a total distance of about 20 miles. However, from Fresh Pond Junction to Bay Ridge the tracks of the Long Island Railroad will be used, thus making only 8 miles of new route construction. The road will be double-tracked for its entire length and there will be about 10 miles of yard trackage at Bay Ridge, where there are located unloading piers for the car floats, which transfer freight from the Pennsylvania lines on the Jersey shore. Including this yard the track mileage to be electrified will amount to approximately 50 miles. The route will be used for both freight and passenger service, the passenger trains running over a connection to the Long Island tracks at Astoria and from there through the tunnel under the East River to the Pennsylvania Railroad station on Manhattan Island. The lines will be placed in operation some time between the months of January and April, 1917.

EMPLOYEES SCHOOL AT BRADFORD ATTENDED BY WOMEN

The latest addition to the municipal institutions of Bradford, England, is the tramway school. It has been established only a short time, and it was intended primarily to enable men to be taught the duties of trainmen of the city tramcars. Twenty young women have now entered the service of the tramway department as potential conductors, and they are learning the theoretical part of their work in the tramway school. The decision to employ women on the Bradford trams was arrived at reluctantly by the tramways committee, but war conditions made this the only course possible to enable the service to be maintained. Everything is being done to make as agreeable as possible for the women a type of work which the committee has so reluctantly engaged them to undertake. Though their hours of duty will be practically the same as those of the men, the women will have double the customary time for meals. Special arrangements have been made to provide them with separate accommodation for meals and rest, and they will be under the control of a woman superintendent. Their rate of pay will be the same as that of the men, and they will be provided with suitable uniforms. The schoolroom embodies a peculiar combination of the customary features of a classroom and those which tramway work demands. There is a blackboard, and several rows of desks are ranged down one side of the room, but the other side is occupied by a skeleton tramcar. The women students in the school are only partially concerned with matters relating to the operation of the car. Their teaching chiefly centers around the value of tickets, the rules and regulations of the service, their duties as to stopping places, and the numerous facts which it is possible to impart without actual service on the routes.

The tramways and electric lighting committee of the Liverpool Corporation has decided that, as far as possible, vacancies arising in the electrical department shall be filled by soldiers and sailors discharged through disablement, subject, of course, to suitable qualifications.

ADVISORY COMMISSION FOR TORONTO

Special legislation will have to be secured before a permanent transportation commission can be established in Toronto, Ont., to manage, control, operate and supervise transportation facilities within the city limits. This is the opinion expressed by City Solicitor Johnston in a report made to the Board of Control. It was possible such a commission might be created following a favorable vote of the people, but even then legislation would have to be obtained for the transfer of the statutory powers now vested in the city engineer to the new body. The City Council, however, had the power to appoint an advisory commission, but any action that might be necessary to give effect to recommendations made by such a body would have to be authorized by the Council.

DECISION IN TACOMA CASE

The United States Circuit Court of Appeals at San Francisco, Cal., has affirmed the decision of the District Court of Washington in the case of the Old Colony Trust Company against the city of Tacoma. The lower court decided the municipality had a constitutional right to nullify a franchise that had been given to the Tacoma Railway & Power Company. The Old Colony Trust Company was trustee for the bondholders of the power company. In 1905 a franchise for twenty-five years was granted to the power company to sell electricity for heating and power purposes. The privilege of selling power for lighting was not given. In 1913 the Tacoma Railway & Power Company, according to the municipality, entered into a contract with the Northern Pacific Railway to supply light. When the power company refused to rescind the contract, the Tacoma City Council ordered the franchise revoked on the ground that its provisions had not been observed. The Old Colony Trust Company appealed.

"AMERICA'S ELECTRICAL WEEK"

This name has been selected by the campaign executive committee of the Society for Electrical Development as the official name for the great electrical celebration, Dec. 2 to 9, 1916. A start has already been made on the nation-wide campaign which from every indication will surpass even the wonderful results accomplished by the 1915 "electrical prosperity week." The campaign executive committee has eleven members and there is also an advisory committee of twenty-six, representing the jobbers, central stations, manufacturers, contractors and the electrical industry at large. The campaign will again be conducted under the auspices of the Society for Electrical Development, which so competently handled the big affair last year.

City Rejects Company's Lighting Proposal.—The city of Fort Wayne, Ind., has rejected the proposal made by the Fort Wayne & Northern Indiana Traction Company to take over the lighting of the city under a contract which the company estimated would save the city more than $300,000 in ten years.

Conference on Pittsburgh Subways.—The City Council of Pittsburgh, Pa., sitting as the committee on public service and surveys, has decided to take up the question of the construction of a subway and has adopted a motion asking Attorney A. O. Fording of the Pittsburgh Subway Company and Attorney A. E. Anderson of the Pittsburgh District Railways to confer with members.

Railway Man Reported Accused.—A press cable to the United States from Manila, dated March 4, stated that Percy Farrant, auditor of the Manila Electric Railroad & Light Company, had been arrested. It is said he is charged with embezzlement of funds amounting to $50,000 extending over a period of seven years. Mr. Farrant has been connected with the company in Manila since it began operations in 1905.

$345,000 Requested for Power Improvements in Cleveland.—Fielder Sanders, street railway commissioner, has been petitioned by the Cleveland (Ohio) Railway for permission to spend $345,000 in the improvement of the Cedar Avenue power station, the equipment of which has become obsolete. The company states that $95,000 will be taken from the maintenance fund and $250,000 would be classified as capital. Commissioner Sanders is making an investigation to determine whether it will be cheaper to make the improvement or purchase power. He is said to favor the submission of bids for power in order to determine the question.

Widening of Broadway Devil Strip Suggested.—The Public Service Commission for the First District of New York on the recommendation of Clifton W. Wilder, its electrical engineer, has called the attention of Borough President Marks and the Board of Estimate to the necessity of widening the strip between the car tracks, especially in Broadway. At present there is a stretch of 13,120 ft. of track along Broadway in the section where the permanent roadway had not been restored since the new subways were constructed, and Mr. Wilder said that gave an excellent opportunity for the alteration of the present lines.

New Wage Scale on Cleveland Suburban Line.—The Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, has reached an agreement with its employees which provides that for the first three months of the first year new men work their compensation shall be fixed by the company, probably 22 cents an hour. For the remainder of the year the wages are to be 28 cents. The second year the men are to receive 30 cents and the third year and thereafter, 32 cents. The old scale began with 22 cents for the first year and increased 2 cents each year to 30 cents. The new scale will go into effect on April 1.

Newport Franchise Negotiations Apparently Fail.—Negotiations between the South Covington & Cincinnati Street Railway and the Commissioners of Newport, Ky., relative to the renewal of its franchise were broken off on March 2. Mayor Livingston and one of the commissioners favored a continuation of negotiations in the belief that an agreement could finally be reached, but the other commissioners overruled them. The commissioners demanded a rental of $10,000 a year for the use of the streets. The company offered $3,000. It is said that the city will now seek through the courts to collect $1,000 a month rental for the use of the streets.

Interurban Roads Must Pay Excise Tax.—In the case of the State of Ohio against the Cincinnati, Milford & Loveland Traction Company, the Ohio Supreme Court handed down a decision on Feb. 28 to the effect that interurban companies must pay the excise tax on the portion of fares paid to street railways for the use of their tracks, the same as on other passenger income. Suit was brought against the company for the recovery of $237 tax on money paid to the Cincinnati Traction Company for the use of its tracks. The interurban railway paid the city company 3 cents of each fare collected within the city, and contended that this should not be included in its gross receipts, because it did not receive the benefit from it. The lower courts had held for the State.

Doherty Men Discuss One-Man Cars and Package Freight.—A consultation of the traction heads of the Doherty organization was held recently in New York. In attendance were F. R. Coates, president of the Toledo Railways & Light Company; J. H. Van Brunt, vice-president of the St. Joseph Railway, Light, Heat & Power Company; A. B. Paterson, general manager of the Meridian Light & Railway Company; R. L. Lindsey, general manager of the Durham Traction Company; B. Waller Duncan, general manager of the Cumberland & Westernport Electric Railway Company; R. F. Carbutt, railway engineer, and W. W. Lowe. One-man operation, the development of package freight business, a central bureau for Doherty advertising and other matters were discussed.

Million Dollar Terminal for Coney Island.—The Public Service Commission for the First District of New York has authorized the New York Municipal Railway Corporation (Brooklyn Rapid Transit System) to award the contract for the construction of the Coney Island terminal to the Lord Construction Company, the lowest bidder, for $1,279,274. The company is to furnish the materials and the contractor to do the work of erecting and installing, including track-laying, station finish, etc. The contract, which has already been approved by the commission, provides for the construction of the terminal, including concrete pile foundations and the erection of an elevated structure thereon, the construction of four elevated stations, including trainmen's quarters in Stillwell Avenue and Brighton Beach stations, interlocking towers, etc., and the maintenance of existing operating facilities during construction.

Extension in New York Elevated Signal Order.—The Public Service Commission for the First District of New York has granted to the Interborough Rapid Transit Company an extension from March 1 to March 20 of the time within which to indicate its acceptance of an order to install an experimental system of signals on its elevated railroad lines. On April 27 of last year the commission adopted an order for an experimental system which was to be "capable of preventing collisions and so designed as to permit the operation of the maximum number of trains." The commission finally admitted that there was force in the company's contention that the execution of the order was really impossible since any system which would absolutely prevent collisions must retard service. The resolution has accordingly been modified so as to provide for the installation by Sept. 1 next of one or more experimental systems of signals which will afford protection against collisions and at the same time reduce the capacity of the lines as little as possible, and the company is to report thereon by March 1, 1917.

PROGRAMS OF ASSOCIATION MEETINGS

New York Railroad Club

The annual electrical night of the New York Railroad Club will be held at the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on the evening of March 17. A paper will be read at the meeting by George Gibbs of Gibbs & Hill, New York, on the report of the committee on smoke abatement and railway terminal electrification, which was abstracted in the ELECTRIC RAILWAY JOURNAL for Dec. 4 and Dec. 11, 1915. A number of prominent engineers are expected to discuss the paper.

Wisconsin Electrical Association

The Wisconsin Electrical Association's annual convention will be held in the club room of the Hotel Pfister, Milwaukee, Wis., on March 16 and 17. On March 16 there will be a joint session with the Wisconsin Gas Association. The following is a list of subjects on which papers will be presented:

"Attitude of the Wisconsin Railroad Commission on Security Issues," by Harold L. Geisse, secretary of the Railroad Commission of Wisconsin.

"A Review of State Legislation During the Past Session," by John B. Sanborn of Sanborn & Blake, Madison, Wis.

"Methods of Taxation of Public Service Companies in Wisconsin and Why Taxes Have Been Increasing Annually," by T. E. Lyons of the Wisconsin Tax Commission.

"Outdoor Substations," by H. W. Young, president of the Delta Star Electric Company, Chicago.

"Rates for Residence Electric Service," by A. C. Babson, manager of the Wisconsin Gas & Electric Company, Watertown.

"Street Lighting Rates and Contracts," by G. W. Van Derzee, assistant to the vice-president of The Milwaukee Electric Railway & Light Company.

"Two Years' Experience With One-Man Car Operation," by R. M. Howard, general manager of the Wisconsin Railway, Light & Power Company, Winona, Minn.

"The Telephone Company and the Electric Utility," by S. O. Seymour, general manager of the Wisconsin Telephone Company, Milwaukee.

S. B. Way, vice-president and general manager of The Milwaukee Electric Railway & Light Company, in conjunction with the Wisconsin Electrical Association's committee on overhead distribution, will discuss the subject "The National Electrical Safety Code."

Another subject scheduled for discussion is "Automatic Current Limiting Circuit Breaking for the Protection of Railway Feeders and Rotary Convertors."

The entertainment feature will be a banquet in the fern room of the Hotel Pfister at 7 p. m., on March 16. Speakers of national reputation, among them Lou J. Beauchamp, famous Chautauqua lecturer, will be present.

Financial and Corporate

I. C. C. ISSUES ACCOUNTING ANSWERS

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts Prescribed by Commission for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts prescribed by the Interstate Commerce Commission for electric railways has just been released by the commission. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission. The questions raised and the answers made to them follow:

Q. To what account should be charged an attorney's fee in connection with a suit to annul an electric light franchise?

A. To operating expense account No. 86, "Law Expenses," unless the lighting business is accounted for as an auxiliary operation, in which case the expense should be charged to income account No. 214, "Auxiliary Operations—Expenses."

Q. A company was required under the terms of its franchise to do extensive grading in connection with the initial construction of tracks. No distinction was made as between the amount of grading which would have been necessary to construct an electric railway and the amount of grading done in excess thereof in order to comply with the city's requirements. Will it be proper to charge the entire cost of such grading to road and equipment account No. 504, "Grading"?

A. The entire cost of grading a street in connection with the initial construction of the track should be included in road and equipment account No. 504, "Grading."

Q. A company owning certain ocean front lots, the cost of which is included in road and equipment account No. 503, has found it necessary to construct a sea wall to prevent the land from being washed away. To what account should the cost of the wall be charged?

A. To account No. 503, "Other Land Used in Electric Railway Operations."

Q. To what account should be charged an assessment against a street railway for its share of the cost of elimination of a grade crossing, resulting in the elevation of a steam road crossing over that of the electric railway?

A. To road and equipment account No. 516, "Crossings, Fences and Signs."

Q. To what account should be charged an electric railway's proportion of the cost of building a city street over the electric railway's right-of-way?

A. To road and equipment account No. 516, "Crossings, Fences and Signs."

Q. Occasionally a company sells material from stores and a small percentage is added to cover the expense of handling, etc. To what account should the added percentage be credited?

A. As the added percentage represents principally cost of handling, it should be credited to operating expense account No. 95, "Store Expenses."

Q. Under the terms of a mortgage a company is required to keep the proceeds of certain bonds in a fund to be used only in payment for newly acquired property. Under what balance sheet account should the amount of this fund be entered?

A. If such funds are held by trustees or have been specially deposited, the amount thereof should be included in balance sheet account No. 408, "Special Deposits."

Q. A number of years ago a company sold bonds at par. These bonds are now due and refunding mortgage bonds, due twenty-five years hence, are being issued at 90. Is it permissible to amortize the 10 per cent discount on the refunding mortgage bonds throughout the twenty-five years?

A. Either the 10 per cent discount on the refunding mortgage bonds should be amortized over the life of such bonds by uniform monthly charges to income account No. 222, "Amortization of Discount," or the option may be exercised of charging all or any portion of the discount remaining at any time unextinguished to profit and loss account No. 313, "Debt Discount Extinguished Through Surplus."

Q. In what balance sheet account should interest paid in advance on notes payable be included?

A. In account No. 420, "Other Unadjusted Debits."

Q. Under the sinking fund provisions of a mortgage a company is required to set aside annually from surplus, and pay to trustees, specified sums for the purpose of retiring the bonds issued under the mortgage. (*a*) What is the correct accounting for the amounts thus set aside? (*b*) How should bonds issued or assumed by the accounting company and purchased by the trustees of the sinking fund be accounted for?

A. (*a*) The specified sums set aside annually from surplus for sinking fund purposes should be charged to profit and loss account No. 309, "Appropriations of Surplus to Sinking Fund and Other Reserves," and credited to balance sheet account No. 449, "Sinking Fund Reserves." When the sums set aside are paid to the trustees of the sinking fund, balance sheet account No. 402, "Sinking Funds," should be charged and account No. 407, "Cash," credited. (*b*) If the trustees purchase bonds issued or assumed by the accounting company at a discount, the amount of discount realized should be charged to account No. 402, "Sinking Funds," and concurrently credited to account No. 306, "Miscellaneous Credits." If the bonds are purchased at a premium, the amount of the premium paid should be credited to account No. 402, "Sinking Funds," and concurrently charged to profit and loss account No. 317, "Miscellaneous Debits." When the reacquired bonds are canceled, account No. 402, "Sinking Funds," should be credited and account No. 427, "Funded Debt Unmatured," charged with the par value of the bonds. Concurrently, account No. 449, "Sinking Fund Reserves," should be charged and account No. 448, "Funded Debt Retired Through Surplus," credited with the amount of surplus expended in the discharge of the principal (less the discount, if any, suffered at the time of sale) of the bonds. (See case 312 and note B of account No. 448, "Funded Debt Retired Through Surplus.")

Q. (*a*) To what account should be charged the cost of labor for changing advertising cards in cars? (*b*) To what account should be credited the revenue received for the privilege of placing these cards in cars?

A. (*a*) To operating expense account No. 78, "Other Transportation Expenses," unless the employees performing such work are also engaged in other duties, and the amount involved in connection with changing or caring for the cards is small and not readily ascertainable, in which case there is no objection to including such expense in the account to which such employees' wages are ordinarily charged. (*b*) To operating revenue account No. 110, "Station and Car Privileges."

Q. (*a*) To what account should be charged the cost of labor for removing ballast, ties, rails, rail fastenings and joints, and special work in connection with the renewal of such items? (*b*) To what account should be charged the cost of labor for removing foundations for elevated structures, bridges, trestles and culverts, general office buildings, shops and carhouses in connection with their renewal?

A. (*a*) To operating expense account No. 8, "Track and Roadway Labor." (*b*) To the operating expense accounts to which is chargeable the cost of repairs of the structures.

Q. To what account should be charged commissions allowed trustees, acting under a sinking fund provision of a mortgage, for redeeming bonds?

A. These items should be charged to income account No. 225, "Miscellaneous Debits."

ANNUAL REPORTS

British Columbia Electric Railway, Ltd.

The statement of income, profit and loss of the British Columbia Electric Railway, Ltd., Vancouver, B. C., for the year ended June 30, 1915, follows:

Income	£369,656
Registration fees, etc.	236
Total	£369,892
Renewals maintenance	£167,888
Directors' fees	1,049
Special remuneration to chairman's assistant	1,253
Office rent, salaries, etc	5,610
Income tax provision	10,000
Trustees fees	877
Capital amortization fund	2,554
Total	£189,231
Balance	£180,661
Balance brought forward from previous year	6,884
Transfers from reserve fund	60,000
Total	£247,545
Interest on debentures and debenture stock	132,879
Balance	£114,666

The number of passengers carried in 1915 was 46,330,096 as compared to 63,429,023 in 1914, a decrease of 17,098,927, or almost 27 per cent, while the income after charging renewals maintenance in the last fiscal year was £201,768 as compared to £410,229 in the preceding year, a decrease of £208,461, or 50.8 per cent. During the year the company paid the usual 5 per cent dividend of £72,000 on its cumulative perpetual preference stock, but on the preferred ordinary stock only 2.5 per cent was paid as compared to 6 per cent for the preceding seven years, while the 8 per cent dividend maintained for seven years on the deferred ordinary stock was in the last year cut to nothing. In order to make the dividend payments that were completed it was necessary to transfer £60,000 from the reserve fund.

Owing to the war, and especially to the resultant paralysis of the shipping trade, commercial depression of the most acute severity prevailed throughout British Columbia during the year, and this depression was responsible for an estimated decrease of 30 per cent in population in the districts served by the company. The spending power of the remaining population was reduced, and a general tendency to economize resulted.

Besides the business depression, the company was forced at the beginning of 1915 to meet the serious difficulty arising from jitney competition. To meet this the company made an experimental reduction of some of its fares, but as the result of this plan proved disappointing, it is now adopting other measures to cope with the situation. In the company's opinion it has been proved that cities of the size of those served by it cannot support a thoroughly efficient and convenient railway service and also an unrestricted jitney service. The present jitney situation in Vancouver and the results of higher fares are described on page 512 of this issue.

The business depression and the jitney competition combined made it impossible for the company, notwithstanding the most rigid economy, to operate its system at a profit. During the year the operating and all other expenses of the company were drastically reduced, but the full effect of this is not apparent in the year's account. On June 30, 1915, the arbitration board reduced the wages of employees by about 8.5 per cent, which will represent a saving of about £22,000 a year. It is estimated that the various economies put into force during the current year, together with the wage decrease, will amount to a reduction in expenditures of nearly £200,000 as compared to the returns for the year ended June 30, 1914, but against this economy there is already during the first four months of the current year a decrease in gross earnings of £124,147.

The expenditures on capital account during the last year by the company and its subsidiaries were £180,528 as compared to £847,422 for the preceding year. Practically the whole of these expenditures were for work authorized and entered into prior to June 30, 1914. The company holds as part of its liquid assets £100,000 of the last war loan. The employees and officers have been contributing 1 per cent of their salaries to a local patriotic fund, these contributions amounting to £2,631 up to Oct. 30, 1915.

London Street Railway

The gross earnings of the London (Ont.) Street Railway for the year ended Dec. 31, 1915, amounted to $398,856, an increase of $22,963 over the preceding year's returns. Of this total, passenger traffic accounted for $393,299, an increase of $22,383. The total operating expenses amounted to $275,212, an increase of $7,311, which arose from increases of $3,886 in maintenance of way and structures, $7,512 in transportation expense for car service and $5,361 in general expenses, and from decreases of $5,623 in maintenance of equipment and $3,286 in transportation expenses for power. The net earnings for the last fiscal year amounted to $123,645, an increase of $15,651, while the total deductions rose only $844, so that the net income amounted to $90,852, an increase of $14,807.

During the year $42,189 was expended in construction and equipment. The passengers carried in 1915 totaled 10,801,531, as compared to 10,286,488 for the preceding year, and the car earnings per revenue passenger rose from 3.64 cents to 3.68 cents. Including transfers, the total passengers were 12,566,598, as compared to 11,984,411 in 1914, and the car earnings per passenger increased from 3.09 cents to 3.13 cents. The gross earnings per car-mile increased from 19.69 cents to 20.48 cents, the operating expenses per car-mile from 14.03 cents to 14.14 cents and the net earnings per car-mile from 5.66 cents to 6.35 cents. The gross earnings per mile of track showed an increase from $10,682 to $11,334.

RAILWAY MATERIALS SHOW HIGHER COST

Kansas City Railways Testifies to Increased Prices, Slowness of Deliveries and Scarcity of Some Products

That the increasing cost of electric railway supplies is felt by more electric railways than those consulted by the ELECTRIC RAILWAY JOURNAL in the preparation of the article on this subject appearing in the issue of March 4, page 471, is evidenced by the opinion of E. E. Stigall, purchasing agent Kansas City (Mo.) Railways, as expressed in the first issue of the Kansas City Railways *Bulletin*, just published. Aside from the high prices prevailing at the present time, says Mr. Stigall, there has been considerable delay in deliveries of material, and in some cases unsatisfactory substitutions owing to the difficulty of obtaining certain raw products.

Steel, copper, lead and tin products are usually understood to be the most important materials necessary for railway construction and maintenance. The present base price on steel bars and shapes is $2.10 per hundredweight f.o.b. Pittsburgh, Pa., this being an increase of approximately 100 per cent over the price two years ago. Bare copper wire is sold at a base price of approximately 30 cents per pound f.o.b. New York, whereas during the last two years this price was as low as 15 cents per pound. Lead has increased from 4 cents per pound to 6.5 cents per pound. Tin has risen from less than 30 cents to 42 cents per pound, while zinc has gone up from less than 10 cents to 21 cents per pound. Similar increases are found in the cost of rubber, leather, cotton fabrics and lumber.

In regard to materials that are dependent on imports from foreign countries, Mr. Stigall states that it is found to be practically impossible to obtain rattan, high-grade bristle brushes and special grades of steel, which include alloy materials necessary to produce certain characteristics—manganese and tungsten being the principal metals for this purpose. High-speed tool steel, which was formerly purchased for less than $1 per pound, costs to-day more than $3 per pound on account of this special treatment.

It is difficult even to obtain materials at the high prices shown, for it is necessary to place orders for delivery from three to six months prior to the date when the material is needed for actual use. It is also difficult to obtain prompt service from the railroads because of weather conditions, unusually heavy shipments, and blockade at the Eastern yards, resulting in a scarcity of cars, on account of lack of sufficient vessels for export shipment. When, as Mr. Stigall says, his company burns daily approximately twenty-five cars of coal at its power plants, and receives each month probably fifty cars loaded with different materials at the store yards, it is evident that slight interruptions in the regular service of the railroads seriously affects the operations of the electric line.

Ardmore (Okla.) Electric Railway.—Payment was not made on Feb. 23 for the Ardmore Electric Railway, sold under foreclosure on Jan. 31. The road will be advertised and resold.

Biddeford & Saco Railroad, Biddeford, Me.—The annual report of the Biddeford & Saco Railroad shows that the railway operating revenues for 1915 were $68,865 as compared to $68,932 for the preceding year, a decrease of only $66. The railway operating expenses, however, amounted to $51.880 as compared to $47,572, a decrease of $4,308, so that the net revenue from railway operation at $16,985 represented a decrease of $4,374. The taxes on real and personal property totaled $2,032, and interest on funded debt, $6,000.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The income statement of the Chicago & Milwaukee Electric Railroad for 1915 shows total operating revenue of $911,669, as compared to $958,111 in 1914. The total operating expenses were $608,826, as compared to $609,692 the previous year. The net operating revenue was $302,842, as compared to $348,419, and the gross income was $342,507, as compared to $370,379. Fixed charges, taxes, etc., were $55,000 and interest on receivers' obligations was $68,034, making a total of $123,034, as compared to $118,160 in 1914. The net income was $219,473, as compared to $252,219 for the previous year.

Choctaw Railway & Lighting Company, McAlester, Okla.—Judge Ralph E. Campbell, in the Federal Court at Muskogee, has authorized the sale of the properties of the Choctaw Railway & Lighting Company. The date of the sale is left with the master commissioner, Allen Wright. The sale will be within the next thirty days. The court has authorized receivers' certificates for $130,000 for immediate improvements.

Des Moines (Iowa) City Railway.—Harris, Forbes & Company, New York, N. Y., and Boston, Mass., and the Harris Trust & Savings Bank, Chicago, Ill., are offering for subscription at 97½ and interest to net about 5.20 per cent $2,280,000 of Des Moines City Railway general and refunding mortgage 5 per cent twenty-year gold bonds dated Jan. 1, 1916, and due Jan. 1, 1936. The bonds are redeemable on any interest payment date at 105 and interest. The bonds are in coupon form in the denomination of $500 and $1,000 with the privilege of registration as to principal only. The Harris Trust & Savings Bank is trustee under the mortgage securing the bonds. The terms of the refinancing of the Des Moines City Railway were referred to at length in the ELECTRIC RAILWAY JOURNAL of Feb. 12, page 332. Pursuant to the deed of trust dated Aug. 11, 1891, made by the Des Moines Suburban Railway to secure $300,000 of 6 per cent first mortgage refunding and improvement bonds the Iowa Loan & Trust Company as trustee has announced that funds have been deposited with the trustee, and that the railway will redeem all the outstanding bonds of the above mentioned issue.

Empire United Railways, Inc., Syracuse, N. Y.—Receivers Hendrick S. Holden and C. Loomis Allen of the Empire United Railways, Inc., have applied to Justice William S. Andrews for permission to purchase the Monroe County Electric Belt Line, a link in the direct line connecting Syracuse with Rochester. Payment of the purchase price is to be made from funds in the hands of the Columbia Trust Company, New York, trustee of the mortgage of the Rochester, Syracuse & Eastern Road, according to present plans. The Monroe County Electric Belt Line owns several miles of track through the village of Fairport.

Hudson & Manhattan Railroad, New York, N. Y.—The directors of the Hudson & Manhattan Railroad on March 1 declared the interest earned on the adjustment income mortgage bonds for the six months ended Dec. 31, 1915, at the usual rate of 2 per cent per annum, or $10 per $1,000 bond for the period. The interest payment is made payable on April 1 at the office of the company's fiscal agents, Harvey Fisk & Sons, New York.

Interborough Consolidated Corporation, New York, N. Y.—The board of directors of the Interborough Consolidated Corporation, at a meeting held on March 7, declared a dividend of 1½ per cent on the preferred stock, payable on April 1.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—It is reported that the appointment of receivers has been asked for the Kansas City, Kaw Valley & Western Railway.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—The Lewiston, Augusta & Waterville Street Railway for 1915 showed railway operating revenues of $696,448 as compared to $664,939 for the preceding year, an increase of $31,509. The railway operating expenses were $441,539 as compared to $439,650, an increase of $1,887. The net revenue from railway operations was $254,909, an increase of $29,612. Other items in 1915 were revenues from auxiliary operations, $6,856; expenses from auxiliary operations, $4,538; net revenues from auxiliary operations, $2,318; taxes on real and personal property, $4,861; taxes on earnings, $8,338; interest on funded debt, $173,725; interest on unfunded debt, $2,745, and amortization of discount on funded debt, $10,811.

Mexico (Mex.) Tramways.—A protective committee for the bonds of the Mexico Tramways and its affiliated corporations, Mexican Light & Power Company, Mexican Electric Light Company and the Pachucca Light & Power Company, has been formed in London and is requesting deposits of the bonds of the companies.

Nova Scotia Tramways & Power Company, Halifax, N. S.—The Board of Public Utilities of Nova Scotia is reported to have authorized the Nova Scotia Tramway & Power Company to raise $5,575,000 by the issue of $3,000,000 of 5 per cent thirty-year bonds at 90, 25,000 shares of preferred stock at 75 and 25,000 shares of common stock at 40. The proceeds will be used in connection with the acquisition of the property of the Halifax Electric Tramway, Ltd., and to develop power on the Gaspereaux River. The company applied originally for permission to issue $3,000,000 par value of bonds, 32,500 shares of preferred stock and 62,500 shares of common stock. Reference was made to the application in the ELECTRIC RAILWAY JOURNAL of Aug. 14, 1915, and Jan. 8, 1916.

Ottawa (Ont.) Traction Company, Ltd.—The depressing effects of the European war were felt by the Ottawa Traction Company, Ltd., during the year ended Dec. 31, 1915, but not to so great an extent as might have been anticipated. The month of August showed the greatest falling off in receipts, since which time business has been normal and generally showing a slight increase over 1914. The gross receipts of the company and of the Ottawa Electric Railway, its subsidiary, were $1,041,100 for 1915, as compared to $1,096,459 in 1914, a decrease of $55,359 or 5.0 per cent. The total expenses, however, including mileage payments, taxes and interest, increased from $736,809 in 1914 to $742,124 in 1915, an amount of $5,315 or 0.7 per cent. The net income in 1915 amounted to $298,976 as compared to $359,649 in 1914, a decrease of $60,673 or 16.8 per cent. The pasengers carried in 1915 totaled 24,361,867, a decrease of 959,680 or 3.8 per cent. The operating ratio rose from 60.6 in 1914 to 63.2 in 1915.

West Penn Traction Company, Pittsburgh, Pa.—The West Penn Traction Company has resumed preferred stock dividends after an intermission of more than a year. The distribution will be 1½ per cent for the quarter, payable on April 15 to stock owners of record of April 1. An extra one-half of 1 per cent was also voted on account of dividends in arrears.

Winnipeg (Man.) Electric Railway.—J. D. McArthur, has been elected to the board of the Winnipeg Electric Railway to succeed the late William Whyte, who was a member of the board and vice-president of the company.

York (Pa.) Railways.—In listing $665,000 additional first mortgage thirty-year 5 per cent gold bonds on the Philadelphia Exchange the York (Pa.) Railways states that $479,690 of the bonds were issued for extensions, improvements, betterments and double tracking on the parent company's lines of railway; $135,000 for acquiring and constructing a power plant for supplying current for or to the York Railways and the Edison Light & Power Company, and $50,310 for the purchase of a majority interest in the York & Windsor Electric Light Company and the Edison Light & Power Company. With the additional issue the total amount of outstanding bonds is $4,938,000.

DIVIDENDS DECLARED

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Ont., quarterly, 1½ per cent, preferred.

Brockton & Plymouth Street Railway, Plymouth, Mass., 3 per cent, preferred.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

El Paso (Tex.) Electric Company, quarterly, 2½ per cent, common.

Frankford & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.50.

Galveston-Houston Electric Company, Galveston, Tex., 3 per cent, preferred.

Manhattan Bridge Three-Cent Line, New York, N. Y., quarterly, 1½ per cent.

Third Avenue Railway, New York, N. Y., quarterly, 1 per cent.

United Light & Railways Company, Grand Rapids, Mich., 1½ per cent, first preferred.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

Wisconsin - Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILWAY, WHEATON, ILL.

Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '16	$148,860	$97,092	$51,768	$40,724	$11,044
1 " " '15	144,145	96,296	47,848	39,802	8,046
7 " " '16	1,173,181	747,043	426,138	282,824	143,314
7 " " '15	1,241,520	781,359	460,161	279,386	180,775
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.					
1m., Jan., '16	$66,284	*$34,648	$31,636	$17,717	$13,919
1 " " '15	65,330	*30,842	34,488	17,515	16,973
12 " " '16	789,786	*404,316	385,470	212,697	172,773
12 " " '15	779,395	*374,728	404,667	209,278	195,389
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.					
1m., Jan., '16	$101,420	*$63,311	$38,109	$28,855	$9,254
1 " " '15	81,330	*60,208	21,122	29,349	†8,227
12 " " '16	1,107,434	*730,834	376,600	357,268	19,332
12 " " '15	1,067,193	*701,579	365,614	341,105	24,509
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO					
1m., Dec., '15	$33,711	*$17,196	$16,515	$12,314	$4,201
1 " " '14	29,880	*18,191	11,689	11,386	303
12 " " '15	407,030	*218,510	188,520	133,252	55,268
12 " " '14	408,492	*220,652	187,840	132,273	55,567
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
1m., Jan., '16	$297,417	*$172,919	$124,498	$41,122	$83,376
1 " " '15	274,752	*164,178	110,574	38,719	71,855
12 " " '16	3,135,840	*1,855,178	1,280,662	478,684	801,978
12 " " '15	3,069,024	*1,878,975	1,190,049	477,823	712,226
FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.					
1m., Dec., '15	$141,620	$88,247	$53,373	$54,894	‡$156
1 " " '14	156,696	91,004	65,692	54,796	‡12,991
12 " " '15	1,648,505	1,007,448	641,057	645,800	‡1,357
12 " " '14	1,825,203	1,054,133	771,070	635,506	‡142,042
GRAND RAPIDS (MICH.) RAILWAY					
1m., Jan., '16	$105,817	*$64,663	$41,154	$14,534	$26,620
1 " " '15	104,728	*67,014	37,714	13,740	23,974
12 " " '16	1,177,539	*830,449	347,090	165,980	181,110
12 " " '15	1,288,710	*831,507	457,203	161,904	295,299
KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.					
1m., Dec., '15	$68,609	$35,464	$33,145	$20,396	‡$15,386
1 " " '14	63,171	33,653	29,518	19,824	‡12,913
6 " " '15	440,116	223,587	216,529	122,291	‡102,832
6 " " '14	429,291	226,391	202,900	118,487	‡95,575
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
1m., Dec., '15	$123,811	*$76,891	$46,920	$36,095	$10,825
1 " " '14	110,110	*73,855	36,255	35,819	436
12 " " '15	1,387,143	*898,136	489,007	433,203	55,804
12 " " '14	1,427,957	*890,813	537,144	426,659	110,485
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO					
1m., Dec., '15	$379,817	*$217,965	$161,852	$53,040	$108,812
1 " " '14	316,381	*197,415	118,966	50,534	68,432
12 " " '15	3,890,751	*2,373,010	1,517,741	628,309	889,432
12 " " '14	3,636,085	*2,237,429	1,398,656	606,898	791,758
REPUBLIC RAILWAY & LIGHT COMPANY, NEW YORK, N. Y.					
1m., Dec., '15	$320,869	*$178,026	$142,843	$61,069	‡$81,873
1 " " '14	259,659	*152,857	107,002	58,044	‡45,585
12 " " '15	2,121,297	*1,884,218	1,237,079	679,239	‡559,730
12 " " '14	3,001,285	*1,856,467	1,144,818	679,987	‡465,007
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.					
1m., Dec., '15	$503,448	$223,305	$280,143	$142,040	‡$145,669
1 " " '14	443,651	212,305	231,346	132,638	‡105,007
6 " " '15	2,785,966	1,307,952	1,478,014	857,548	‡670,957
6 " " '14	2,632,705	1,262,020	1,370,685	810,563	‡600,877

*Indicates taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

HEARING BEGUN ON PORTLAND-WESTBROOK FARES

The Public Utilities Commission of Maine held a hearing at Westbrook on Feb. 24, on the petition sent to the commission on Dec. 9, 1915, by the city of Westbrook, containing the names of twenty-two citizens of that city, in which they claimed that the rate of fare charged by the Cumberland County Power & Light Company between Portland and Westbrook was excessive; that at certain hours of the day when the traffic was heavy the number of cars provided was inadequate, and that the company made use of its lines within the limits of Westbrook for the carriage of freight, a privilege which it exercised without license from the city, and without rendering any compensation to the municipality. The complainant further contended that the distance between Portland and Westbrook was 6.5 miles, while in reality the present 10-cent fare limit between the cities is 7.8 miles.

At the hearing Charles W. Wentworth acted as counsel for the city, and William M. Bradley, president of the Cumberland County Power & Light Company, as counsel for the company. The right of the company to carry freight and express matter over its tracks in the city of Westbrook is a point in law, and was left for the Public Utilities Commission to decide. Much of the time at the hearing was taken up by witnesses called by Mr. Wentworth, who testified as to the number of passengers on the cars at certain times during the day. In his argument for the reduction of fares between Westbrook and Portland he used figures of earnings about fourteen years ago. A number of witnesses were questioned by Mr. Wentworth in regard to their attitude toward the reduction of the fare and the effect it would have on business in the city. Most of the witnesses favored a reduction, but one or two of the local merchants thought that if the fare to Portland was reduced, people who now traded in Westbrook would go to Portland, where they would have a choice of larger and better stores.

In regard to the complaint of the overcrowded condition of cars during certain times of the day, the company was able to show from figures accurately obtained that on an average week day during the rush hours between 4 p. m. and 6.30 p. m. 785 seats were provided for 788 passengers leaving Portland for Westbrook, or approximately one seat per passenger. Throughout an average week day, the company provided 3887 seats for 2406 passengers carried, or an average of 162 seats for every 100 passengers.

In its reply to the complaint of excessive fare, the company stated that in order to arrive at the proper charge for transportation on its cars between Portland and Westbrook, it would be necessary to value the property used by that line before the rate of fare that would bring a proper return on the investment could be determined. The company explained that from the time the petition was received it had been working diligently to obtain this information, but that it would require additional time to complete the valuation. In view of this the commission decided to postpone the case until such time as the company had completed its figures. The engineer for the commission will then check the results and submit the data to the counsel for the city of Westbrook. A public hearing will then be called and the case continued.

COMMISSION DECISION AGAINST ONE-MAN CARS

The Newport & Providence Railway on Dec. 20, 1915, filed a complaint with the Public Utilities Commission of Rhode Island setting forth that the rules prescribed in the franchise ordinance governing operation in the town of Middletown were unreasonable, in some respects impossible of fulfillment, and would tend to the great injury and inconvenience of the railway and its patrons. The company requested that the commission determine the reasonableness of the rules in the exercise of the powers granted under Sec. 51 of the public utilities act. Upon the hearing the issue was narrowed to the reasonableness of Rule III of the agreement between the company and the town. This rule reads:

"No car shall be operated within the highways of Middletown unless attended by two competent men, one of whom shall be a trained motorman duly instructed in the art of operating an electric car, and capable of running and controlling the same under any and all conditions. This rule shall apply to work cars as well as to passenger cars."

The rule was called into question because the company after correspondence with various street railways, on Nov. 7, 1915, commenced the operation of a one-man car on the "Training Station Line," and on Dec. 1, 1915, commenced a similar operation on the main line between Newport and Bristol Ferry. The company defended such operation upon the ground that the traffic was very light and the possibility of accident remote, and laid particular stress upon the experience of other roads where platform accidents had been greatly reduced under such operation. The company has $300,000 of bonds and $300,000 of stock outstanding, has never paid any dividends on its stock and made expenditures out of earnings in 1913, 1914 and 1915 totaling $48,761. This practically eliminated its surplus.

The commission denied the plea of the company. In concluding its ruling that body said:

"We are convinced from the testimony introduced and from our investigation of the matter that the risks of operation of electric cars would be greatly increased under such a system of operation, especially in view of the dangers resulting from the very large increase of motor traffic upon the public highways. The attention of the motorman should be directed entirely to the operation of his car. No matter what rules may be adopted to govern one-man operation, the combination of duties would tend to develop careless habits on the part of motormen. It is therefore ordered that the petition be dismissed."

The decision of the commission was referred to briefly in the ELECTRIC RAILWAY JOURNAL of Feb. 26, page 424.

FIRST ISSUE OF NEW KANSAS CITY PUBLICATION

The first number of the *Kansas City Railways Bulletin*, dated March, has been issued and distributed. It contains much matter of personal interest to the men of the system, correspondence from the various carhouses and departments, news of the company, a page of jokes, and several short serious articles. A feature of the magazine is to be its promotion of safety-first efforts. On this account the paper will be sent to every school teacher in Kansas City. The *Bulletin* contains a biography and a portrait of Philip J. Kealy, president and general manager of the company. The title page carries the following paragraphs by Mr. Kealy on the object of the publication:

"This is the first issue of a paper that will appear monthly. It is for the employees of the Kansas City Railways; it is intended to be the medium for an interchange of ideas between the men who constitute the brains, the bone and the sinew of this company; it is to be their paper; it is intended that each employee shall receive a copy of each issue, and it is hoped he and his family will read it carefully.

"It is the desire to make each worker feel he is a part of one enterprise—not a motorman or conductor only, not a machinist only, not an electrician only, not a track layer only, not a clerk only, not a superintendent only, not a watchman, not a president only—but that each fills an essential part in a great organization devoted to public service.

"The paper will contain items of personal interest to the men, news from the various carhouses, shop news, articles of interest to railway men everywhere in the system; in fact, everything that may result in good to the employee. There will be no sermons, but there will be frank expositions of some of the shortcomings of all, and solid matter for the student of railway business. It is hoped much good will come from the publication, and that through it there will be built among all a spirit of fellowship, of zeal and of fidelity which will permeate this great institution, which by reorganization has really become a new institution with new blood."

ATLANTA JITNEY ORDINANCE SUSTAINED BY STATE SUPREME COURT

A decision adverse to the jitneys was rendered on Feb. 28 by the Supreme Court of Georgia in one of the jitney bus cases before it, carried up on appeal from the Fulton Superior Court. The Supreme Court upholds the position of the city of Atlanta in its ordinance taxing and bonding the jitneys. The decision controlled two other cases which originated in Savannah. The Atlanta court was upheld. The Savannah court, which sustained the jitneys, was reversed.

The court held that the ordinance of the city of Atlanta regulating the licensing and operation of the jitneys and requiring the giving, by the person operating such vehicle, of an indemnity bond in the sum of $5,000 for each vehicle so operated, was not invalid on the ground that it violated Art. 7, Sec. 2, Par. 1, of the Constitution of Georgia, which provides that all taxation shall be uniform upon the same class of subjects; nor on the ground that it was discriminatory against persons engaged in the business of operating such vehicles, and in favor of other persons operating taxicabs and other like vehicles, which the plaintiffs contended were of the same class as jitney buses.

The court also held that the ordinance was not invalid on the ground that it imposed upon persons operating jitney buses a much larger license fee than that imposed upon persons operating taxicabs; nor on the ground that the graded license fee imposed by such ordinance was unreasonable. This graded license fee imposed a tax of $75 for a motor bus having a seating capacity of four persons or less, including the driver, $100 for motor bus having a seating capacity of more than four and less than eight persons, $125 for each motor bus having a seating capacity of more than seven and less than ten persons, and $150 for each motor bus seating more than ten persons.

Argument in April on St. Louis Mill Tax Case.—The appeal of the United Railways, St. Louis, Mo., to the United States Supreme Court in the matter of the mill tax, which was decided adversely to the company in the Missouri Supreme Court by a vote of four to three, has been set for argument in the United States Supreme Court in April.

Jersey Assembly Passes Bill Aimed at Auto Buses.—The Assembly of New Jersey passed on March 8 the substitute measure reported by the committee on municipal corporations for the original bill introduced by John B. Kates of Camden County, regulating the use of jitney buses. The measure provides that owners of the automobile buses must take out liability or indemnity insurance to the amount of $5,000.

New Denver Publication Christened.—The new publication of the Denver (Col.) Tramway, referred to in the ELECTRIC RAILWAY JOURNAL of March 4, page 477, has been christened *Tram-o-Grams*. An award of $15 was made by the judges for the best suggestion in the name contest, with other prizes of $5, $3 and $2 for the names "Street Car Chats," "Bi-Monthly Denver Tramologues" and "Tramway Traveler."

Measures to Insure Better Sanitary Conditions in Kansas City.—The board of control of the Kansas City (Mo.) Railways has requested that the welfare department arrange for talks to superintendents and members of departments on sanitation and ventilation. Placards are to be placed in cars announcing: "Board of health officers are riding the cars and enforcing the anti-spitting ordinance; penalty, arrest." The action is a result of a conference between the board of control and the health department, arranged to bring about close co-operation.

Rochester Jitney Hearing to Continue on March 20.—The hearing before the Public Service Commission of the Second District of New York on the application of jitney operators to continue in service in that city, referred to in the ELECTRIC RAILWAY JOURNAL of March 4, page 476, was continued on March 2. Many witnesses testified in regard to the reliability of the service of the New York State Railways, Rochester Lines. The case will be continued on March 20. William Temple Emmett is presiding for the commission.

Forcing Portland Jitneys to Give Service.—A. L. Barbour, city auditor of Portland, Ore., reports that plans of the City Council to force jitneys to give reasonable service have brought results, and that up to March 1 forty drivers had notified Jitney Inspector Gill that they had increased their running schedules. According to a recent ruling of City Attorney La Roche and Commissioner Daly, jitneys will be required to give regular service from 6 a. m. to 8 a. m., and from 4.30 p. m. to 7 p. m., each day, in order to hold their licenses.

Hearing on Hoboken Fares Continued.—The Board of Public Utility Commissioners of New Jersey took further testimony on March 1, 2 and 3 on the application of representatives of the city of Hoboken to require the Public Service Railway to operate there for a 3-cent fare. Many figures were introduced in connection with traffic counts made in the interest of the city. Considerable difficulty was experienced in identifying some of the figures, which are more than a year old now. The hearing will be continued on April 5, 6 and 7.

Results With Near-side Stop in Akron.—The near-side car stop rule has been in effect in Akron, Ohio, since Feb. 1. The Northern Ohio Traction & Light Company says that the favorable expressions have outweighed and outnumbered by far the unfavorable views and that an impartial report is certain to be that the near-side stops have made an improvement in service and have reduced the chance of accident. A study of conditions will be made with a view to the use of the near-side stop plan in the smaller municipalities in which the company operates.

Injunction Against Memphis Jitneys.—An injunction has been issued against three jitney companies at Memphis, Tenn., by Chancellor Heiskell, of the local Circuit Court. The action of the court was on the grounds that the ordinances which provided franchises were invalid in that they were not signed by the then Mayor, although the commissioners passed them over his veto by a two-thirds majority. This point was one of several made by attorneys for the Memphis Street Railway, which brought the action. In another phase of the case the court expressed the opinion that the $5,000 bond which was ordered applied to each vehicle and not to each company. The city has not determined whether to prosecute an appeal or repass the ordinances.

Separate Car for Women on Suburban Line.—The Ohio Valley Electric Railway has recently added a trailer to a special shopping car, which makes the trip from Catlettsburg, Ky., across the State line to Huntington, W. Va. This particular train is the convenient one for shoppers from Catlettsburg and points along the route to go into Huntington. Since West Virginia voted State-wide prohibition, there are many pilgrims to Catlettsburg, which is "wet." Huntington merchants complained that the car had developed into a "booze" car to the point that the women customers along the line were remaining away from Huntington. To meet the unusual condition the railway has added a trailer to the "booze" car and will reserve it exclusively for women customers of Huntington merchants.

One-Man Cars Announced for North Yakima.—N. C. Richards, president of the Yakima Valley Transportation Company, has announced the decision of the company to install one-man cars in North Yakima, Wash., beginning April 1. In a statement which he issued, Mr. Richards said: "The company has an investment in Yakima County of nearly $2,000,000, on which it has never been able to earn interest, and the past year, owing to increased use of automobiles, its earnings many months have not been sufficient to meet expenses. The most unremunerative part of the system is the city lines where there is no freight to help out the passenger earnings. By adopting the one-man system of operation a considerable saving can be made in operating expenses and good service can be maintained."

Twenty More Cars in Service in Hartford.—The Connecticut Company has reported to the Public Utilities Commission regarding improved conditions in Hartford. The report tells of added cars during the rush hours, placing of pay-as-you-enter cars in service, and other steps taken to relieve congestion. The report is concluded as follows: "When all the changes that we contemplate have been made, there will be in service during rush hours a total of twenty more double-truck cars than were operated previous to date of your order, and a few of that number in place of single-truck cars. The changes and additions have been made on lines where cars were most crowded. However, we will continue to check the riding on all of the different lines of a period of not less than two weeks, so that we may know whether or not any further changes, either one way or the other, should be made."

Near-side Stop Adopted in Minneapolis.—The Aldermen of Minneapolis, Minn., on Feb. 19 voted to adopt the near-side stop in certain localities in Minneapolis, effective on April 3. It is believed that local newspaper publicity instigated by the Safety First Federation of America, and advocating the near-side stop on the ground of safety, had considerable effect in bringing about the sixteen to seven vote in favor of the stop. The district set aside in the Council's resolution for near-side stopping extends from Second Avenue North to Fourth Avenue South, inclusive, and from the Mississippi River on the north to Twelfth Street and Grant Street, which is a continuation, on the south. This district, roughly, is a wedge twelve to sixteen blocks long, with a ten-block base, and includes the main business center. When the advisability of the near-side stop is demonstrated it will be extended over the entire city.

Safety Results in Akron.—The Northern Ohio Traction & Light Company, Akron, Ohio, in its pamphlet report for the year ended Dec. 31, 1915, says in regard to its safety work: "Organized effort toward accident prevention has been steadily continued. The total of all accidents was reduced, notwithstanding an increase in the number of passengers carried, the increase of car-miles operated, and the presence of greatly increased automobile and other traffic upon the streets and highways. On Dec. 31, 1914, there were pending in the courts eighty-eight cases in which the company was a defendant. At the close of 1915 the number was seventy-nine, a reduction of 10 per cent. In pensions and relief $7,607 was distributed during the year. The pension department owns 150 shares of the company's preferred stock, and had on hand on Dec. 31, 1915, a cash balance of $2,713, making a total reserve of $17,713. Twenty-two retired employees are now receiving pensions."

New Express Agreement on Utah Lines.—A traffic agreement has been effected by the Salt Lake & Ogden Railway, Salt Lake City, Utah, and the Wells Fargo Express Company, whereby the residents of the Cache Valley district on the line of the Ogden, Logan & Idaho Railway will receive the advantage of the hourly express service between Salt Lake and Ogden over the Salt Lake & Ogden Railway. Under the arrangement the residents of the Cache Valley district will have express service to and from Salt Lake every two hours during the day, and as the electric lines enter a joint terminal station at Ogden, the disagreeable feature of wagon transfer will be eliminated. The agreement does not affect the local business of the Bamberger Express Company between Salt Lake and Ogden. Business from Cache Valley points shipped over the Ogden, Logan & Idaho Railway to Salt Lake will be handled and distributed in Salt Lake City from the offices and by the wagons of the Wells Fargo Express Company.

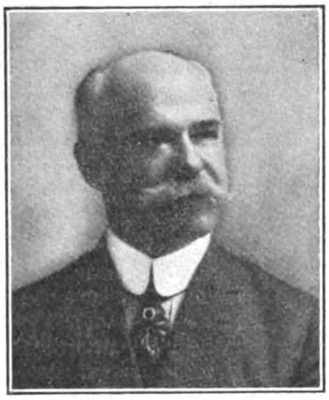
Hearing on May 8 on Complaint Against One-Man Cars.—The Public Service Commission of the State of Washington on May 8 will hear testimony in the complaint brought by the city of Spokane against both the Inland Empire Railroad and the Washington Water Power Company, which are operating one-man cars on several of their routes. The city of Spokane contends that the cars are unsafe and cause delay. The companies assert the competition of jitneys and other economic factors have forced them to the one-man car as a measure of relief. The hearing before the Public Service Commission was to have been held on March 6 and 7, but by an agreement entered into between Corporation Counsel H. M. Stevens of Spokane and F. T. Post, counsel for the Washington Water Power Company, the date of the hearing has been changed to May 8. A. A. Lewis and Frank R. Spinning, members of the Public Service Commission, utilized March 6 and 7, the days assigned originally for the hearing, to investigate the company's service.

Personal Mention

Mr. Leroy L. Newman, formerly superintendent of way and structures of the Birmingham Railway, Light & Power Company, Birmingham, Ala., has been appointed assistant general manager of the company. Previous to Mr. Newman's connection with this company he was employed in various departments of the Pennsylvania Railroad.

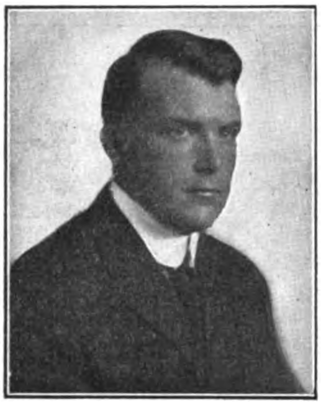
Mr. R. J. Clark, comptroller of the Kansas City Railway & Light Company, Kansas City, Mo., since 1910, has been made secretary and treasurer of the Kansas City Light & Power Company, the office of comptroller having been abolished with the successor company in the reorganization. Mr. Clark went to Kansas City in 1910 from the Toronto (Ont.) Railway.

Mr. H. H. Evans, secretary of the local transportation committee of the Chicago City Council, has also been appointed secretary of the Chicago Traction & Subway Commission, the newly-appointed engineering body which is to investigate Chicago's local transportation conditions and recommend improvements. Mr. Evans was born in Mississippi in 1880 and was graduated from the Annapolis Naval Academy in 1899. Following his graduation he served as a midshipman in the United States Navy and was a commissioned officer in the Spanish-American war. He resigned from the service in 1904 and accepted a position with the Cananea Copper Company in Mexico. In 1906 Mr. Evans accepted a position in the erection department of the Allis-Chalmers Company, where he was later appointed assistant superintendent of construction. He resigned from that organization in 1908, to make some special reports for the city of Chicago on the electrification of the steam railroad terminals. After he completed these reports, Mr. Evans was appointed secretary of the transportation committee.



E. H. BAKER

Mr. Edwin H. Baker, who has recently retired as second vice-president of the Galena Signal Oil Company, has been engaged in the manufacture and supply of lubricating oils for the past forty-three years and is one of the best-known and most highly esteemed men in the electric railway and steam railroad supply business. It was in 1873 that he entered the employ of S. T. Baker & Company, a firm which had been founded by his father in 1849 and was a large manufacturer of lubricating oils in New York. In 1894 he joined the Galena Signal Oil Company, but he continued to act as president and manager of S. T. Baker & Company, which was afterward a corporation, until 1912, when the Baker business, which up to that time had been a department of the Galena Company, was consolidated with the Galena Company. When this consolidation took place he was elected second vice-president of the Galena Company. Mr. Baker's activities have not been confined to the oil business. He early took an interest in the American Electric Railway Manufacturers' Association, his high standing in the trade and his personal popularity leading to his election to various offices. In 1904, a year after the organization of the association, he was chosen a member of its executive committee and chairman of its finance committee. He continued in these offices during 1905, and was elected treasurer of the association in 1906. In 1910 and again in 1913, he was re-elected a member of the executive committee of the association, and he served as vice-president from 1911 to 1914, and was president during the past year. It is safe to say that, although he is retiring from active work with the Galena Signal Oil Company, Mr. Baker will maintain his interest in electric railway affairs.



E. A. WEST

Mr. Edward A. West, efficiency engineer of the Portland Railway, Light & Power Company, Portland, Ore., has resigned from that position, as announced briefly in the ELECTRIC RAILWAY JOURNAL of March 4, to take up the duties of chief engineer of the Denver (Col.) Tramway under Mr. F. W. Hild, general manager. Mr. West has been efficiency engineer of the Portland Company since August, 1913. His duties in this capacity took him into all departments and activities of the company. He inaugurated many changes in departmental relations; introduced cost and planning methods, a reorganization of the methods of keeping track of and storing supplies, a perpetual inventory system for recording property valuation data, and made a detailed study of the integral parts of the company organization. Prior to his appointment as efficiency engineer, he had the title of assistant engineer during the construction period of 1909 to 1913 under Mr. O. B. Coldwell, general superintendent and electrical engineer. While in this position he had an active part in the construction work of the company's hydroelectric plants on the Clackamas and Bull Run rivers, the steam plant Station "L," the underground system, steel tower line, Hawthorne Building, etc. He attended Tufts College and the Massachusetts Institute of Technology after having served an enlistment in the engineering department of the United States Navy. After he left college Mr. West entered the employ of the Boston Elevated Railway under Mr. John Lindell, superintendent of motive power and rolling stock. He took a two years' apprenticeship course with the Boston Elevated and worked in many departments. He was with this company during 1906 and 1907 when all the larger steam plants were increased in capacity. His title when he left its employ was assistant to superintendent of power stations. He next worked on fuel efficiency under Mr. Schumaker of Schumaker & Santry, Boston, Mass. While with this firm he conducted investigations in the organization and methods employed in the boiler and engine rooms in several of the largest textile and industrial plants in the New England States. He held the post of chief engineer of the Oregon Naval Militia, and his gun crews made a total of nineteen hits out of twenty shots with a 6-in. gun on the practice cruise last summer. He has prepared a number of articles for technical magazines and engineering societies.

OBITUARY

Edward Harris Goodman, formerly vice-president and general manager of the Pullman Palace Car Company of Chicago, and of the Union Switch & Signal Company of Pittsburgh, Pa., died on March 4 at Palm Beach, Fla., where he had gone for a short visit.

Edward I. Leighton, one of the founders of the Van Dorn & Dutton Company, Cleveland, Ohio, died at St. Augustine, Fla., on Feb. 26. Mr. Leighton was born in Birmingham, England, in 1850. He moved to this country with his parents when about six years old, settling in Cleveland where he attended the public schools. In 1880 with Mr. Frederick W. Bruch he started the Cleveland Punch & Shear Works Company. About 1890 Mr. Leighton purchased his partner's interest. The business was later sold to Walter D. Sayle and others. Although Mr. Leighton retired from active business nearly fifteen years ago he has been a large factor since in such representative concerns as the Acme Machinery Company, the Forest City Live Stock & Fair Company, the Van Dorn & Dutton Company, the Van Dorn Electric Tool Company and the Reliable Machine Company. At the time of his death he was a director in all of the concerns mentioned, as well as others. Mr. Leighton is survived by a widow and one son, Mr. Thomas E. Leighton, purchasing agent of the Van Dorn & Dutton Company and the Van Dorn Electric Tool Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Morganfield-Uniontown Electric Railroad, Morganfield, Ky.—Incorporated to construct a line between Morganfield and Uniontown, for which rights-of-way have been secured. Capital stock, $125,000. Incorporators: S. B. Anderson and Walter B. McLean, Memphis; R. J. Nelson, Cincinnati, and O. G. Lucian Drury, Morganfield. [Feb. 19, '16.]

***Colon Electric Traction Company, Hackensack, N. J.**—Incorporated with a capital stock of $200,000. Among the incorporators are Cornelius A. Cole, Hackensack; Robert A. Van Voorhis and Arthur R. Oakley, Jersey City, N. J.

***Nashville, Hartsville & Red Boiling Springs Railway, Nashville, Tenn.**—Incorporated in Tennessee to construct a line from Hartsville through Lafayette to the springs, the line connecting with the Louisville & Nashville Railroad at Hartsville. Capital stock, $50,000. The charter provides that electricity or steam may be the motive power, although the plan of the promoters is to electrify the line. Incorporators: John C. Shofner, Howard Andrews, Perkins Baxter, J. C. Collins, W. M. Long and J. M. Wilson.

FRANCHISES

Arlington, Cal.—The Council of Arlington has denied the petition of the Pacific Electric Company to abandon a portion of its track on Brockton and Arlington Avenues and also on Victoria Avenue.

Los Angeles, Cal.—Col. Lewis Ginger, to whom the Council granted a franchise for a scenic incline railway at Griffith Park, has announced that the State Commissioner of Corporations has granted a permit for the company to sell stock to build and equip the road and erect pavilions and beautify the picnic grounds at the top of the incline. The road will be about ½ mile long and will be constructed on a uniform grade of 32 per cent. [May 15, '15.]

Oak Park, Ill.—The Chicago & West Towns Railway Company has applied to the trustees of the Village of Oak Park for a new twenty-year franchise.

Detroit, Mich.—By a vote of more than 80 per cent of those who went to the polls the electors of Mount Clemens on Feb. 29 expressed their approval of the ordinance granting the Detroit United Railway a twenty-year extension of its franchise. Under the franchise the company agrees to replace the Macomb Street bridge, to contribute $15,000 toward the cost of a bridge connecting South Gratiot Avenue and the Gratiot road and to double-track South Gratiot Avenue.

Newburgh, N. Y.—The Orange County Traction Company has asked the Council for a franchise to construct an extension of its lines through Lake Street from Broadway to a point opposite the Newburgh Bleachery.

Columbus, Ohio.—The Council of Columbus has refused to grant a franchise to the East Linden Electric Railway to construct a line beginning at Champion Avenue and Long Street and extending on Champion Avenue to the corporation line of Columbus and a line beginning at Water and Spring Streets and extending on Randolph Street, Front Street, Naghten Street and Grant Avenue to Grove Street.

Radford, Va.—Oren Dodds has asked the Council for a railway franchise in Radford.

Stoughton, Wis.—The Wisconsin Interurban System has asked the Council for a franchise to construct a line through Stoughton. [Nov. 13, '15.]

TRACK AND ROADWAY

***Tolchaco, Ariz.**—It is reported that plans are being considered to construct an electric railway from Tolchaco into the Oatman district. E. L. Mayvew, Oatman, is interested.

Nelson Street Railway, Nelson, B. C.—The City Council has commissioned H. P. Thomas to prepare detailed estimates of the cost of extending the city car lines along Baker Street, from Josephine to Cedar Streets, and on Vernon Street from Cedar to Josephine Streets. The Council is in favor of this extension, and it is reported that if the cost is not too excessive the extension will be made.

Municipal Railways of San Francisco, San Francisco, Cal.—The public utilities committee of the Board of Supervisors on Feb. 23 voted to recommend the setting aside of $275,000 for the construction of tracks and overhead trolley system from the Market Street entrance of the Twin Peaks tunnel to the junction of Sloat and Junipero Serra Boulevards.

Wilmington & Philadelphia Traction Company, Wilmington, Del.—It is reported that this company will change from the storage-battery system to the overhead-contact system on its line from New Castle to Delaware City. Other extensive improvements are contemplated.

Boise (Idaho) Railroad.—It is reported that this company will expend $90,000 for improvements and betterments.

Oregon Short Line Railroad, Caldwell, Idaho.—According to reports, the electrification of the Wilder branch of the Oregon Short Line will be started immediately and rushed to completion. Material and equipment have been ordered. The people of Caldwell, Wilder and Greenleaf, and along the line of the Wilder branch, have subscribed for bonds to the amount of $25,000 to finance the electrification. Work will be started on the construction of transmission line, transformers, etc., at once, and electric cars will be in operation within 90 days.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—This company has indicated its intention of extending its North Avenue line in Waukegan east on Glen Flora Avenue to the new industrial site of Waukegan, as soon as 1000 men are employed there.

***Rochelle, Ill.**—Plans are being made to construct an interurban line between Rochelle and Moline. It is reported that the project is being backed by capitalists in various towns and cities along the route.

Boston, Mass.—The contract for the construction of Section F, Dorchester Tunnel, has been awarded by the Boston Transit Commission to T. A. Gillespie Company, Boston, at $363,744. [Feb. 19, '16.]

Kansas City & Tiffany Springs Railway, Kansas City, Mo.—This company has filed with the Missouri Public Service Commission statements and estimates asked for, with reference to the request of the company to be allowed to buy about 10 miles of track of the Quincy, Omaha & Kansas City Railroad between Gower and Trimble. The Commission had suggested that a showing should be made as to the power of an electric railway to operate profitably on this line, in view of the discontinuance of service by the steam road. The statements filed include figures of the earnings of the road when operated as a steam railway, indicating the possible business when few stops were made; showings as to the population of the district, and the possibilities of traffic when an electric car is operated, stopping frequently; estimates of the cost of erecting overhead transmission line from Edgerton or other power sources, and operation as an electric railroad with one car at 2 cents a mile for passenger traffic. [Feb. 12, '16.]

Metropolitan Street Railway, Kansas City, Mo.—The first cars over the extension of the Thirty-first Street line from Indiana Avenue to Brighton Avenue, Kansas City, were operated on March 4. The Broadway extension from Fourteenth to Twenty-fifth Streets is completed, but schedules have not yet been provided. The Twenty-fourth Street Extension from Brighton Avenue to Hardesty Avenue, will be completed this summer. Surveys have been ordered on Fifteenth Street for the line that will connect with Fairland Heights on the Independence division, shortening the route to Independence, Mo., and this may be built this year.

Salem & Pennsgrove Traction Company, Salem, N. J.—Martin & Company of Philadelphia are offering first mortgage 6-per cent twenty-year bonds of the Salem & Pennsgrove Traction Company. The issue is followed by $100,000 second mortgage 6s, which, with $10,000 of stock, were sold to E. I. du Pont de Nemours & Company, whose plants will be reached by the new line. [Feb. 19, '16.]

International Railway, Buffalo, N. Y.—The Public Service Commission for the Second District of New York has approved the agreement between the New York Central Railroad and the International Railway providing for the two bridges over which the new Buffalo-Niagara Falls line of the International Railway will cross the New York Central tracks. The plans were first subjected to the scrutiny of the commission's grade-crossing engineer.

Hillsboro, Cynthiana & Bainbridge Traction Company, Hillsboro, Ohio.—Representatives of this proposed company held a conference with the members of the Ohio Public Utilities Commission on March 3 in reference to financing the line on which they hope to begin construction in the spring. The tentative plans provide for a bond issue of $1,700,000 and stock amounting to $500,000. [Oct. 2, '15.]

Hamilton (Ont.) Street Railway.—This company will reconstruct its tracks on Herkimer Street between Queen and Locke Streets early in the spring.

Perkiomen Valley Traction Company, Collegeville, Pa.—The State Highway Department has accepted the plans of the Perkiomen Valley Traction Company for the construction of its proposed line from Collegeville to Schwenkville. James L. Wolcott, Dover, Del., president. [Jan. 15, '16.]

Pennsylvania Railroad, Philadelphia, Pa.—This company is making surveys for a second track from Pavonia to Mount Holly, N. J., with the ultimate plan of electrifying this branch of its system. It is proposed to use the same method of propulsion as on the main line out of Broad Street Station, Philadelphia.

Ogden-Logan & Idaho Railway, Ogden, Utah.—It is reported that this company will extend its line northward from Preston through Pocatello, Blackfoot and Idaho Falls to the border of Yellowstone Park. According to the report plans are being formulated and the extension will be made at an early date. It is stated that the Oregon Short Line Railroad is interested, as the proposed line would be a feeder to the Short Line. Branch lines are planned out of Pocatello to tap the Arbon and Rattlesnake Valleys.

Lewiston-Clarkston Transit Company, Clarkston, Wash.—G. W. Burrows, vice-president of this company, recently stated his company will begin the construction of the Clarkston extension of the line as soon as weather conditions will permit, and that construction work on the Lewiston extension of the line will begin late in March, if possible. At the present time the operating forces of the company are endeavoring to restore service in Lewiston and Clarkston, which was badly demoralized by the recent storms which swept over the Northwest.

***Bluefield, W. Va.**—A committee has been appointed by the Bluefield Chamber of Commerce to investigate the possibility of constructing an electric railway from Bluefield to the Pocahontas coal fields.

Pan-Handle Traction Company, Wheeling, W. Va.—It is reported that plans are being considered by this company for the construction of an extension from Short Creek to the Pennsylvania State line.

Wisconsin Interurban System, Madison, Wis.—At a recent meeting of the stockholders of this company resolutions were adopted authorizing an issue of $600,000 of bonds and the entering into a contract for the construction of the company's line from Madison to Portage, Madison to Prairie du Sac, Madison to Janesville and across Madison. It is proposed to begin construction work as soon as the weather permits. The company has awarded the contract for building the entire system to James Stewart & Company of New York. Counselman & Company, Chicago, will finance the proposition. In all, bonds of $4,000,000 are to be issued for financing the entire project. [Nov. 13, '15.]

SHOPS AND BUILDINGS

Southern Pacific Company, San Francisco, Cal.—It is reported that this company is contemplating the construction of a new office building to be erected on the south side of Market Street between Steuart and Spear Streets. The structure will probably be nine or ten stories high. The design, construction and type of materials have not been considered. The company's lease on the James Flood Building expires in October, 1917.

Tri-City Railway Company of Illinois, Rock Island, Ill.—Work will soon be begun by this company on the construction of new car shops at Rock Island. The structure will be two stories, and will be of brick, steel and concrete construction to conform with the carhouse adjoining. It is estimated that the cost will be about $80,000. An inn to cost $100,000 will also be constructed by the company at Rock Island. Reference to this proposed construction was published on page 470 of the ELECTRIC RAILWAY JOURNAL for March 4.

Massachusetts, Northeastern Street Railway, Haverhill, Mass.—This company will prepare plans and let the contract in the near future for a new car house to replace the one at Merrimac which was destroyed by fire on Feb. 29. The car house will probably be rebuilt of brick.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has authorized the New York Municipal Railway Corporation to award the contract for the construction of the Coney Island terminal to the Lord Construction Company, the lowest bidder, for $1,279,274, as referred to on page 514 of this issue.

Interborough Rapid Transit Company, New York City.—A new mezzanine passageway will be built at the Grand Central Station of the subway to relieve congested conditions on the platforms. The Public Service Commission for the First District of New York has authorized the Rapid Transit Subway Construction Company to begin the work as an "extra" under the original subway contract, the cost of the same not to exceed $6,000. The plan of the improvement provides for a passageway crossing over the express tracks and connecting the existing mezzanine platform, immediately west of Vanderbilt Avenue on the northerly side of Forty-second Street, with the southbound platform by means of a new stairway landing on this platform about 64 ft. west of the present easterly stairway.

Charleston (W. Va.) Interurban Railroad.—This company reports that it is building a 45-ft. x 146-ft. extension to its carhouse. The building will be of brick construction with steel roof trusses. The steel has been purchased from L. Schreiber & Sons Company, Cincinnati. Contractors, H. Bagsten & Son, Charleston.

POWER HOUSES AND SUBSTATIONS

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—It is reported that this company will install a 60-cycle frequency set at its Batavia power plant.

Cumberland & Westernport Electric Railway, Cumberland, Md.—This company is contemplating enlarging its power plants at Eckhard and Reynolds.

Durham (N. C.) Traction Company.—It is reported that this company will probably install a 300-kw. rotary converter and additional switchboard equipment.

Northern Ohio Traction & Light Company, Akron, Ohio.—The following improvements are being planned by this company during the year: Installation of two 20,000-kw. turbogenerators in its main generating station, one 1500-kw. rotary converter and transforming equipment in its High Street substation, and equipping a new light, power and railway substation in East Akron. Some of the equipment for these installations has been purchased. The company is building 14 miles of new transmission line, and other sections of the transmission system will be rebuilt during the year.

Scioto Valley Traction Company, Columbus, Ohio.—This company has received permission from the Public Utilities Commission of Ohio to purchase the electrical distribution system of the Groveport Development Company. It is understood that the company will install a new distributing system in Groveport.

Philadelphia (Pa.) Rapid Transit Company.—A new power house on the Barren Hill and Wissahickon branch of this company's line will be constructed just north of the city line on the Ridge Pike.

Charleston (W. Va.) Interurban Railroad.—A report from this company states that it has purchased two 300-kw., 750-volt, d.c. Westinghouse rotary converters for installation at its Cabin Creek substation.

Manufactures and Supplies

Algiers Railway & Light Company, Algiers, La., is reported as expecting to purchase new rolling stock.

Harrisburg (Pa.) Railways are planning to order from The J. G. Brill Company five new double-truck passenger cars.

Cincinnati (Ohio) Traction Company is reported as having 100 motor cars for city service built by the Cincinnati Car Company.

Kansas City (Mo.) Railways have asked for bids on fifty to seventy-five cars of the same type as purchased last year. The contract is to be awarded on March 15.

Goldsboro (N. C.) Electric Railway is in the market for a motor-generator set and one open summer car. All communications should be addressed to R. Harold Smith, general manager.

Toronto & York Radial Railway, Toronto, Ont., is reported as contemplating the purchase of new rolling stock for the provision of more frequent service on the recently electrified Schomberg division.

Massachusetts Northeastern Street Railway, Haverhill, Mass., has ordered from the Laconia Car Company twelve semi-convertible, double-truck cars to replace those which were destroyed on Feb. 29 in the Merrimac carhouse fire. The new cars will be provided with Westinghouse Type 532-B, box-frame motors and Westinghouse air brakes.

Boston (Mass.) Elevated Railway has ordered ten elevated cars from The J. G. Brill Company. The railway company has also ordered from the Brill Company ten all-steel car bodies to replace equipment lost in the recent East Boston car-house fire. The car bodies resemble those used in the company's standard No. 4 type of semi-convertible car and have been approved as to design by the Massachusetts Public Service Commission.

TRADE NOTES

Walter E. Hinmon, Western sales manager of the Peter Smith Heater Company, Detroit, Mich., for the past six years, has resigned to become sales manager of the Cooper Heater Company, Carlisle, Pa.

W. S. Barstow & Company, New York, N. Y., have adopted a new emblem which is composed of a link, signifying strength and security, and a circle, which is the Egyptian hieroglyphic signifying energy.

Stone & Webster Construction Company, Boston, Mass., is being employed in the capacity of constructing engineers for a new 60,000-kw. steam power station which is being built in Buffalo for the Buffalo General Electric Company.

Philadelphia (Pa.) Holding Company has received an order to equip with radial trucks the three center-entrance cars recently ordered from the Laconia Car Company by the Bangor Railway & Electric Company, Bangor, Me. The company has also received orders for four radial trucks from the Newport News & Hampton Railway, Gas & Electric Company and one truck from the Hutchinson Interurban Railway.

Bethlehem (Pa.) Steel Corporation recently acquired the property and assets of the Pennsylvania Steel Company. The purchase price aggregates approximately $31,900,000, this being at the rate of par for the preferred shares and about $27 for the common shares. This amount is to be paid in 5 per cent twenty-year purchase money bonds, bonds being reserved to retire underlying issues and to provide for employment and additions.

Midvale Steel & Ordnance Company, Philadelphia, Pa., has acquired a controlling interest in the Cambria Steel Company, which has under a 999-year lease the property of the Cambria Iron Company. Control is thus also secured of all the stock of the Penn Mining Companies of Michigan and Wisconsin, and a one-half interest in the Mahoning Ore & Steel Company. The stockholders of the Midvale Steel & Ordance Company have contributed more than $25,000,000 in cash toward the acquisition of the Cambria Steel Company, and the balance has been provided by the issuance of approximately $50,000,000 of twenty-year 5 per cent convertible sinking fund gold bonds due on March 1, 1936, the purchase price being at the rate of $81 per share ($50 par value) for the 900,000 shares outstanding. When the books were closed on Feb. 21, sufficient shares had been turned in to make $45,736,000 of the bonds available for allotment, and this amount was oversubscribed for the syndicate.

ADVERTISING LITERATURE

Laclede-Christy Clay Products Company, St. Louis, Mo., has issued a sheet describing its automatic stokers.

Spray Engineering Company, Boston, Mass., has issued a catalog describing the system of applying protective coatings to the interior of explosive shells by means of its spraying process.

Pyrene Manufacturing Company, New York, N. Y., has printed a special railroad number of *The Fire-Fly*, its monthly publication. The issue contains a number of illustrated articles showing how the destruction of cars and other railroad equipment and buildings might have been avoided through the installment of its fire extinguishers.

American Museum of Safety, New York, N. Y., has issued a bulletin which contains a reprint entitled, "Some Hazards and Safety Suggestions in Connection with Construction, Inspection and Maintenance of Public Utilities," by H. W. Mowery. This is an illustrated address which was delivered last December before invited guests from the staff of the Public Service Commission, First District, New York, and representatives of the public utilities corporations and insurance companies of New York City, under the auspices of the American Museum of Safety. The paper calls attention to the fact that although spectacular accidents are given wide publicity, common every-day hazards, such as slipping and tripping which produce far more casualties, are usually overlooked. Recommendations for safe construction are given, such as anti-slip treads for car steps, floor inserts and safety station treads, as adopted, for example, by the New York Municipal Railway and the Interborough Rapid Transit Company.

J. D. Este Company, Philadelphia, Pa., has issued a catalog describing the game of "skee-ball" which is being used as a drawing card by a number of amusement parks operated by electric railways, and which is also adapted for use by employees' welfare associations. "Skee-ball" is a variation of bowling in which the ball is put to an entirely new use. When the ball, which is about the size of a duck-pin ball, is rolled rapidly over a 20-ft. section to a hump, it leaps high in the air in the manner of a ski-jumper. If the shot is properly directed with just the right force it will enter the bull's-eye of a target, which is placed 16 ft. beyond the hump. The game has a fascination in that it requires not only the accuracy of direction needed in bowling, but the nicety of force acquired by a finished billiard player. The interest of the spectators is kept up by an automatic scoring machine which registers the score adequately. Another unique feature is the nickel-in-the-slot machine, which releases the ball for a new game when a coin is inserted. This makes the game self-operating and does away with the need of an attendant.

EXPEDITING FOREIGN SALES

An arrangement has recently been made by the Stow Manufacturing Company, Binghamton, N. Y., to expedite the sale and delivery of its flexible shaft grinders and other products abroad, which may be of interest to other manufacturers. According to the announcement of the company, customers in foreign countries desiring to place orders simply give them to the nearest office of the American Express Company, but made out directly to the manufacturing company, and not to the express company. Orders so written will be transmitted directly to the manufacturers by the express company, which will also open credits or accept payments for the account of the manufacturers and will take entire charge of details of shipping, customs, etc. In this business the express company charges no buying commission on such transactions, but makes only reasonable charges for handling credit or remittances, transporting the goods, etc. The Stow Manufacturing Company is said to be the first American manufacturer to make this arrangement with the American Express Company.

ANNUAL MAINTENANCE NUMBER

Electric Railway Journal

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SCARCITY OF TRACK LABOR

Track labor efficiency must of necessity receive more attention in this year's construction and maintenance programs than ever before. The colossal struggle in Europe has depleted the ranks of the American army of common laborers, and since these losses cannot be replaced entirely, in so far as cheap track labor is concerned, greater efficiency and an increased number of labor-saving tools appear to afford the only solution of the problem. Added to these difficulties is the fact that the wages paid for ordinary labor in this country have been greatly increased, particularly for that class of labor capable of assisting in the manufacture of munitions and other war materials. This has had a demoralizing effect on other industries to say the least, and when construction work opens this spring the indications are that the labor situation will be as critical as the delivery of some classes of materials. While this is a very satisfactory condition for labor, it presents a prospect for those requiring labor which will be difficult to surmount. Not only will increased efficiency and a reliance on more labor-saving tools be necessary, but it will be difficult to hold the labor obtained if competition is keen. Under these conditions it is perhaps fortunate that the policy of retrenchment, particularly in track construction and maintenance, effective during the past few years has forced the way departments to increase their efficiency and look with greater favor upon labor-saving tools.

ORGANIZATION OF TRACK GANGS

In an effort to push construction work, the sizes of the gangs are too frequently increased to a point where it is practically impossible to obtain a day's work from every man. A careful study of construction organization, with particular reference to the sizes of the various units going to make it up and the amount of supervision they require, is certain to produce good results. The trite saying that "too many cooks spoil the broth" applies to track work as well as it does to culinary operations. Greater efficiency may generally be had with small gangs than with large ones, due largely to the fact that they have better supervision. But if the same attention should be given to supervising a large force, there is absolutely no reason why the amount of work per unit should not be the same. Some men are born leaders, and they are endowed with the ability of obtaining the maximum amount of work out of a force of any size. It is apparent, therefore, that a careful study of the qualifications of the men in charge of construction forces is of utmost importance. In this day and age it is not the "driver" who is needed, but the leader who can maintain the proper *esprit de corps* within his organization. If the greater use of machinery this year means a larger outlay for tools than has been necessary heretofore, it is well then to become reconciled to the fact immediately. Otherwise, those who fail to recognize existing conditions will doubtless be delayed in supplanting a shortage of labor with labor-saving equipment, because prompt deliveries will be out of the question in the height of the construction season.

DETROIT TUNNEL MAINTENANCE

In many respects the Detroit tunnel electrification, whose maintenance practices are described elsewhere in this issue, is a remarkable installation. Its success has been notable, notwithstanding its handicap of small size and the extraordinary severity of the operating conditions involved by the transfer service making up its traffic. An operating record of 26,000 miles per locomotive failure is an evidence of that fact, and this very satisfactory figure is accompanied by a maintenance cost that is regularly close to 5 cents per locomotive mile in spite of the low mileage of individual engines, only about 50 miles per day. The most prominent feature of the repair method, perhaps, is that the engines are never overhauled. It is true that they are given what is locally known as an overhauling about once each year, but this is really nothing more than a glorified inspection, since none of the engines has ever been completely dismantled. This practice, which is the same as that followed on the eminently successful New York Central electrification, may possibly be called the radical feature of difference between the maintenance of steam and electric locomotives. Of its soundness there can be no question, because after five years of operation the characteristic that is most in evidence about the Detroit installation is the lack of necessity for special performance records of the various parts of the equipment, maintenance of the control, for example, involving the replacement of only six contact tips and six arc chutes during the five years' life of the installation. "Happy is the nation that has no history."

Cost of Urban Transportation

THE monograph on the "Cost of Urban Transportation Service," compiled under the direction of F. W. Doolittle by the Bureau of Fare Research and just now issued by the American Electric Railway Association, constitutes the best authority in book form dealing with the economics of electric railway transportation. In about a year and a half of assiduous effort the bureau has completed a work that covers broadly yet concretely the entire subject of the relation between the elements of cost and the elements of service in electric railway transportation. A great deal of the detailed data contained therein will not be new to electric railway operators, but the ensemble is new and as such should be of inestimable value to both railways and the public. To railway operators the book will serve as an encyclopedic summary of data, practices and theories that have heretofore existed in a very scattered form, while to the public, and to semi-public bodies like public service commissions, it will be an invaluable source of cost and service information, and one which cannot fail, if properly studied, to do much toward clearing up popular misunderstandings in regard to the financial results of electric railway operation under present conditions.

The book is too comprehensive in its scope to admit of any general digest by this journal, but we recommend that the officials of each member company thoroughly study the copy to be sent by the association. In the last decade, with ever-increasing force, electric railway operators have been confronted with the fact that their companies are failing in the selling price of their commodity to meet the cost of production, this failure being due largely to causes beyond their control, chief among which is the inadequacy of the rate of fare, fixed by legal restraints or by custom, to pay for the service rendered. The public, suspicious of corporate financing and operation, has belittled individual pleas for relief from this condition, but the time has come when public authorities must be made fully to understand this present fundamental tendency in utility operation if the electric railways are to receive their due share in the general prosperity of the country.

It has not been so long since the early days of the industry that the popular mind has been thoroughly disabused of the idea that electric railways are bonanzas. As a matter of fact, with an increasing investment per dollar of gross earnings upon which to pay an attractive return, the charge for service has remained practically the same, with the purchasing power of money depreciating, transfer privileges being made more liberal and service standards becoming more severe. Mr. Doolittle has ably compiled all available information on these points. It is now the duty and the privilege of the association and all its members persistently to spread the information in an intelligible and attractive form before the public.

Autogenous Welding in the Shop

THE importance of the relatively new practice of autogenous welding in electric railway repair shops can hardly be overestimated. The major reason for this is, of course, the fact that much of repair-shop work consists in the restoration of broken parts, which in many cases can be replaced only after much dismantling is done and generally involve enough machine work to give each piece considerable value. For such work autogenous welding appears at its best, in some cases even permitting the welding together of broken parts without their removal from the car. Of late, also, there appears to be a tendency to use it for building up metal upon worn parts, and here the welding process is a realization of the "putting-on tool" for which green apprentice boys were sent when they had spoiled a piece of machine work by making too deep a cut.

On another page of this issue appears an article descriptive of a number of more or less unusual jobs done by oxy-acetylene welding, and the list indicates the extraordinary variety of uses to which this process may be put. It may seem strange that oxy-acetylene apparatus should find a place in an electric railway repair shop where direct current for an electric arc is always available at a comparatively low price. Yet there are definite reasons for this paradox. The primary one appears to be the delicacy that is an inherent feature of the oxy-acetylene flame, which can be made to work in places where the rather bulky electrode of the arc-welding process would cover the whole job and prevent any possibility of the operator's seeing how the work was progressing. However, for heavy work, the arc welder is very popular, and, as a matter of fact, many electric railways use both the arc and the oxy-acetylene flame in their repair shops, dividing the work between the two in accordance with their individual advantages.

Of course, heavy work can be done with oxy-acetylene if desired, so that the basis for comparison between the two seems to come down to the question of cost. Since the electric-arc welder uses current only when an arc is actually struck, the draft of current for an arc such as is used for light work, which is of the order of 100 amp., does not last continuously. Instead the average draft of current over any extended period of time is more likely to be about 50 amp., which at ½ cent per kilowatt-hour would involve a cost of about 15 cents per hour for current. For the oxy-acetylene flame, the cost per hour is of the order of, say, 40 cents with the smaller tips used in light work, and although this is nearly three times the expense involved with electric light the actual expenditure is really immaterial in view of the amount of work that may be accomplished.

For heavy work, however, the large sizes of tips for the oxy-acetylene process must be used, and with these the cost per hour appears to run to, say, $1. With the electric arc, even on the heavier jobs, the average draft of current seems to be seldom beyond 100 amp., and the cost per hour should hardly exceed 30 cents. Here the matter of cost difference is an appreciable one and, besides, in the large jobs the matter of rapidity with which the work can be done is of real importance. Here the electric arc seems to have somewhat the best of it, just as the oxy-acetylene flame is superior for small work.

In repair shops, of course, the electric arc is not really a portable outfit, and it must be used in a space that is partitioned off from the rest of the shop, not only because of the danger to the eyes of those who may look at the flame, but also because of the fact that it can be used only in those parts of the shop where overhead wires give a supply of current or where special wiring with the proper receptacles is installed. On the other hand, the oxy-acetylene apparatus is completely self-contained and lends itself readily to use as a portable tool, one especially handy scheme being that used in the shops of the New York Railways, where a sheet-iron cabinet 24 in. square and 5 ft. high has been equipped with wheels and handles so that one man can move it from place to place, a backward list provided in the mounting eliminating any tendency for the tanks to fall out when the door is opened. Such an equipment enables the apparatus to be used anywhere, and this, of course, is one of the most important of the factors which make all forms of autogenous welding so greatly superior to the old methods of the blacksmith shop.

Planning and Efficiency in Shop Work

AN interesting experiment in the way of adopting the principles of scientific management to routine car overhauling and special repair-shop work is described in an article by F. P. Maize in this issue. As the results have amply justified the effort and as the plan has been in operation for two years with increasingly satisfactory results, the description is well worth while. It is especially appropriate in our annual maintenance issue.

At first sight it would not appear that the electric railway maintenance shop affords a fertile field for a planning system. Much of the work is special, and the average layout is more that of a repair shop than a manufacturing establishment. However, overhauling is being done more and more systematically, and such work lends itself well to careful planning. As Mr. Maize shows, even irregular repair work can be taken care of by the plan which he has worked out. The crux of the situation consists in the existence or absence of lost motion in the shop processes. If there is much of it, a systematic planning system will reduce it. The Portland scheme is one such; the same fundamental principles can be applied generally.

As the article in question is read carefully, several points are like to impress the reader. One is that losses in labor and material of considerable magnitude may be exempt from detection by ordinary means. Comparison of detailed maintenance costs with respective costs on other properties are helpful but only in a general way. Analysis of local conditions is necessary also. A second point is that the scientific spirit which produces results in the laboratory is also applicable in prosaic shop work. The root of this spirit is analysis, and its crown is application. Both of these results are illustrated in the present instance.

The advocates of more elaborate schemes of scientific management will probably consider the Portland plan unnecessarily simple and tentative. It appears, however, to be founded on correct principles. Each successive step has been taken as it became necessary, and the results, the conclusion by which every premise and process must be tested, are plainly evident on the credit side of the ledger.

American Association to Conduct Exhibits

THE letter which is being sent by the executive committee of the American Electric Railway Manufacturers' Association to its members this week and which is published under "Association News" elsewhere in this issue, announces a very important change in the purposes and future of that association. It explains that the American Electric Railway Association has decided to take charge of the arrangements for the convention exhibits, entertainments, etc., for the 1916 convention and will appoint a committee for that purpose composed of representatives from railway companies and from manufacturing companies which have joined the parent association under the revised by-laws. Under these circumstances, the Manufacturers' Association, as it exists to-day, has little work to perform, and it is proposed to move the headquarters on May 1 to less expensive quarters and that there will be no necessity for the collection of the usual yearly dues.

We have already positively expressed our opinion that the changes in the constitution of the American Electric Railway Association, adopted at Chicago last month, were desirable and in the interests of the entire industry. They not only eliminate the waste of duplication necessitated by the conduct of two organizations when one will answer the purpose, but they enable the manufacturing companies to act, side by side, with the railway men, in the American Electric Railway Association and participate in its work as well as in its councils. No one will deny that the Manufacturers' Association, as an association, has been of great assistance to the industry in the past, but the time has come for a single association, and for one which can more closely knit together all of the various interests, than was possible under the old plan of organization.

We hope that the plan laid down by the executive committee of the American Electric Railway Manufacturers' Association in its letter to its members will receive general indorsement. It recommends unified endeavor in all branches of the industry and that the members of the Manufacturers' Association should show their willingness to co-operate in the purposes of the American Electric Railway Association by becoming "member companies" in that association. The time for divided councils has passed. There is now only one association representing the interests of the industry, and it should receive the cordial support of all of those manufacturing companies which have previously been members of the Manufacturers' Association.

Maintenance on the Detroit Tunnel Electric Zone

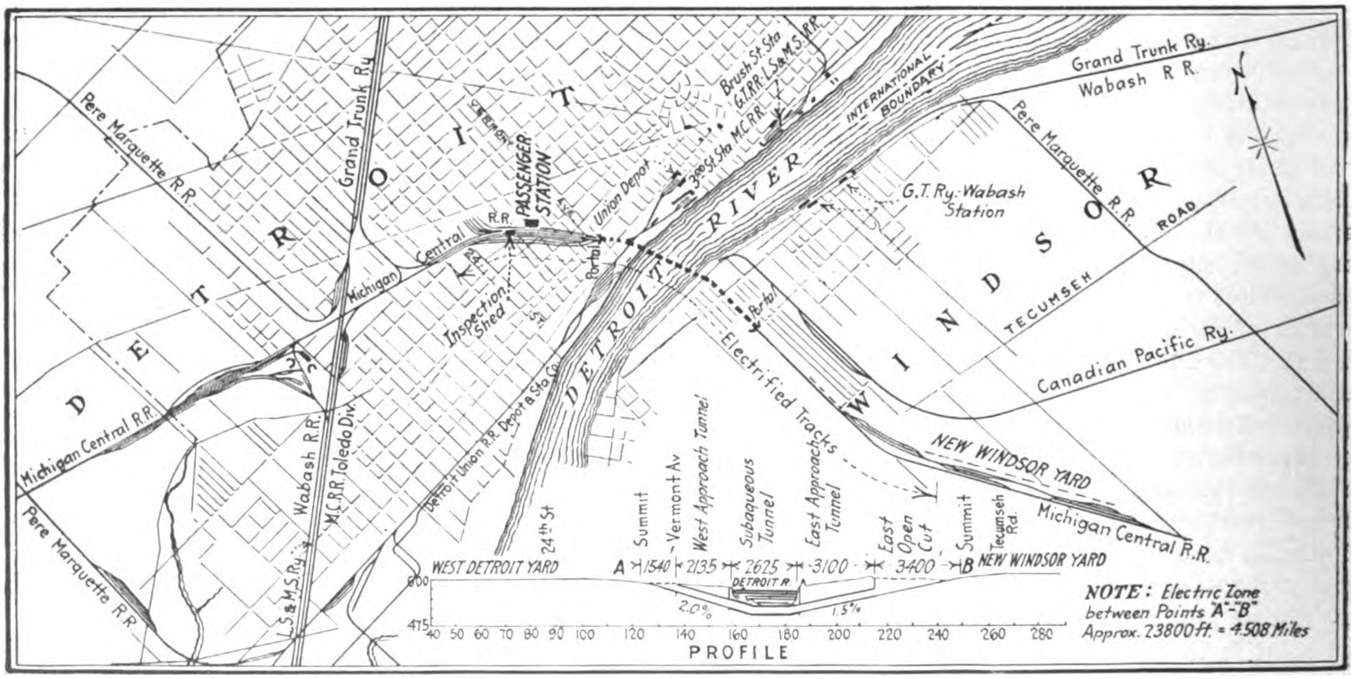
Five Years' Operation of Ten Electric Locomotives and Some 20 Miles of Third-Rail Have Shown Remarkably Successful Results, and an Outline Is Given of the Work and the Methods Involved in the Upkeep of the Installation

IN October, 1910, the Michigan Central Railroad placed in operation the now well-known tunnel between the cities of Detroit, Mich., and Windsor, Canada, for the purpose of eliminating the delays and expenses incident to the operation of car ferries over the Detroit River, and since that date the operations of the electric tractive equipment which was installed have been so remarkably successful that an account of the company's maintenance practices should be of interest. The electrification covers a zone of about 4.5 miles in length, including all of the track between the passenger stations in Detroit and Windsor, these buildings being located near the summits of the tunnel approach grades at either side of the river. Extensions of the electrified track are made beyond these points to provide yard trackage upon which trains may be set out and picked up by the electric locomotives after being made up in the near-by steam-operated classification yards.

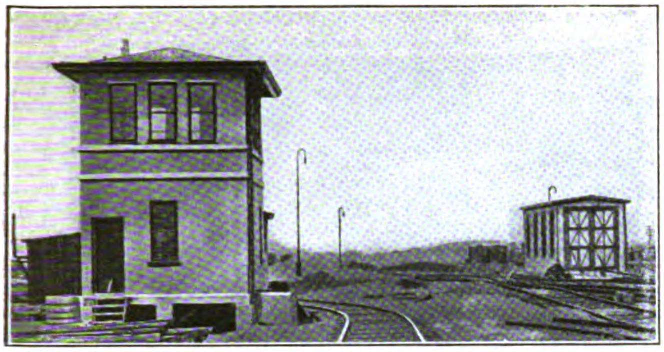
All classes of traffic are handled electrically through the tunnel, and the annual tonnage in both directions approximates 17,000,000, the maximum west-bound freight trains being 2000 tons and the maximum east-bound 2500 tons. The grades for the approach tunnels are 1.5 per cent east-bound and 2 per cent west-bound, three freight engines ordinarily being used on the heaviest freight trains, one at the head end and two behind. Passenger trains are hauled 2.3 miles for each trip and freight trains about 3.6 miles. A certain amount of switching is done in both classes of service—in part by the locomotives that haul the trains through the tunnel—and in consequence the mileage records of the tunnel locomotives are made up with a constructive 4 miles added to the actual mileage made each day. Mileage records for the regular switch engines are based upon the customary rate of 6 m.p.h. All locomotives are so assigned that they are practically pooled, and during the course of a year they operate indiscriminately in the different services. On the above basis the average annual mileage of each locomotive approximates close to 18,500, or somewhat more than 1500 miles per month.

All of the locomotives are of the four-axle, double-truck type with all weight on drivers, and they are designed to use 600-volt direct current collected from an under-running third-rail. Each is equipped with four General Electric motors of 280 hp., and these are geared direct to 48-in. driving wheels with a 4.37 ratio, there being two gears to each axle and a pinion on each end of the armature shaft. The motors have box frames, commutating poles and forced ventilation, which is applied at all times when the engine is in motion. The control is of the Sprague-General Electric multiple-unit type, with two master controllers in the main cab and the contactors in the auxiliary cabs, or housings, at each end of the locomotive. Three running positions for the controller are provided—series, series parallel or parallel.

At the present time ten engines are in service. Six of these are of the 100-ton type described in the ELECTRIC RAILWAY JOURNAL for June 19, 1909, and four are of a similar design but with slightly different details of motor and control construction, and with considerably more ballast, which brings the total weight to 120 tons. This equipment is somewhat more than enough to handle the existing traffic through the tunnel, there


DETROIT
WINDSOR
Pere Marquette R.R.
Grand Trunk Ry.
Michigan Central R.R.
PASSENGER STATION
Union Depot
Inspection Shed
Portal
Brush St. Sta. G.T.R.R.-L.S.&M.S.R.R.
3rd St. Sta. M.C.R.R.
INTERNATIONAL BOUNDARY
DETROIT RIVER
Grand Trunk Ry.
Wabash R.R.
G.T. Ry.-Wabash Station
TECUMSEH ROAD
Canadian Pacific Ry.
Electrified Tracks
NEW WINDSOR YARD
Wabash R.R.
M.C.R.R. Toledo Div.
L.S.&M.S. Ry.
Detroit Union R.R. Depot & Sta. Co.
24th St
Summit
Vermont Av
West Approach Tunnel
Subaqueous Tunnel
East Approach Tunnel
East Open Cut
Summit
Tecumseh Rd.
WEST DETROIT YARD
A 1540 2135 2625 3100 3400 B
NEW WINDSOR YARD
DETROIT R.
600
475
2.0%
1.5%
40 50 60 70 80 90 100 120 140 160 180 200 220 240 260 280
PROFILE
NOTE: Electric Zone between Points "A"-"B" Approx. 23800 ft. = 4.508 Miles

DETROIT TUNNEL MAINTENANCE—PLAN AND PROFILE OF TUNNEL AND APPROACHES



DETROIT TUNNEL MAINTENANCE—SIGNAL TOWER AND EMERGENCY INSPECTION SHED IN WINDSOR YARDS

being regularly in operation five double-crewed engines that work twenty-four hours a day and two that are operated only for one shift daily. Of the remaining engines one serves as a spare to take the place of whichever road locomotive is turned in for regular inspection, and the other two are stand-by machines that can be used during periods of abnormally heavy traffic.

INSPECTION FACILITIES FOR LOCOMOTIVES

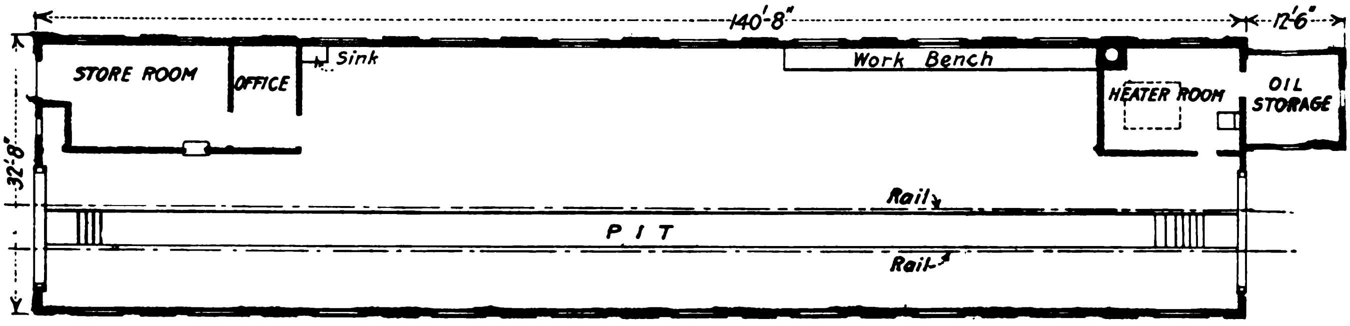
For the inspections, which are given to each engine at ten-day intervals, there is provided a small steel and concrete building in the yard at the Detroit end of the tunnel. This is approximately 140 ft. x 32 ft. in dimensions and it will hold three locomotives comfortably. It has a single longitudinal track along one side. A pit is provided for the whole length of the track, and this, it may be said, was very successfully built upon a gravel fill, which was introduced because suitable foundation material existed only at some distance below the level of the pit bottom. There is no transverse drop pit for wheels, all dismantling work being done from above with the aid of a 25-ton traveling electric crane which has a single trolley. This, it may be said, is capable of lifting the heaviest single piece that has to be handled in stripping the engine, but it is, of course, not capable of lifting the cab off its frame. The latter operation, however, has not yet been required, and when it is the engine will be hauled to one of the steam locomotive repair shops elsewhere on the system.

Along the side of the building opposite the track are work benches and space for storing heavy spare parts, and at one corner of the building is an office and storeroom, the other corner being occupied by another room that contains a small steam plant to heat the shop. An oil storage room is housed in a small addition. No machine tools are installed, as the small amount of machine work that is occasionally required is done in one of the steam locomotive repair shops at another point on the railroad. Neither the third-rail nor any overhead contact structure is extended inside of the inspection building, and engines are moved as required by means of a long, flexible, insulated cable and a contact piece that may be held on the third-rail shoe of a locomotive, this rig being made live by cutting in a handthrow switch on a slate panel on the wall.

This covers the only facilities that are provided for inspection and repairs, except for a small shed on the Canadian side which is intended only for emergency use and which holds but one engine. It is provided with a pit so that locomotive running gear can be examined or a brakeshoe applied, but it is normally unoccupied. A live rail supported on an overhead structure permits engines to be moved in and out of the building under their own power through contact with either of the two small pantographs which are mounted on either side of the cab roof of each locomotive. It might be said here that the locomotives had originally a single pantograph in the center, but because of the adoption of train sheds at the new passenger station in Detroit which had ventilating openings along the center line of the track the double pantograph arrangement was introduced.

The entire shop force for electric locomotive maintenance is located in the Detroit inspection building and consists of five men. This number includes a machinist-foreman, an electrician, an air-brake specialist and two

DETROIT TUNNEL MAINTENANCE—FREIGHT TRAIN IN WINDSOR YARD



DETROIT TUNNEL MAINTENANCE—PLAN OF INSPECTION SHED AT DETROIT

wipers. No work is done at night, the surplus of equipment permitting overhauling to be carried on in the intervals between the regular ten-day inspections. Overhaulings are made dependent largely upon tire wear, the removal of tires being the heaviest routine job in connection with the locomotive maintenance. They come at intervals of from eight to ten months, and hold the engine for ten or twelve days. The inspections require about ten hours, and the engines are held for this purpose in regular order, being inspected first-in, first-out. After an inspection the engine is assigned to the crew of the next engine due for inspection, and this crew stays on it until its next inspection falls due.

MAINTENANCE PRACTICE AND RESULTS

From a maintenance standpoint the installation presents a record that is truly remarkable in view of the small number of locomotives, the grilling service and the low annual mileage per locomotive that is inevitable on account of the short route. The expenditures for locomotive maintenance remain very close to 5 cents per locomotive mile, the change from year to year being practically negligible. Figures for the year 1914 are given in Table I.

TABLE I—EXPENDITURES IN CENTS PER ENGINE-MILE FOR REPAIRS AND SUPPLIES, DETROIT TUNNEL LOCOMOTIVES

Repairs to locomotives:		
Labor	2.27	
Material	2.69	
Total		4.96
Engine-house expenses:		
Labor	0.325	
Material	0.16	
Total		0.485
Lubrication		0.165
Other supplies		0.29

The costs shown under the heading "Repairs to locomotives" in Table I include all labor and material required to turn the engines out in good condition after inspections and overhaulings, and also the charges that are made against the electric locomotives for work done for them at the steam locomotive repair shops at other points. The costs appearing in the table under the heading "Engine-house expenses" cover the incidental supplies and the labor involved in the actual inspections.

At these inspections the locomotive is examined thoroughly and such work as is needed is done on the spot by the man who is doing the inspection. Separate inspectors who do no repair work are not employed, nor are the reports of the motorman that last ran the engine depended on for a complete statement of the locomotive's condition. However, the motormen turn in work cards in accordance with the form shown in an accompanying illustration, calling attention to any defects that have been found, and these, of course, receive due consideration by the repair force.

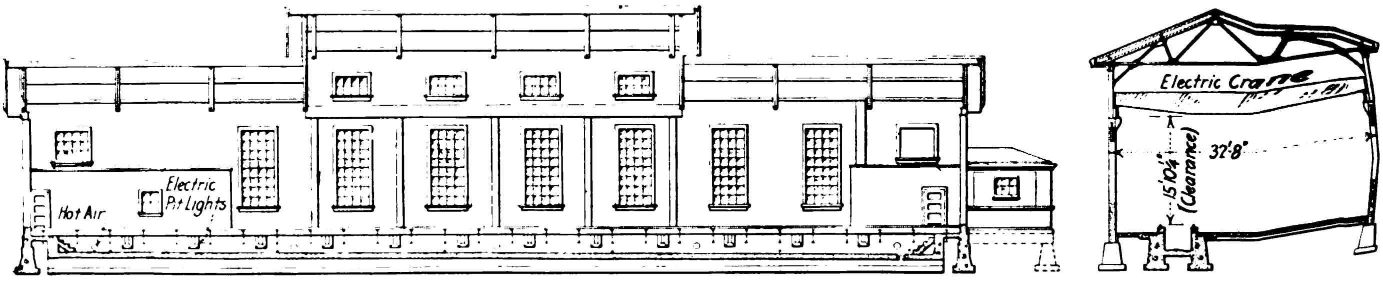
At the overhaulings, which, as before mentioned, are given to the engine whenever it becomes necessary to turn or change its tires, the cab frame is lifted off the trucks and the latter are stripped. All mechanical wear about the running gear is taken up and the motors and control are thoroughly overhauled, the engine being turned out in a condition that is as good as new. As no facilities are provided at Detroit for turning driving wheel tires, the tires, after they are removed from the wheel centers, are sent to the nearest steam locomotive repair shop.

The changing of a set of tires, exclusive of any other overhauling work, holds an engine for about four days, the procedure being somewhat slow on account of the fact that only a single overhead crane is provided. For tire work one end of the cab frame is blocked and the other end is raised while the trucks are run out from underneath. The raised end is then lowered onto blocks and the crane is released for the work of dismantling the trucks, the wheels being removed and set up on the floor so that the tires can be taken off the centers and replaced with new ones.

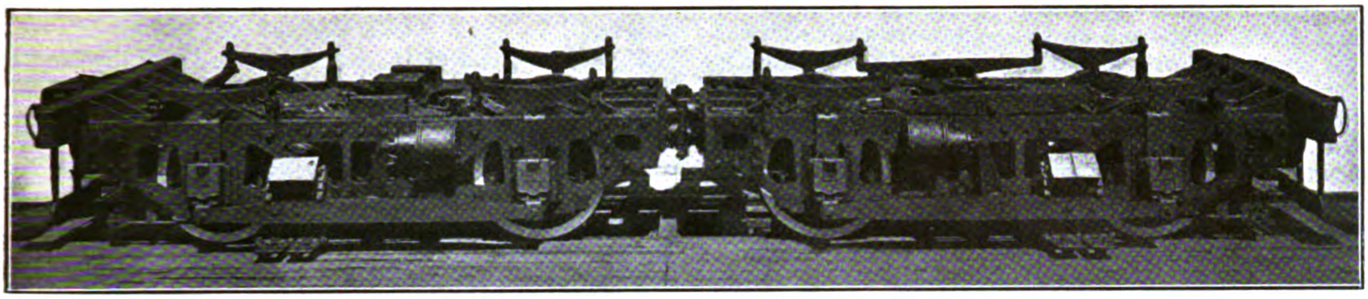
ELECTRICAL REPAIRS

The regular attention that has been devoted to the locomotives has resulted in keeping the details of the equipment in astonishingly good shape, this being especially applicable in the case of the motors, which are taken off the trucks at each overhauling, stripped of their armatures, blown out and thoroughly examined. Before being replaced in service the armatures and fields are painted all over with Sterling black varnish.

At the present time the commutators are in perfect condition and none of them has yet required turning or slotting, the mica having been cut down when the motors were built. Self-lubricating General Electric brushes are used and the life averages about eighteen months, some lasting for two years. They are almost invariably renewed only on account of wear, such break-



DETROIT TUNNEL MAINTENANCE—ELEVATION AND CROSS-SECTION OF INSPECTION SHED



DETROIT TUNNEL MAINTENANCE—SIDE VIEW OF ASSEMBLED TRUCKS AND MOTORS FOR LOCOMOTIVE

age as occurs happening only in cold weather. Only two armatures have given out during the five years that the engines have been in service. One of these got an interior short-circuit which burned out three coils and a pair of core bands. On the other, two armature coils were burnt out and had to be replaced.

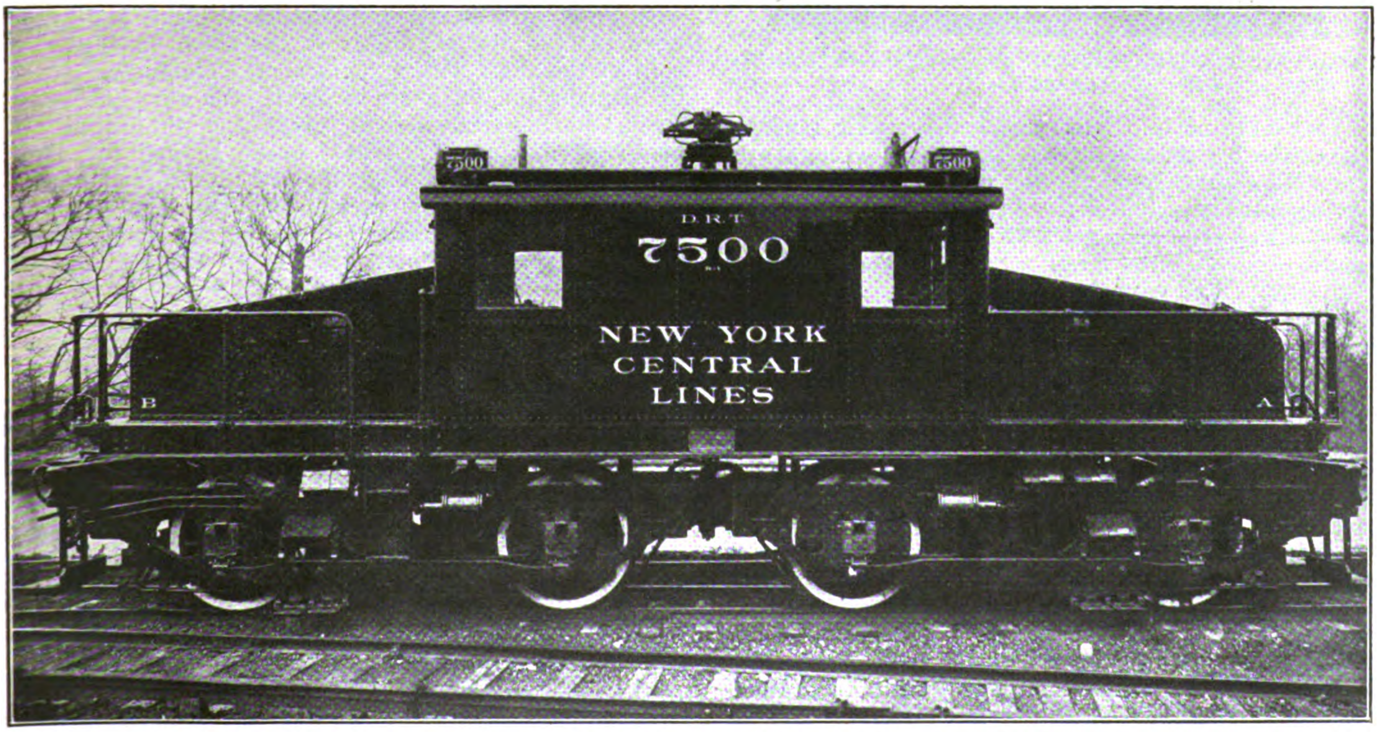
Aside from these failures, practically nothing has had to be done on the armatures since they were placed in service. At the end opposite to the commutator the canvas hoods have frayed off in some cases, and where this has occurred the frayed canvas has been trimmed off and bound down by means of heavy cotton cord, six or eight turns being wound on between the edge of the first band and the edge of the bell. On this winding there are applied three coats of Sterling varnish, and this seems to hold the cover permanently in place, as no troubles have developed from such repair jobs.

The field windings also have given excellent satisfaction, only one field coil having had to be renewed because of an actual failure in the windings. In addition, one compensating field lead broke down at such a point as to require the renewal of the field coil. A negligible number of flash-overs have been experienced. These have taken place between the commutator and the end-bell, and in most cases the arc has carried over to the motor frame. But in every instance the results of the flash have been easily repaired by the local force at Detroit by filing up the burnt spots and painting over the creepage space.

However, for the sake of protecting the locomotives against the effect of emergencies, two complete spare motors and two extra armatures are kept in storage in the inspection building at all times. One spare controller is also kept on hand, but this has never been used, and it should be said that the control equipment appears to be in a remarkable state of preservation.

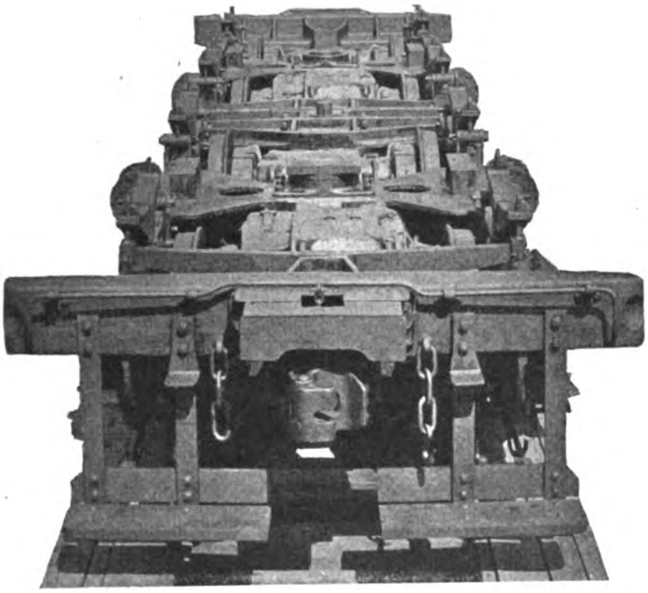
Only six arc-chutes have been replaced, and only six pairs of contact tips renewed, during the five years' service of time on the six older locomotives. On the original engines the contactors were of the GE-166 type, and these have given exceptional service. On the newer engines No. 266 contactors were installed, and these have not shown quite perfect results, although under ordinary circumstances their action would be considered thoroughly satisfactory. Drafts of current of the order of 500 amp. per motor are frequent on the tunnel approach grades and the engines are run on sand with the idea of getting the train up the grade regardless of the load on the motors. Consequently, when trains beyond the locomotive rating are inadvertently delivered at the tunnel the above-mentioned amperage is greatly exceeded, and cases have been encountered where the contactors have been unable to break the heavy current, the consequent arc burning them out. No circuit-breakers are installed on the engines, the motors being protected by 600-amp. fuses.

It is the practice to paint the inside of the arc chutes with shellac at each overhauling, as this is considered to be an aid in reducing the burning caused by the arcs that are thrown from the contactors. Whenever this



DETROIT TUNNEL MAINTENANCE—ONE-HUNDRED-TON LOCOMOTIVE painting is undertaken the burnt composition on the sides of the chute and on the contactors themselves is first scraped off with an old hacksaw blade so as to leave a smooth surface for the paint. On the master controller the segments are wiped off with oil once every ten days, removing only just what the oil takes off. The results have been thoroughly satisfactory, because the only wear apparent at present is at full running position, where the vibration has produced a shallow notch but not enough to be noticeable. No burning is in evidence anywhere about the master controller.

With regard to the motor bearings, it may be said that axle bearings are renewed when they are 1/8 in. large. They are only just now beginning to require changing, having lasted about five years. Quite a little side play, however, has been found to develop in all of these bearings, and at intervals liners have had to be riveted onto the collar at the end of the brass to take this up. During the period of about a year this side play increases up to approximately 1/2 in., and it is then reduced by attaching a soft brass liner with countersunk brass rivets, the thickness being sufficient to reduce the side play to about 1/16 in. The axle-cap studs gave a certain amount of trouble in the beginning, as they were made of steel and had a strong tendency to become brittle and break. Later on wrought-iron studs were substituted for the original ones, and this has obviated the difficulty. Armature-bearing brasses are renewed after they get 1/32 in. large, or during the course of about three years' service. Some trouble has been experienced with these, three or four of them running hot in the course of every year.



DETROIT TUNNEL MAINTENANCE—FRONT VIEW OF LOCOMOTIVE CHASSIS

MECHANICAL REPAIRS

Practically no trouble has been experienced with the mechanical features of the locomotive. Repairs, aside from normal wear, have been confined to small details, such as that the equalizer pins at the centers and ends of some of the equalizers have shown a tendency to roll and shear off the keys. This is ascribed to extreme hardness of the metal of which the pins were made, which permitted them to work out of place and cut off the keys, since soft-metal pins installed on some of the engines do not display the tendency. Occasionally, also, equalizer hangers have broken, but in the newer engines these were made considerably heavier than on the older machines, the thickness having been increased to the depth of the boss throughout the whole length of the hanger.

At only one end of the cab frame is there the usual center casting and kingpin, the other end having a sliding support to permit the swivelling of the articulated truck frames, and this center casting is fastened to the cab frame with eight 1-in. bolts. These bolts have been found to shear off when one engine hits another a moderately hard blow, the primary cause being the extreme rigidity of the heavy engine frame, which prevents any "give" to reduce the force of the impact.

Very little difficulty has been experienced with the third-rail shoes. Normally these run for three or four months, and have to be replaced then only because of mechanical damage and not because of excessive burning or wear. However, when the engines are operated on the grades in the tunnel against the normal direction of the traffic (a practice sometimes necessitated by congestion of freight at one side of the river) the shoes burn off very rapidly. It has been the case, in fact, that shoes have lasted only for twelve hours' service under such conditions. This appears to be caused by corrosion on surface of rail from brine dripping from refrigerator cars. A high-resistance scale is formed, often 1/16 in. thick.

Side play for the driving wheels does not appear to be a serious matter on these locomotives. Engines are turned out after an overhauling with about 1/8-in. side play in the driving boxes, and they stay in service until the movement reaches as much as 1 in. Normally, of course, the speed is low, but occasionally the locomotives are reported to reach a speed of 50 m.p.h. for short distances. Even with the maximum side play, however, no especially hard-riding qualities are developed nor is any damage done to the track. The side play at the driving wheels is taken up with hub collars, which were originally made of cast iron but later were changed to soft brass, as this metal was found to run better against the cast-steel boxes. The hub collars run loose in the recess at the inside of the driving wheel hub, and it is stated that they never cut the surface of the hub because of grit getting in between the two surfaces.

As before mentioned, double pinions and gears are used for each motor. These were originally applied with great care at the manufacturers' plant, and they were checked for alignment of the teeth on opposite ends of the shaft with a surface gage reading to 0.003 in. During the five years of service the wear has been small, the material in both gears and pinions being heat-treated, General Electric grade D, and for this reason the problem of applying new pinions and maintaining the original alignment of teeth has not yet arisen. However, during the life of the locomotives, the circumstance has been brought up whereby one of the motors originally installed upon a locomotive has been replaced with another, and in this case the pinions on the new armature shaft have always meshed perfectly with the old gears. Pinions are also removed from the armature shaft quite frequently owing to the fact that the motors are of the box-frame type, and at overhaulings it is necessary to remove one pinion before the motor can be dismantled. In this case the pinion is replaced upon the old key, being warmed in boiling water and tapped into place with a light sledge hammer, while being forced home by screwing up the pinion nut. The gear center on each side is in one piece with the driving wheel, the gear teeth being cut on a rim that is shrunk onto the gear center and keyed in place. None of these rims has ever been taken off, owing to the small amount of wear on the gear teeth.

A noticeable feature of the engines in operation is the spotless condition of the cabs, the brass work, even to the Pyrene fire extinguishers, being polished to a looking-glass finish, and the miscellaneous equipment neatly stowed away. Among the latter is a droplight on a long flexible cord, which when not in use is kept in a specially arranged sheet-iron receptacle. For the cleanly cabs the assistant motormen who are assigned to each engine are responsible. The motormen are charged with the duty of seeing that the engines are in good operating condition while they are in service, bearings that run hot or controllers that act badly having to be promptly reported to the maintenance force. In this connection it may be noted that three men ride with each engine: a motorman, an assistant motorman and a conductor, who handles train orders, makes couplings and is generally responsible for the movements of the locomotive, especially in the case of its running light.

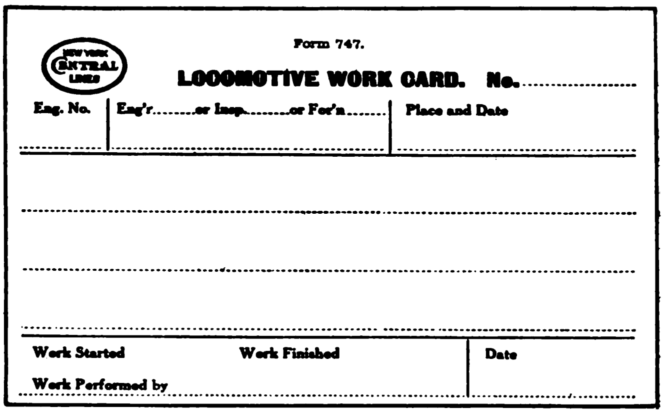
THIRD-RAIL MAINTENANCE

The electrical department of the Michigan Central Railroad, which is under J. C. Mack, signal-electrical engineer, and C. G. Winslow, assistant electrical engineer, and which has charge of the electric locomotive maintenance as above outlined, also is responsible for the upkeep of the third-rail contact system that is installed in the electric zone. The latter division of the electrical work is handled by a force of repair men separate from that employed on the locomotives. This force is headed by an electrical supervisor and a general foreman, and reporting to them, are three men classed especially as third-rail maintainers. However, because of the fact that all electrical work involved in the supply of electric power, the operation of telephones, signals and interlocking plants, the lighting and industrial power in the Detroit passenger station and the like is also handled by this department, there are a number of other employees who help out on third-rail maintenance in cases of emergency. In the same manner the third-rail maintainers devote a part of their time to outside work, no rigid line being drawn between the duties of the different classes of workmen. For the past two years a considerable amount of construction work has been done, so that the actual cost of third-rail maintenance cannot be definitely determined during this period. However, in the year 1913, the cost was $135 per mile, on the 19 miles of third-rail then existing, and this will give an idea of the cost under normal conditions. For the year 1915 the recorded cost of power distribution was $210 per mile of third-rail, this figure including, however, maintenance of power-distributing underground cables of all voltages.

Generally speaking, the most prolific causes of expenditure in the maintenance of the third-rail are derailments and the salt-water drip from refrigerator cars, of which a great number are handled over the electric zone. This drip falls upon the third rail and causes creepage across the insulators from the third-rail to the brackets that support it, setting up carbonization that eventually provides a sufficiently free path for current to burn out the insulator. The drip from the refrigerator cars also displays a tendency to run to the under side of the third-rail, and, as before mentioned, the consequent rusting, together with the salt deposit, forms an insulating medium on the contact surface that causes a certain amount of burning and also produces cracks in the contact shoes of the locomotives.

During dry weather it is very unusual for any insulators to break down. However, whenever fog or rain comes creepage is accelerated, and frequently as many as twenty-five or thirty insulators have been lost within a short time after damp weather sets in. There are 1000 insulators for each mile of third-rail, the insulators being installed in pairs, two to each supporting bracket. Under normal conditions many more insulators are lost by burning than by breaking, an example of which may be seen in the record for 1913, when 1200 insulators were burnt out and only 360 broken. Of these burned insulators, it may be said, 375 were on the tunnel tracks, and all but five of these were lost on the east-bound track, which serves the majority of loaded cars, as the west-bound traffic is composed largely of empties. From June, 1912, to June, 1913, approximately 700 insulators out of a total of 19,000 installed were lost by burning and approximately 200 by breaking, but between June, 1913, and June, 1914, when a large amount of construction work began, the number of burned insulators was increased to 1336 and the broken ones to 1017. This increase in insulator failures was largely traceable to the construction of the new passenger station at Detroit and the lack of adjustment of new and untried construction.

A certain amount of work has to be regularly done in adjusting the position of the third-rail to provide for wear in the running rail and ties. Recently brackets have been supplied that are 1 in. shorter than the standard, so that as the running rail cuts into the ties, the third-rail can be lowered correspondingly by using the short brackets with the proper number of shims under the base to bring the third-rail to the correct height above the top of the running rail. Previous to the introduction of the short brackets it was necessary to remove the brackets and cut away the extended ties on which they rested whenever it was desired to lower the third-rail.



NEW YORK CENTRAL LINES

Form 747.

LOCOMOTIVE WORK CARD. No.....................

Eng. No.	Eng'r........or Insp........or For'n.......	Place and Date

Work Started Work Finished | Date

Work Performed by

DETROIT TUNNEL MAINTENANCE—WORK-REPORT CARD

The wear on the third-rail to date has been very small, and there is nothing about the construction that regularly requires repairs or replacement, except the insulators. However, on account of occasional derailments that take place, with a consequent breaking down of the third-rail, the department keeps at hand in storage half a mile of material for third-rail construction, in addition to the supply of extra insulators required to replace those which are lost by burning or mechanical breakage. At the present time the third-rail mileage approximates 23, the increase from the previously mentioned figure of nineteen being due to additional construction in connection with the large new passenger station at Detroit.

The West Penn Railways Company of Pittsburgh, Pa., has substituted 1¼-in. x 4-in. grooved maple flooring for the yellow pine flooring formerly used for its car bodies and vestibules. Experience has demonstrated that the maple flooring lasts twice as long as the yellow pine, which was also purchased with ½-in. grooves at 2½-in. centers.

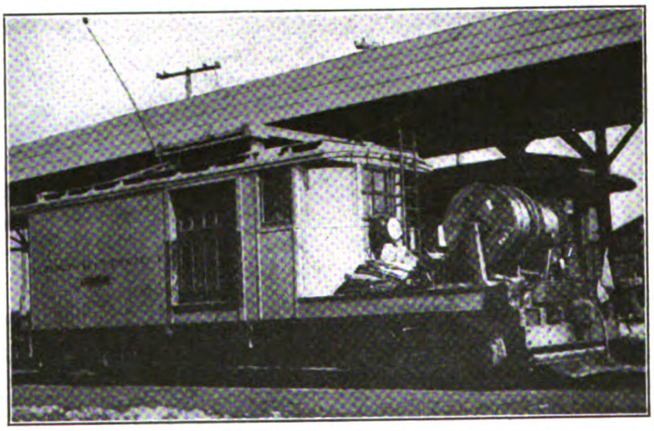
Overhead Construction—Tools, Specifications and Tests

The Relative Merits of Tower Cars and Automobile Emergency Wagons Are Discussed—Valuable Hints Are Also Given on Reel Cars, Pole-Setting Equipment, Small Tools, etc., and the Precautions to Be Taken to Secure Satisfactory Overhead Material

By CHARLES R. HARTE
Construction Engineer The Connecticut Company, New Haven, Conn.

THE really fundamental piece of apparatus of overhead construction and maintenance is the tower, which has been changed very little from its earliest form. This apparently is due to two quite unrelated causes: first, an appreciation and fulfillment at the outset of the real requirements, and, second, failure on the part of overhead men to realize the cost of the line gangs' effective time. Whether it shall be mounted on a car or on a wagon depends on the service. For lines on private right-of-way the car is a necessity, and its ability to carry a full equipment of tools and material makes it exceedingly valuable whenever it can be brought to the point involved and kept there. For city work, however, the mutual interference between tower and trolley and street traffic restricts its use to other than rush hours, compelling the use in addition of a wagon which can short cut to the work, dodging interference, and make quick temporary repairs.

At least one large company employs almost no towers at all, practically all work being done from extension ladders used in pairs to form "A's." To pass a car the men come down and stand the ladders in a vertical position. This brings them just outside the clearance. When the car has passed, the "A" is again formed and the men go back, all in less time than it takes to describe the procedure.

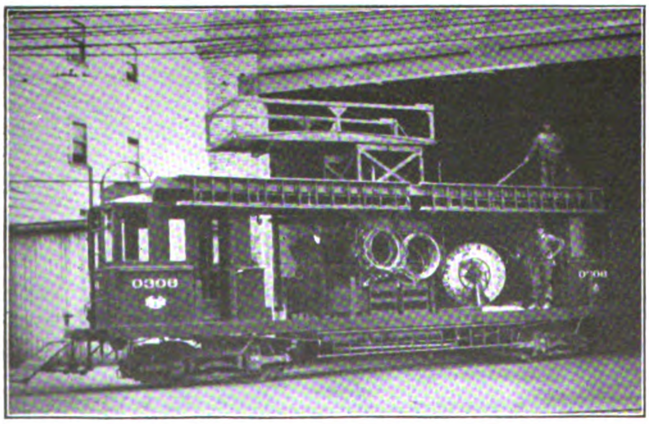

OVERHEAD CONSTRUCTION—COMBINED TOWER AND REEL CAR; PLATFORM SLIDES INTO EXTENSION POSITION

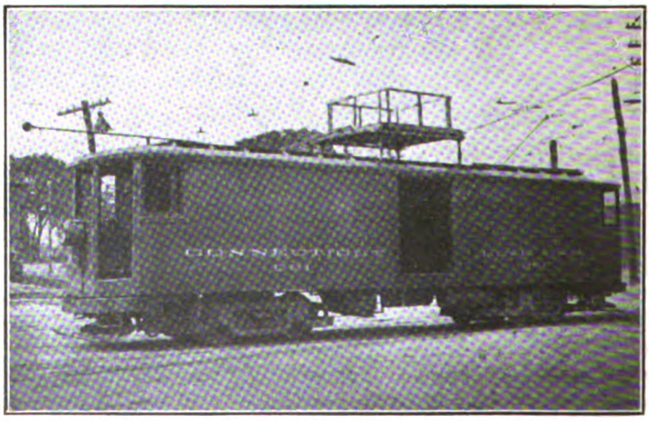
Time being the main essence of the situation, particularly if the trouble arises from a fire, many of the urban companies maintain an emergency service which, in addition to regular repair work, goes out on fire alarms. In many instances by the use of drop harnesses and horses the apparatus is rushed to the ground with the first apparatus. However, in spite of the marked advantages of the automobile chassis—instant readiness, high speed, unlimited operating radius, and ability to carry a heavy equipment, often obviating the necessity for a car—there are surprisingly few used, and practically none of these makes use of the engine for anything but propulsion.

RAISING AND LOWERING THE TOWERS

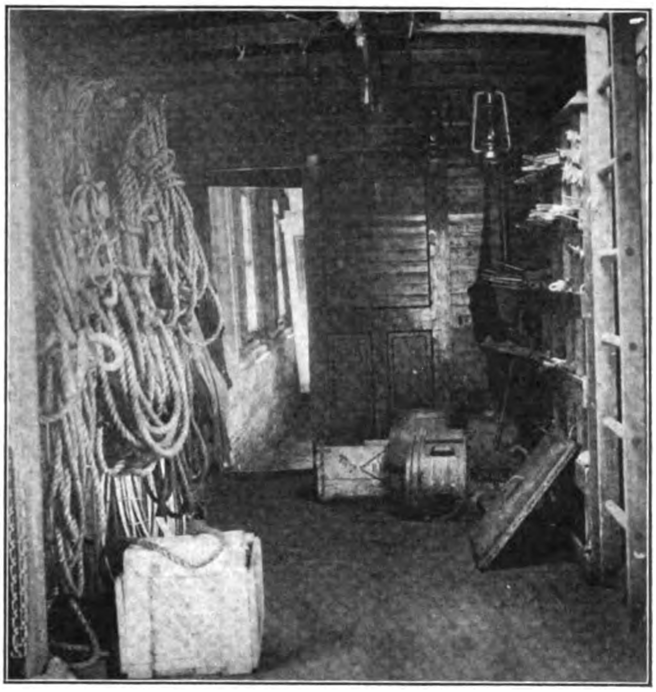
The lighter towers can be raised by hand with comparatively little loss of time, although the engine could do it far better; but although the big car towers require far too much costly time and effort, and that when it is most needed for other purposes, the large majority depend upon hand winches and human muscle. The simplest power application connects the hand winch with an electric motor, but this, as well as the more compact and efficient motor winch, is high in first cost. Air devices are less costly. In one instance an air motor has been connected through the worm gearing to the winch.

A less expensive but more complicated installation consists of an air hoist with, if necessary, a system of sheaves for multiplying the stroke to give the required lift. This, as well as the plan of carrying the platform on the plungers of vertical air cylinders, is objectionable on account of the elasticity


OVERHEAD CONSTRUCTION—UNITED RAILROADS OF SAN FRANCISCO TOWER AND RUNNING OUT CAR


OVERHEAD CONSTRUCTION—CONNECTICUT COMPANY TOWER CAR; PLATFORM RAISED ABOUT 1 FT.

OVERHEAD CONSTRUCTION—INTERIOR OF CONNECTICUT COMPANY TOWER CAR; BENCH END



OVERHEAD CONSTRUCTION—INTERIOR OF CONNECTICUT COMPANY TOWER CAR; OPPOSITE END TO BENCH

of the air, which causes the platform to dance. On the other hand, a liquid system requires a special pump as contrasted with the well standardized compressors used with the air lift, and leakage is not readily compensated for.

A scheme devised by Mr. Thomas, master mechanic in the Waterbury shops of The Connecticut Company, and now standard on the system, cleverly utilizes the good points of both air and liquid. In this a supply pipe is taken from the air-brake tank through an engineer's valve to the top of a pressure tank which is partly filled with oil. From the bottom of this tank an oil pipe passes, through a control valve, to the bottoms of four ram cylinders, which are simply sections of 3½-in. brass pipe. With the control valve open, applying pressure on the oil lifts the platform, which is carried on the plungers. Releasing the air lowers it, and it can be locked in any position by simply closing the control valve. It was found that while the maintenance of perfectly tight plungers was very costly they could be kept reasonably tight with little trouble, the leakage oil being led to an overflow tank from which it is returned to the pressure tank. The first installation lacked proper insulation between plungers and platforms, and in wet weather the latter were too "hot" for comfort, while the heavy oil employed stiffened up so in cold weather that it literally "gummed the game." These troubles were easily remedied, however, and the cars have been exceedingly satisfactory ever since.

EQUIPMENT OF THE TOWER CAR OR WAGON

Whether or not the platform shall be of the overhang type depends upon the nature of the service. An overhung platform allows work to be done with wagon or car clear of the track involved, and causes the least disturbance to traffic, particularly if rotated by power. It adds greatly to the weight, however, for it must have far more rigid and substantial support. For work in large cities the best combination is usually found to be a square-platform emergency wagon working directly beneath "the trouble," and an overhung platform car, which, however, also works under the trouble if practicable.

Tower equipment ranges from a light extension ladder, a pair of heavy bolt cutters for strand and trolley wire, a few small coils of strand and trolley, and a chest carrying some hand tools, ears, hangers and insulators, this being pretty close to the irreducible minimum of a light emergency wagon, up to a car installation that is a cross between a general store and a machine shop—and for the high-pressure repair and renewal work of the larger cities there is none too much. For example a recent medium-sized car has the following normal equipment:

Pole-framing tools: Axes, draw-knives, plane, chisels, saws, braces and bits, etc.

Pole-setting tools: Picks, shovels, bars, pike-poles, chains, blocks and falls, etc.

Overhead tools: Sampson grips, monkey and Stilson wrenches, heavy bolt-cutters, hammers, soldering pot, etc.

Overhead material: Ears, hangers, pull-overs, strain insulators, splices, anchor sets, section insulator runs, brackets, trolley wire, strand, clamps, bolts, washers, tape, S-hooks, cross-arm braces, lag screws, etc., sufficient for about 1 mile of single track, with extra supplies of parts most subject to wear.

Telephone and signal material: Cross-arms, insulators, insulator pins, choke coils, ½ mile of No. 10 wire, side brackets, signal lamps, keyless sockets, etc., for about ½ mile of line, with extra parts.

Telephone test set; telephone set with pole connector.

Signal lamps, signal lanterns, fusees, flags, "stop" and "slow" signals.

Fire extinguishers, metal pails, brooms, etc.

Work bench with 10-in. bench vise.

30-ft. extension ladder.

APPARATUS FOR RUNNING OUT WIRE

For running out feeder or trolley wire a reel car is often used as a tender, a common form being a flat car with triangular frames a little more than reel width apart with reel bearings on long screws on the inclines. Still simpler, for use in connection with a wagon, is the reel gig, a reel-carrying frame which is an extension of the tongue projecting enough behind the axle, to which it is pivoted, to hold the reel clear of the ground when the tongue is level, while by raising the latter the bearings are lowered and the reel rests on its rims. This same device with slight modifications can also be used as a pole gig, such as was described by S. L. Foster of the

United Railroads of San Francisco in a recent number of the JOURNAL. Mr. Foster, by the way, has the best reel gig the writer has seen.

Often, however, the reel is carried on the tower car. If mounted to feed out on the center line, as it should be, the reel requires some handling device, such as a small crane or trolley hoist, and on one car the standards can be rotated 90 deg. and the reel rolled into place. Commonly, plain cheek plates are bolted to the reel sides, an arbor a trifle smaller than the holes is slipped through them and the bearings of the adjustable supports, and the desired tension is maintained by means of a piece of scantling—or pretty much anything else that is handy—used as a brake against the rim, or not infrequently against the wire itself. In a much better plan a band brake forms part of the standards, lugs or similar devices on the cheek plate, engaging with the brake drum. This is always on the job, gives perfect control, and the empty reel can be returned for credit without causing a riot when it reaches the maker.

Although the writer knows of no case where the reel stand is also fitted for power drive, such an arrangement would seem very desirable when picking up wire if a special motor was not necessary. At least one of the larger companies, the United Railways of San Francisco, has found an independent wagon with motor-driven reel and winch head a profitable investment.

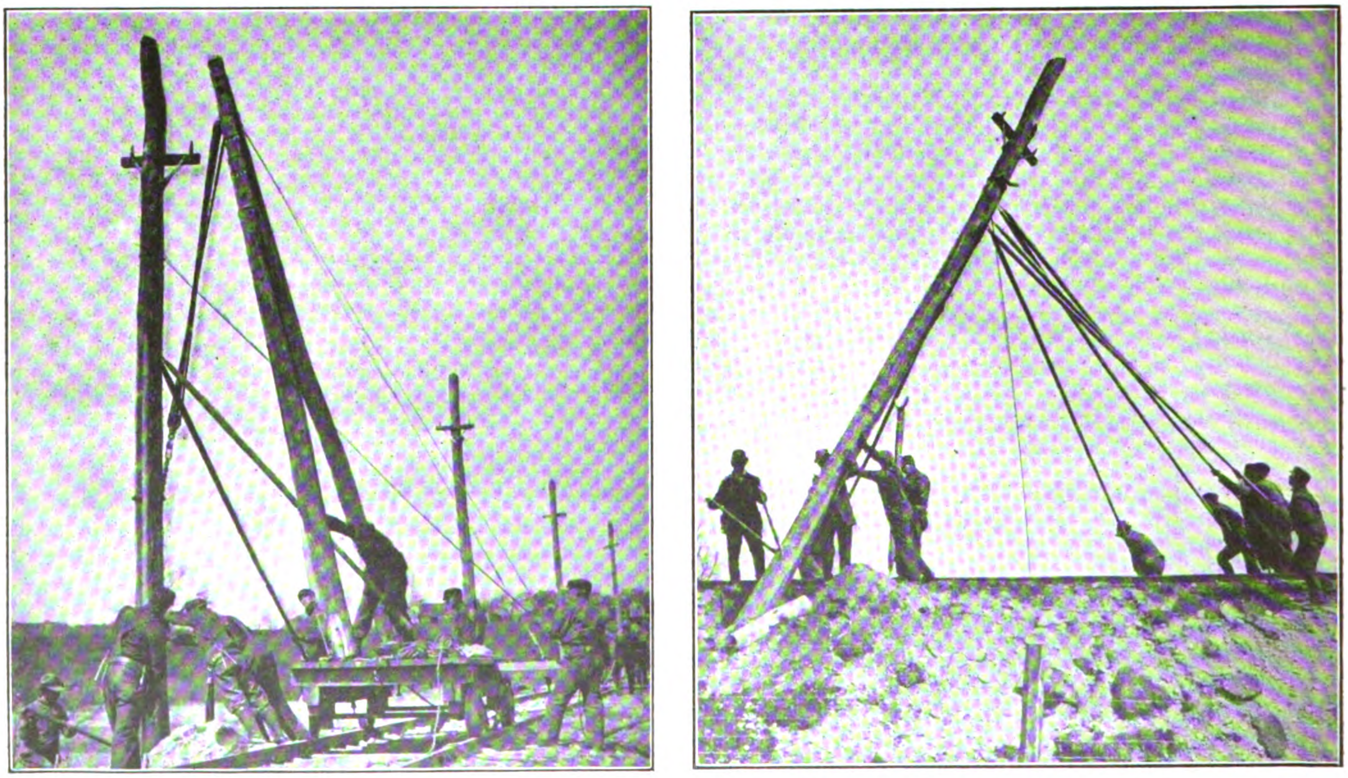
SMALL TOOLS FOR OVERHEAD WORK

The overhead smaller tools were largely standardized by the telegraph and lighting industries before the electric railway entered the field. The requirements of the latter have differed in the main only in requiring strength to handle the heavier material. In a few cases changes in type were required, the cam and similar short-grip come-alongs, for example, when enlarged to handle the heavy copper wire developing a tendency to deform as well as to securely grip it. The tools, of whatever kind, should be of the best, for cheap tools are costly wherever used, and nowhere more so than in overhead work, where a failure at a critical moment may have most serious consequences.

Pliers and cutters of the smaller sizes are usually worn as personal armament in the belt, often in company with a peen hammer, screw driver, and small monkey wrench, but the tower should carry extra ones for emergencies. A very useful tool for installing round-top hangers is the "wrench" which holds the hanger so that one lug can be hooked on the span and the round top can then be twisted until the other lug can be adjusted. Special local devices often require special tools for their best installation. For example, S. L. Foster, previously referred to, uses on turns a feeder clamp consisting of two lugs which grip the feeder and hold it to the insulator when the single bolt is tightened. The feeder is bent to the proper angle by a "jim-crow" similar to a diminutive rail bender.

TOOLS FOR POLE SETTING

Spoons, digging-bars, pikes, cant-hooks, jenneys and the rest of the pole-setting equipment are in the main no different from that of pre-trolley times. A device long in use, but only recently on the market in a form designed to meet the heavy eccentric load, is the pole jack. It is indispensable in city work, and nearly so in the open, its use being economical because it is a time saver, and, with wood supports, a pole saver. Another "once-used-never-without" device, which has been very slowly developed, is the pole setter, almost an absolute necessity in modern city work, and a money saver even on small lines, particularly if wisely combined with the tower or tool wagon. In its simplest form it is a gin pole, but it may be found in varying degrees of complexity and efficiency. In the open, where guys can be run out, a gin pole, shears or wagon derrick, if fitted with a good winch, is usually quite satisfactory. In some cases a snap rig permits easy use of the team, in which case, of course, provision must be made to prevent pulling the setter out of place. For city work, however, where heavy poles must be handled among a



OVERHEAD CONSTRUCTION—HOME-MADE YET VERY EFFICIENT POLE SETTER; NOTE ANCHOR GRIP ON RAIL OPPOSITE POLE BETWEEN WHEELS. POLE ERECTION BY HAND maximum of light, power and communication wires with a minimum of clearance, and traffic conditions restrict if they do not entirely prevent guying, the device must be very carefully worked out or the results will be disastrous.

A pole-setting device of comparatively recent development, which is very effective in its limited field, that is where many poles are to be set on low grades and in soil free from large stones, is the power auger. On the transcontinental telephone lines this machine proved exceedingly satisfactory. In the South and West, particularly if built as an attachment to other apparatus and not as an independent unit, it might well prove economical on extensive work.

OTHER DEVICES FOR OVERHEAD WORK

Speaking of attachments, a mounted, "able-bodied" motor or gasoline engine can often be used to great advantage on a small system if arranged to serve a number of devices hooked up to it as needed, and requiring little space or interest allowance when idle. Many of the field devices find good use in the store yard. The cable-puller winch is worth several men if heavy material is to be handled, while if it is equipped with a rereeling device, as it should be, with its aid usable old wire can readily be put in shape for re-employment. It is well to use a uniform diameter for such coils, or possibly two diameters, so that one size can be hung inside the larger. If strand is kept tied up in coils of a size easily handled, and of a length lending itself to the requirements of the system, the cars can be restocked in a few minutes and there is not the waste of wire or time which results when a full reel is kept "on tap" and the men help themselves.

Requiring little power work, but sometimes helped out thereby if it is available, is the overhead work which can be done in advance in the yard. How much can be so treated is always a local question which requires a balancing of the gain in time against the loss in material. Anchor logs can be prepared, brackets made up, and similar work done in advance without waste. Spans can also be made up if for uniform distance between poles, otherwise the margin allowed in length for safety eats up an astonishing amount of strand. Goose-egg and other open-groove porcelain strains, now used to a considerable extent, do not lend themselves to advance make up, the desire on the part of workmen to close the strand so tightly that the "egg" cannot drop out resulting in much injury and breakage, particularly with high-grade strand. In San Francisco wrought-iron loops are used, these being so shaped that the eggs can be slipped in at one end and slid down to a snug fit at the other.

As stated earlier, however, the whole question of tools and practice is tied up with local conditions, and each property has to determine for itself whether the saving at one point warrants the probable added cost at another.

SPECIFICATIONS

Although telegraph construction, long standardized, has furnished the groundwork for trolley overhead practice, until recently there were almost no specifications for the latter. The few which had been written were far from complete, and differed widely in what they prescribed. This was doubtless due to the fact that by far the greater part of our trolley mileage has been built in independent units, too small or too uncertain in outcome to warrant the expense of special research work. The absence of any standard specification resulted in each constructor becoming a law to himself.

Sometimes service or other requirements were set forth, sometimes not. In at least one instance "—— miles of overhead put up" covered the field broadly if not specifically, and at least as sensibly as a recent specification which prescribed a minimum weight for certain devices under bending stress only, without the slightest restriction as to the section to be used. In the same class was another specification, which fixed a minimum weight for a hanger, where every unnecessary ounce is an economic crime of high degree, not merely wasting material, but accelerating wear on car and trolley. This minimum being greater than the standard weight of a well-known make, the manufacturer had the patterns vigorously rattled in preparing the molds, giving a much thicker and heavier shell, which was accepted as entirely satisfactory.

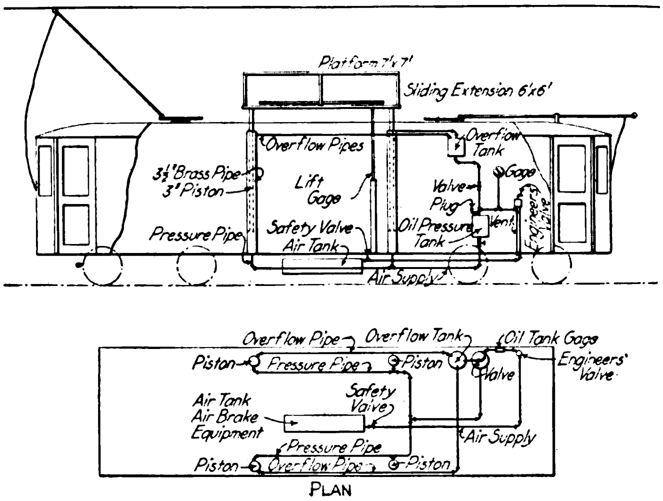
In 1906 R. E. Wade and the writer, with the generous assistance of many "overhead men," engineers, constructors and operators, to whom drafts were sent for criticism and suggestion, prepared quite a complete specification for material and construction for the New York, New Haven & Hartford Railroad trolley lines. Recognizing the importance of the production side of the situation, this specification was also submitted to the leading manufacturers with the request that they, too, freely criticise and suggest from their point of view, and advise just what stock material would most nearly meet the requirements as written, and also as they would modify them. Many of the suggestions were most helpful, and were embodied in the text, and from the material submitted limits were established which would admit all the commercial designs meeting the requirements of the final draft. Drawings were then made up showing only the important dimensions, leaving as much as possible unrestricted except by the requirement that every article comply with good commercial practice. It is interesting to note that with one exception every device specified was standard with at least one manufacturer, by no means always the same maker, however. The feed-in yoke, of which no marked type had fingers of desired length, was readily modified.

The importance of adjusting technical demands to commercial conditions is too often overlooked. A special design, considered by itself, is often more efficient than the market types, but this is only part of the story. The higher cost, and the difficulties and delays involved in securing deliveries, not infrequently give a net result decidedly in favor of the stock article. It is doubtful if there has been more flagrant disregard of this fact, however, than in "overhead," and the shelves of the makers are full of patterns differing just enough from each other to be different, and each acceptable only to its special advocate. That such special designs are more expensive is pretty well understood. That the extra cost of development, care of patterns, loss of room, etc., is paid for by just and unjust alike, as an "overhead" prorated over the output, is not always realized by the purchaser of the usual devices. Obviously the imposition of such charges is the only way in which the maker can protect himself, while the money locked up in stock of this character means just so much less standard material, and consequent greater likelihood of delay in filling orders. In the developing A. E. R. E. A. specifications, recognition of these facts, and acceptance of material already standard with other overhead interests wherever it is applicable, should materially improve market conditions.

TESTS AND TESTING

Whether or not the material obtained complies with the requirements is, of course, best determined in a well-equipped testing laboratory. Many of the larger companies either have such facilities, or employ the services of one of the private laboratories, of which there are a number. Where financial conditions do not seem to warrant the expenditure necessary under either of these plans, much can be done with home methods if used with that breed of sense called "common" because of its rarity.

The sole purpose of any test should be the determination of the fitness, or otherwise, of the device under observation for the service to which it is to be subjected. In some cases it becomes desirable, in order to produce a breakdown and to observe just what happens, to employ loads or conditions unlikely of realization in service. However, as a rule, service loads multiplied by a factor of safety ranging from two, for wire and similar specialized and dependable products, up to six for rough wood, to cover manufacturing and material contingencies, are entirely sufficient and proper. Armed with chemicals and testing machines a laboratory enthusiast can produce all sorts of results and, if a company can afford it, some good can often be had from investigations apparently quite afield from ordinary use. For the less fortunate property, however, this is neither necessary nor desirable.



OVERHEAD CONSTRUCTION—PIPING SYSTEM FOR COMBINED AIR AND OIL TOWER PLATFORM LIFT

For almost every material the general appearance is a good index, especially if the inspector is reasonably familiar with the processes of production.

TESTING WOOD CROSS-ARMS AND STRAINS

Wood requires some little acquaintance and experience. High-grade or very poor stock is unmistakable, but there are intermediate grades in almost all varieties that keep the young inspector continually in hot water. Cross-arms are particularly subject to doubtful appearances. By holding one end of a cross-arm in a vise and subjecting it to a twisting stress by means of a bar slipped through the opposite end pinhole, it can usually be readily determined if the "defect" is an open crack of some kind or merely a scratch or a mark. This test must be made with discretion, however, for a perfectly good cross-arm can be split with surprising ease if the twist is sharply applied. Loose knots can often be "jumped" by a sharp blow on the adjacent wood, while cracks and shells can often be detected by the sound on tapping the suspected stick sharply. Poles do not show defects as clearly as finished material, but many troubles are obvious. A scoring tool is convenient to determine if the wood under the surface is "live," and a miniature pick will usually reveal soft but undisturbed knots, usually a sign of inside rot.

Wood "strains" usually fail either from defective ends or cross-grain. A crude but effective testing machine can be made from a heavy beam with a water tank for the weight. Knowing the relative positions of fulcrum, test point and tank, the weight of the beam and the cross-section of the tank, the latter can be marked for the desired loads which can be applied uniformly and as rapidly as desired up to the delivery capacity of the filling hose. While perhaps not as good as an Emery, an Olsen or a Riehlé, such a testing machine can, with a few fittings easily made by a good mechanic, be of great use. Cross-grain is usually quite apparent with the modern natural-finish strains. For the older black-painted ones, and in testing for dead wood in the natural finish, the strain, held by one end, is struck smartly across the edge of an anvil or the head of a rail, letting the free end extend beyond the object struck.

TESTING METAL PIECES

On inspection protective coats on metal usually show blisters if there is lack of adhesion. If the object will permit bending, a few bends furnish an admirable test for the attachment of the coat. As to its thickness, the well-known Preece test, with its modification for sherardizing, is easily made and is the standard. As many know, sherardizing often "blooms" with a fine red coat, apparently a heavy rust, which presently disappears with no appreciable ill effect. Apparent service failures of this treatment are usually of this class. There has, however, been some irresponsible and wretched sherardizing, the "bloom" of which was real corrosion.

The chief shortcoming of malleable and forged material is brittleness, due to burning or crystallization, and one test is the same as for cross-grain in wood, a smart blow across a sharp edge. Eyebolts, anchor rods and the like can also be treated for protection, adherence and brittleness at the same time by gripping one end in a well-anchored bench vise, and bending sharply a few times. Such a bending test, continued to destruction, is a good rough-and-ready check on the toughness of ears, strand, wire and the like, particularly in connection with the appearance of the fracture. Strand and wire from the better makers, however, runs very uniformly, and tests other than behavior in making up are hardly needed.

MECHANICAL INSULATION TESTS

Hangers rarely give trouble by the softness of the insulation, but there have been instances where they have done so. There should be no observable softening or loss of strength at a continued temperature of 150 deg. Fahr. The chief weakness is at the junction of lugs and body, readily detected by a smart blow on an anvil. The general strength can be checked by hanging by the lugs and loading the stud, through a bar screwed to it, with 600 lb. It has been gravely required that the stud should support 8000 lb., but how senseless such a requirement really is appears from a consideration of the corresponding consistent test for the span. With the standard inclination of 1 ft. in 10 of half spans, 1-lb. load at the car gives 10-lb. pull at the pole. To correspond, then, to the 8000-lb. hanger test, the span strand should be tested at 40 tons.

Whether the company must use these rough tests or whether it can support a full-fledged testing department, and the net cost of the latter if wisely administered is by no means high, it is most important that the inspectors have a reasonably clear knowledge of the manufacturing details of the materials to be tested. Such knowledge, on the one hand, prevents the ridiculous mistakes often made by sincere but ignorant inspectors, and, on the other, permits prompt and effective "nailing of the fairy tales" with which ingenious supply men sometimes endeavor to meet unexpected contingencies.

Planning and Efficiency System in Portland (Ore.) Shops

An Adaptation of the Taylor System to Electric Railway Repair Shops Has Been in Use in Portland for Two Years with Satisfactory Results—By Centralizing the Planning and Other Clerical Work the Effectiveness of the Shop Force Has Been Increased

By F. P. MAIZE
Master Mechanic Portland Railway, Light & Power Company

SOME time ago when the management of this company, after having been impressed with the workings of the Taylor efficiency methods in some of the Eastern manufacturing plants, decided to introduce the system in the electric railway repair shops in Portland, we endeavored without success to obtain printed matter describing the application of the system to electric railway shops. Investigations showed that planning and efficiency systems, sometimes misnamed "scientific management," were being tried out by several roads, but only in a small way and in only parts of their shops. Now that the system has been successfully started in Portland, it may be of assistance to other companies to have the benefit of our experience in order that they may avoid at least some of our mistakes and have something of a foundation to work upon. The following statements have, therefore, been set down, giving the facts just as they occurred.

The master mechanic who adopts the planning system will find that he has undertaken a difficult task, but a study of our experience may encourage him in accomplishing it. He is advised, however, not to attempt it unless he starts with the determination to stick to it and push it through, no matter what occurs. There will be plenty of hard work, and many ups and downs before success is achieved.

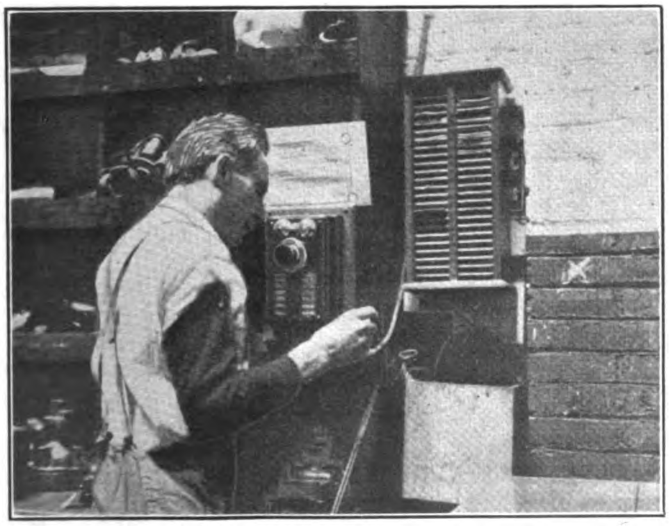
The planning and efficiency system now in operation in the shops of the Portland Railway, Light & Power Company is founded entirely upon the principles and methods made famous by the late Frederick W. Taylor. With all due respect to the "experts in scientific management," we are satisfied that the chances for successful adoption of planning and efficiency systems are greater when the methods are developed and introduced by the local organizations without the aid of so-called experts.

Enthusiasm in the possibilities of the Taylor method is the first requisite. The writer confesses to the possession at first of the usual prejudices against such methods, believing that they meant only additional red tape and that the savings which might be secured in the shops would be offset by correspondingly increased expenses in the office. However, in his apprenticeship and workman days he had had the customary unsatisfactory experiences with piecework methods, and later, when entrusted with the handling of workmen and direction of work, had learned to appreciate the importance and desirability of good pay for the workmen and stability in the schedules of wages. This experience made it relatively easy for him to become interested in, and to take up the principles of scientific planning and efficiency and to apply them to the local electric railway repair-shop conditions.

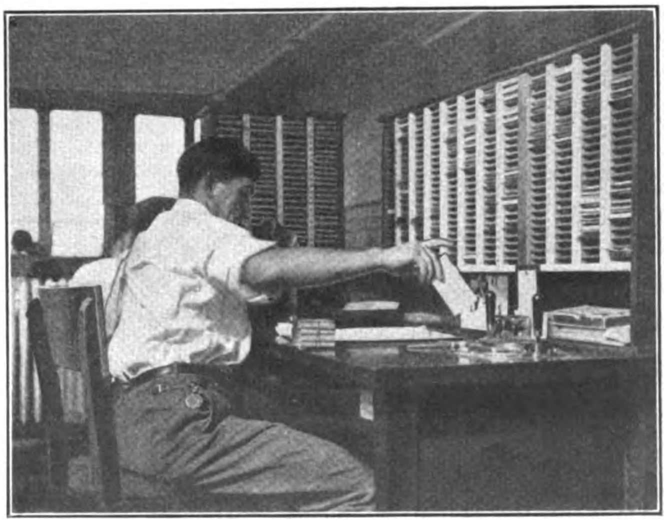
EARLIER REPAIR-SHOP PRACTICE OF THE COMPANY

The conditions on the property at the time of the introduction of the planning system were as follows:

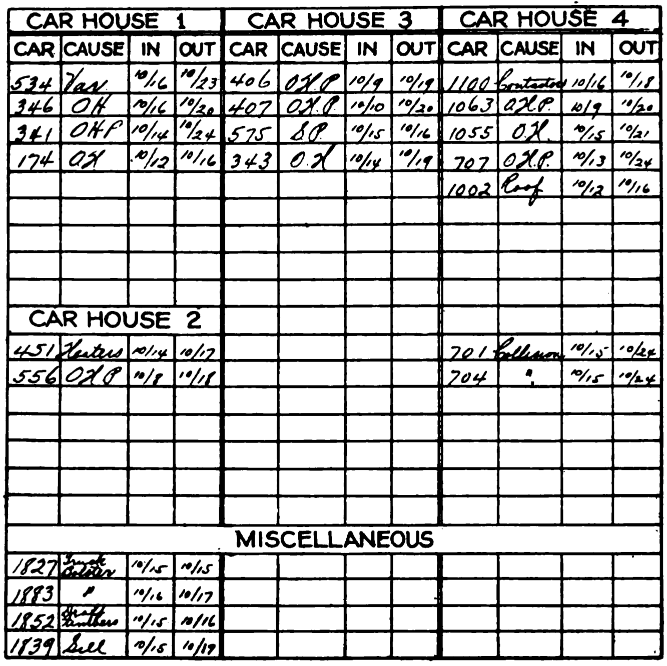
The railway operated from 400 to 500 cars, making a mileage of about 14,000,000 per year. Due to the large area covered by the city, the railway had one large shop and four carhouses well scattered. As the carhouses were some distance from the shop, and it would cost more to transfer the cars to and from the shop than to do the light work on the spot, each carhouse was



PLANNING SYSTEM—FIG. 1, WORKMAN CALLING IN TO START JOB. TIME SLIP CABINET AT RIGHT, BOX FOR TIME AND INSTRUCTION CARDS BELOW



PLANNING SYSTEM—FIG. 2, TIME CLERK ANSWERING TELEPHONE AND STAMPING AND FILING TIME CARD

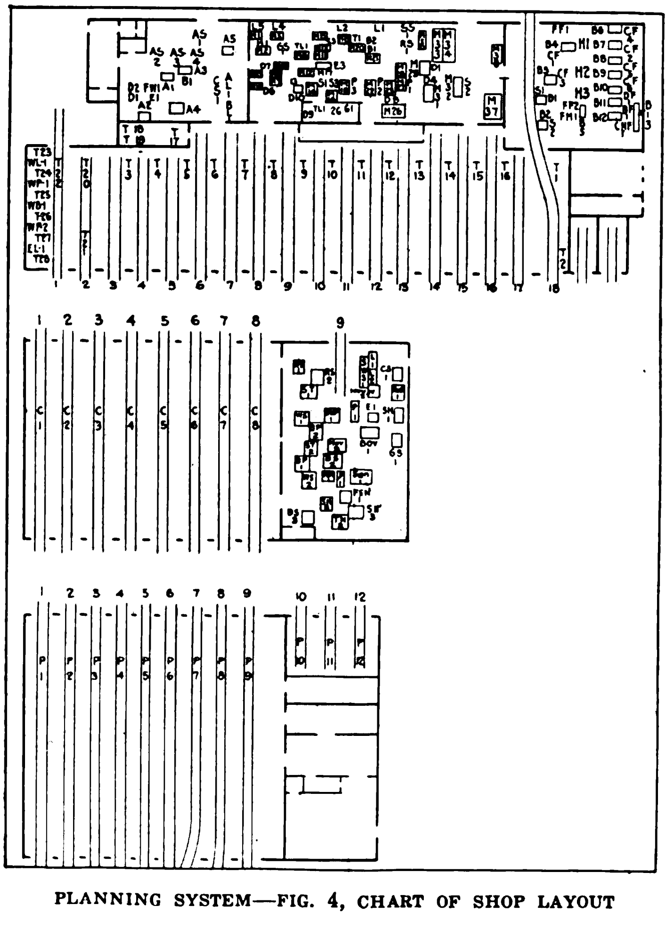


CAR HOUSE 1				CAR HOUSE 3				CAR HOUSE 4			
CAR	CAUSE	IN	OUT	CAR	CAUSE	IN	OUT	CAR	CAUSE	IN	OUT
534	Var	10/16	10/23	406	OHP	10/9	10/19	1100	Contactor	10/16	10/18
346	OH	10/16	10/20	407	OHP	10/10	10/20	1063	OHP.	10/9	10/20
341	OHP	10/14	10/24	575	SP.	10/15	10/16	1055	OH.	10/15	10/21
174	OH	10/12	10/16	343	O.H	10/14	10/19	707	OHP.	10/13	10/24
								1002	Roof	10/12	10/16
CAR HOUSE 2											
451	Heaters	10/14	10/17					701	Collision	10/15	10/24
556	OHP	10/8	10/18					704	"	10/15	10/24
MISCELLANEOUS											
1827	Truck Bolster	10/15	10/15								
1883	"	10/16	10/17								
1852	Draft Timbers	10/15	10/16								
1839	Sill	10/15	10/19								

PLANNING SYSTEM—FIG. 3, BLACKBOARD CHART, CARS IN AND OUT

equipped with wheel grinder, car hoist, crane, drill press, emery wheel, grindstone and small forge. The carhouse forces were allowed to grind wheels on the cars, change wheels, change armatures on the split-type motors, and replace complete motors of the box type, but they were not allowed to do any general overhauling or heavy repairing.

All parts, such as controllers, armatures, motors, air compressors, circuit breakers, etc., were sent to the carhouses ready to be put on the cars, and if any parts were defective these were replaced and the defective parts were sent to the shop for repairs. A delivery car visited each carhouse every other day to deliver and pick up material. By this plan equipment was kept in good shape, and the patchwork which is liable to be done at carhouses because of lack of facilities and time to do good work was avoided.



PLANNING SYSTEM—FIG. 4, CHART OF SHOP LAYOUT

The cars received general overhauling at the shop on a mileage basis. This consisted in taking the motors and trucks apart, repairing all worn pieces, cleaning and painting the motors, overhauling the wiring, electric parts, air valves, etc., as well as the car body. All parts had been standardized, making them interchangeable in the different equipments where possible in order to minimize the variety of parts. All individual parts were made exactly alike, so that if any gave out they could be replaced at the carhouse without fitting.

THE PLANNING AND EFFICIENCY SYSTEM AS ADAPTED TO PORTLAND SHOP CONDITIONS

The Taylor system as applied in industrial plants is so well known that it will suffice here to state that for our purposes the elements consisted in the following elements: (1) The organization and instruction of an office force for planning and routeing work, following its progress and keeping all necessary records; (2) the transferring of all clerical work to this office; (3) the securing of data as to the capabilities of men and machines, and (4) the fixing of such time allowances for jobs as would conduce to economy in production. How this was done will develop as the story progresses.

MAKING A START

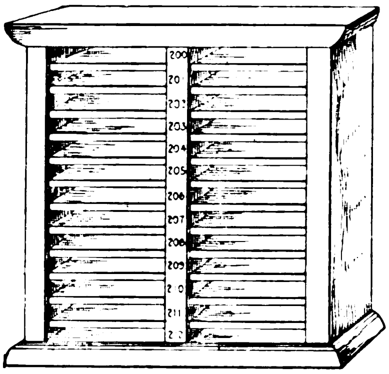
After deciding to adopt a planning and efficiency system the first question was how to start. It was decided that the best way would be to adopt a small part of the system all over the plant at one time rather than to try it in a part of the plant only. The latter procedure might have resulted in interference between the two systems. The chief clerk was first set to planning the office part, and the general foreman to systematizing the work in the shops so there would be no hitch when we were ready to begin. Previously cars had been ordered in by the chief clerk under instructions of the general foreman, but now this was entirely turned over to the chief clerk whose duty it would be to keep the shop supplied with work.

The foremen were first approached on the subject, and as nearly all of them took kindly to the plan we next discussed it with the workmen. Rumors had circulated in the shops to the effect that scientific management was to be introduced, and that it would make the men work harder. For this reason the name "Planning System" was adopted, appropriately, as we had decided to take up the planning part first. The attention of the men was directed to the fact that they would not be required to make out time cards, and that material would be delivered to them, thus saving them the trouble of going for it. They soon began to take an interest in the system, some of the good men asking how soon it was to be inaugurated, as they thought it a good thing.

We had in the shop office a large blackboard on which was a chart for keeping track of cars in the shop. This chart is shown in Fig. 3. We decided to continue the use of this board, and made also a large route board of the complete shops as shown in Fig. 4. This was laid out to scale, and numbers were used to indicate spaces for material with letters for the respective shops. For example, "*A1*" designated space No. 1 in the armature room, "*B*" designated the blacksmith shop, etc. On the board rectangles representing the machines were numbered and lettered also. Thus, "*E*1" was used for emery wheel No. 1, "*BM*2" for boring mill No. 2, etc. Corresponding with the lettering on the route board, signs were hung over each machine and space on square boards painted white and lettered in black. These sign boards were not fastened tight, but were attached in such a way that they could be moved in case a rearrangement of the space was found more convenient.

GETTING THE OFFICE WORK STARTED

As each department had a telephone, we decided to put one calculagraph in the office, to keep the time cards in the office, giving the workmen paper duplicates, and to have the workmen telephone to the office for orders, the time clerk stamping their cards in the office. Small cabinets were made to hold these time cards near the telephone in each department. The design of the cabinets is shown in Fig. 5. The cabinets were made with left-hand and right-hand sections, the left-hand one for the slips representing jobs on which the men were working, and the right-hand one containing the slips showing the jobs next to be started upon. A large cabinet for the use of the time clerk was placed in the office, divided into main sections to correspond with the shop cabinets.



PLANNING SYSTEM—FIG. 5, CABINET FOR TIME CARDS

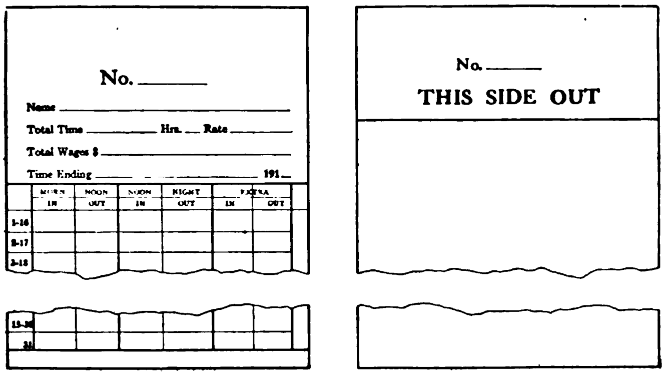
When a workman had finished a job, he telephoned in to the time clerk, who stamped his card out on the calculagraph. The workman would then take up the next time card, which stated that he was starting on a new job, and the time clerk would correspondingly stamp the starting time on the card in the office.

Previous to starting the planning system, the office force consisted of seven men: a chief clerk, a statistical clerk, a mileage clerk, a record clerk, a cost clerk, a time clerk and a stenographer. There was also one clerk in the overhauling department to make out requisitions, and one in the carpenter shop, making a total clerical force of nine. In introducing the new system we found it necessary to move the outside clerks into the office, and to increase the office force by one clerk and one office boy, making a total of eleven. In order to systematize the work of these clerks, the schedules of duties shown in Table I on page 542 were prepared.

SHOP PREPARATION FOR THE TRANSITION

In putting the new plan into operation, no changes were to be made in the shop foremanships but each foreman was instructed on the following points:

A "moving gang" was to be provided, and these men were to move all material. No work was to be done without an order from the office, and if the men had nothing to do they were to wait until they got orders from that source. When work came in that required the taking apart of equipment, an order for such work would be secured, after a list of what was to be done had been made out and reported to the office on an instruction sheet.



No. ______

Name ______

Total Time ______ Hrs. ___ Rate ______

Total Wages $ ______

Time Ending ______ ______ 191__

	MORN IN	NOON OUT	NOON IN	NIGHT OUT	EXTRA IN	EXTRA OUT
1-16						
2-17						
3-18						
15-30						
31						

No. ______

THIS SIDE OUT

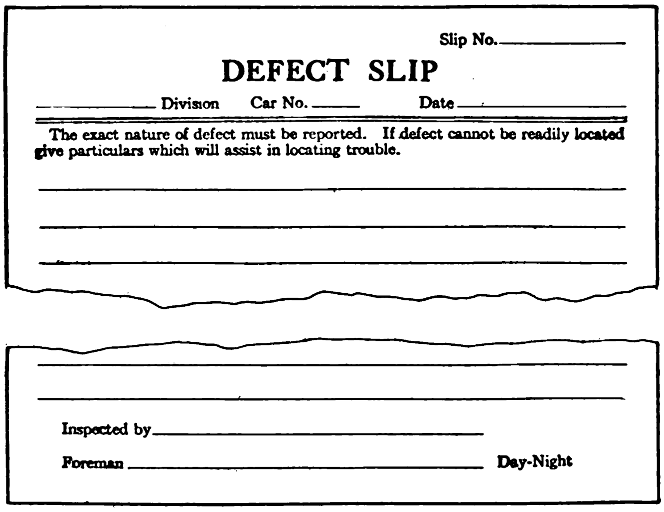
PLANNING SYSTEM—FIG. 6, SEMI-MONTHLY TIME CARD

When all the plans for keeping records had been completed and the necessary forms printed, it was decided to inaugurate the new plan on the date of the beginning of the next ensuing payroll. On the previous day all of the foremen were instructed to close up all of the jobs on which work was being done, and to send to the office a list of the unfinished jobs and a list of the names of men who would work on these jobs. Each workman had been given a number, and the foremen had furnished the chief clerk with a statement of the various classes of work which the respective men could do properly and the machines which they were competent to operate.

The night before the new plan was inaugurated, the daily time cards were taken out of the clock racks, and semi-monthly cards like those shown in Fig. 6 were put in for each man. This was done as the men were to be paid twice a month. The office force made out the individual time cards for all of the jobs left over, and for any new ones which were on hand. The jobs were assigned to the men, and the cards were distributed to the several cabinets ready for the men when they arrived in the morning. The foremen were instructed to be near the telephones in the morning, and to instruct the men if necessary. Everything started out with but little delay, such delay as did occur being caused by the necessity for assigning a job to each workman on the first morning.

THE FIRST DIFFICULTY AND HOW IT WAS OVERCOME

The first trouble started because the workmen ran out of work and had nothing signed up for them to do. As the office force was not acquainted with the work, the foremen turned in to assist them and, although they had to work nearly every night for a while, little time was lost by the men. It was soon found that work was being done so much more rapidly under the new system that the men were running out of work.



Slip No. ______

DEFECT SLIP

______ Division Car No. ______ Date ______

The exact nature of defect must be reported. If defect cannot be readily located give particulars which will assist in locating trouble.

Inspected by ______

Foreman ______ Day-Night

PLANNING SYSTEM—FIG. 7, DEFECT SLIP

Table I—Duties of Office Clerks

Duties of Chief Clerk—Production Clerk

1. Receive all approved orders. Assign shop order numbers. Make out instruction sheet and cost record.
2. Designate order of work and sequence of operations. Approve material lists. Give instruction sheet to route clerk and material lists to material clerk.
3. Receive reports of variation from schedule. Investigate and notify proper departments of delays.
4. Issue tracer for material not received promptly.
5. Receive instruction sheet and cost record from cost clerk when completed. Make record of operations. Index and file.
6. Supervise all office work.
7. Receive and open mail, and send to proper desks.
8. Order in disabled cars. Keep record of cars in shop.
9. Keep record of all cars overhauled and painted, with dates next due. Order cars to shop when due.
10. Keep record of all work performed in department.
11. Make up all work orders and estimates.
12. Make out requisitions for all material to be purchased.
13. Make receipts for all material received on purchase orders.
14. Check all orders and invoices.
15. Check and approve all requisitions for material drawn from storeroom.
16. Keep record of cars owned.
17. Keep record of all changes affecting cars.
18. Make up monthly statement of cars owned.
19. Make up monthly report of work performed in department.
20. Keep record of free transportation of all forms used in department.
21. Keep list of all employees in department, with addresses, etc.
22. Make up office payroll.
23. Check and approve shop and carhouse payrolls.
24. Check report of distribution of shop labor and material. Add percentages and send to auditor.
25. Keep record of locker keys in possession of employees.
26. Check and approve monthly estimate for stationery.
27. Make out credit memoranda for all scrap material shipped.
28. Make up monthly statement of oil and grease consumed.
29. Keep ledger account of manufacturing, work-order and shop expense.
30. Keep record of number of men employed at different rates in each department and keep total of the monthly payrolls.
31. Keep efficiency record of office employees and inspectors.
32. Keep record of all company tools.
33. File catalogs and periodicals.
34. Supervise fire drill organizations at shops and carhouses.
35. Attend and report on all fires occurring on or near company property, excepting buildings under supervision of light and power department.
36. Inspect fire alarm system at shops daily.

Duties of Route Clerk

1. Receive instruction sheet and cost record.
2. Fill in operations and estimated time.
3. Enter work on route sheet.
4. Put tag on planning board.
5. Make out order of work sheet.
6. Make out instruction cards.
7. Give instruction sheet to cost clerk.
8. Receive duplicate time cards and instruction cards for work completed.
9. Check completed jobs on route sheet and plan board.
10. Notify cost clerk when jobs are completed.
11. Report variations from schedule to production clerk.
12. Take shift on time desk.
13. Take production clerk's place when he is absent.

Duties of Assistant Route Clerk

1. Receive instruction card from route clerk.
2. Make out time cards in duplicate for each operation. Send duplicate with instruction card to department foreman. Give original to time clerk.
3. Receive duplicate time cards for completed jobs. Sort by shop-order number and give to route clerk.
4. Receive time cards and work reports from rip track. Put charges on time cards and give to assistant time clerk. Keep record of work.
5. Assist cost clerk in making out cost cards on cars overhauled and painted.
6. Take material clerk's place when he is absent.

Duties of Time Clerk

1. Receive original time cards from assistant route clerk. Distribute in right-hand pigeonholes.
2. At 7 a. m. stamp all cards in left-hand pigeonholes with calculagraph.
3. When workman telephones giving his number and the number of the job he has just completed, take corresponding card from left-hand pigeonhole, stamp in calculagraph, verify number of job the workman is about to take up, take corresponding card from right-hand pigeonhole and stamp in calculagraph, replacing in left-hand pigeonhole.
4. At 4.45 p. m. stamp all cards in left-hand pigeonhole in calculagraph. Copy these cards for the next day's work.
5. At 8.30 a. m. send the office boy to collect "ring-in" cards.
6. Check calculagraph cards for previous day, extend hours and amounts, check total with payroll. Give cards to cost clerk.
7. On the 13th and 28th of each month, close payrolls, extend time and amounts, balance and copy for new payroll. Give to chief clerk.
8. Make out time certificates for all employees leaving service.

Duties of Material Clerk

1. Receive material lists from production clerk. Write all requisitions in triplicate. Forward original and duplicate to storeroom. Send triplicate with move order to moving gang.
2. Receive triplicate requisitions from moving gang when material has been delayed and give them to cost clerk.
3. Take shift on time desk.
4. Assist cost clerk in preparing monthly statement.

Duties of Cost Clerk

1. Receive instruction sheet and cost record from route clerk and file in current file.
2. Receive calculagraph cards from time clerk. Enter on proper cost record sheets.
3. Receive duplicate requisitions from auditing department, sort and check with triplicates. Enter on proper cost record sheets.
4. When notified by route clerk that a job is completed, close shop order. Total up labor and material. Enter on recapitulation sheet.
5. Enter totals for manufacturing shop orders on special cost record.
6. Enter totals for overhauling and painting on special cost record.
7. Submit special cost records to master mechanic.
8. Report cost of manufactured articles to auditor.
9. On the 28th of each month, total up all charges for labor and material, and enter on recapitulation sheet under proper distribution. Total up recapitulation sheet and give to chief clerk.
10. Take shift on time desk.

Duties of Office Boy

1. Every half hour make rounds of shop, taking out time cards and instruction cards, and collecting completed cards.
2. Sort time cards.
3. Perform other duties as designated by chief clerk.

Duties of Statistical Clerk

1. Arrive at 7 a. m.
2. Receive telephone reports of crippled cars, etc., from carhouse foreman. Tabulate and give copies to master mechanic, chief clerk, general foreman, general manager, and file.
3. Receive written pull-in reports from carhouse foreman, and tabulate on morning report.
4. Tabulate weekly pull-in record.
5. Tabulate monthly pull-in record.
6. Keep record of all changes in equipment and report to general manager, superintendent of transportation and claim department, and file.
7. Keep record of car assignments.
8. Keep record of principal items drawn from storerooms.
9. Keep record of cars inspected.
10. Keep record of armatures, fields, wheels, etc., changed.
11. Keep record of cost of changing armatures, wheels, etc., and grinding wheels.
12. Tabulate monthly report of operating expenses.

Duties of Car Record Clerk

1. Receive reports from carhouse and shop foremen of all work performed and equipment changed.
2. Record all data on car record cards.
3. Receive Sellwood carhouse time cards. Put on charges and give to assistant time clerk.
4. Receive daily mileage report from auditor and record on mileage cards.
5. Number all parts of equipment.
6. Make special reports of changes of test equipment, broken axles, etc.

Duties of Mileage Clerk

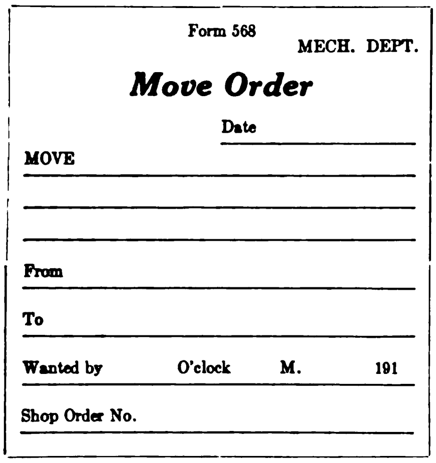
1. Receive reports from carhouse foremen of all renewals of equipment ordered.
2. Enter on record sheets. Obtain mileage from mileage cards and enter on record sheets.
3. Make up monthly statement of mileage made by equipment.
4. Ship all scrapped wheels. Make special report of wheel mileage.
5. Make up graphic charts showing mileage made by parts.
6. Put tabs on mileage cards of cars due for overhauling.

Duties of Stenographer and Assistant Time Clerk

1. Change dial in recorder daily.
2. Take dictation. Type correspondence.
3. File correspondence.
4. Extend and code carhouse time cards.
5. Enter on payrolls.
6. On the 12th and 28th of each thirty-one-day month, and the 12th and 27th of each thirty-day month, close carhouse and rip-track payrolls, extend time and amounts, balance and give to chief clerk. Copy payrolls for next month.
7. Check up stationery stock and make up monthly estimate.

At this time, several men resigned on account of getting better positions elsewhere or leaving town, and we did not hold their places. In fact, we were pleased not to be required to find work for them, as we were getting out more work than was scheduled for each day.

There was no dissatisfaction among the men, but we found that some of the foremen were becoming dissatisfied because the office force, through lack of familiarity with the system, was putting some of the office work on the foremen. The foremen, also, were trying to keep up the old system. To overcome this difficulty, we gave the foreman in each department one workman to work on the old system, and any little odd jobs that had to be done were turned over to this workman. This expedient saved the foremen the work of getting orders for the small jobs that were overlooked by the office, which had all it could do to handle the large jobs. It also showed the foremen that they did not need to keep up the old system, and we instructed them how they could simplify the making out of the sheets by having the workmen give them the lists of items. We also explained that after the sheets had been made out for the work already in the shops, it would not be so difficult to maintain the system.


Form 568 MECH. DEPT.

Move Order

Date

MOVE

From

To

Wanted by O'clock M. 191

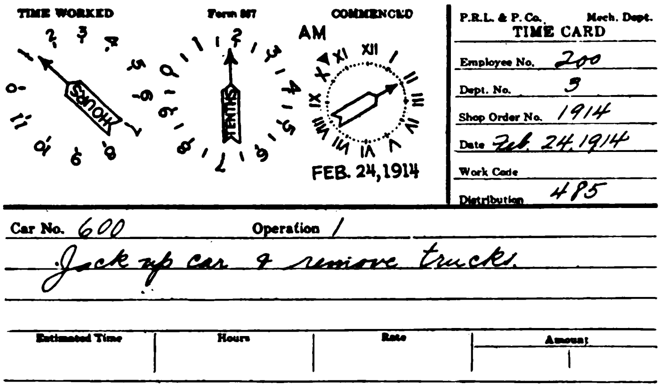
Shop Order No.

PLANNING SYSTEM—FIG. 8, MOVE ORDER FORM

After working on the new scheme for two weeks the office force had a good line on the work, and was able to keep up with its end without working overtime. The work of the foremen had also slackened, so that they were satisfied. To show how the system was working, the following detailed illustration has been selected.

ROUTINE FOR OVERHAULING AND VARNISHING A CAR

A good illustration of the operation of the system is furnished by the procedure in the case of overhauling and varnishing a car. The car is first called in by the chief clerk for overhauling and varnishing. It is sent, some time during the night, from one of the carhouses to the shop with a slip like that shown in Fig. 7. The car is left in the yard and the slip is put into the mail box for the foreman of the "moving gang." In the morning this man notifies the route clerk, who makes the appropriate entry on the blackboard shown in Fig. 1, and also fills in a move order on the blank shown in Fig. 8. The car is then put upon the assigned track in the motor shop. Two time cards, like the one shown in Fig. 9 are made out, one with instructions to raise the car and take out the trucks, and the other with instructions to dismantle the equipment. One card goes to the time clerk, and the other to the cabinet in the motor shop. A sheet like that shown in Fig. 10 is furnished to the foreman, and is filled out when the trucks are dismantled. For example, the items might be as follows:


TIME WORKED Form 807 COMMENCED

HOURS
TENTHS
AM

FEB. 24,1914

P.R.L. & P. Co. Mech. Dept.

TIME CARD

Employee No. 200

Dept. No. 3

Shop Order No. 1914

Date Feb. 24.1914

Work Code

Distribution 485

Car No. 600 Operation 1

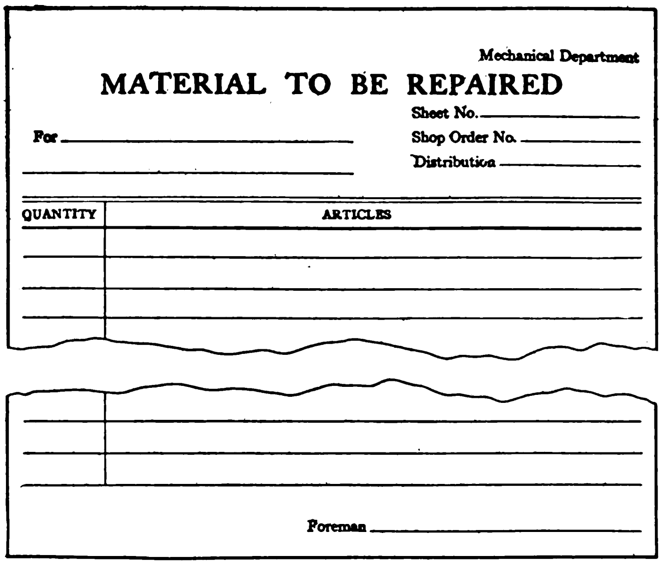
Jack up car & remove trucks.

Estimated Time	Hours	Rate	Amount

PLANNING SYSTEM—FIG. 9, TIME CARD

Quantity	Article
2	Radius bars, straightened, plugged and drilled.
4	Radius bar brackets, straightened, plugged and drilled.
8	Live levers, plugged and drilled.
8	Dead levers, plugged and drilled.
4	Turnbuckles to be repaired.
8	Brake connecting levers, plugged and drilled.
5	Pedestal gibs, straightened, plugged and drilled.
4	Release springs repaired.
4	Brakeheads spot-welded and ground.
2	Motor suspension bracket spot-welded and ground.
4	Brake-hanger castings refitted.
4	Brakeheads refitted.

The instruction sheet, for which the form is shown in Fig. 11, is sent in to the route clerk who routes the material to the first shop that has work to do on the car, issuing a time card for the work and also an order for material if any is needed. In the meantime, all


Mechanical Department

MATERIAL TO BE REPAIRED

For

Sheet No.

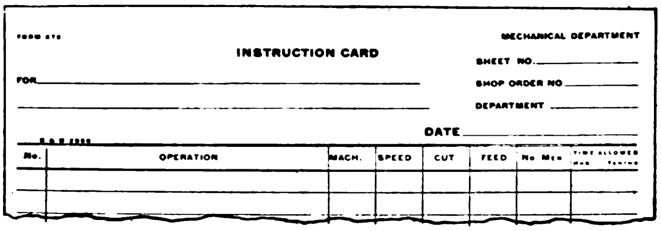
Shop Order No.

Distribution

QUANTITY	ARTICLES

Foreman

PLANNING SYSTEM—FIG. 10, FORM FOR MATERIAL TO BE REPAIRED



MECHANICAL DEPARTMENT

INSTRUCTION CARD

SHEET NO.

FOR

SHOP ORDER NO

DEPARTMENT

DATE

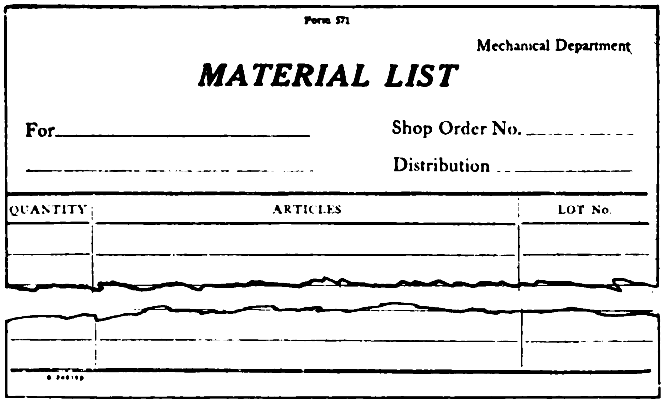
No.	OPERATION	MACH.	SPEED	CUT	FEED	No. Men	TIME ALLOWED

PLANNING SYSTEM—FIG. 11, INSTRUCTION SHEET FORM

parts have been left on the shop floor under the signboard designating the assigned track. When the piece is finished in one department, the route clerk orders it to the next shop and so on until it is finished, when he orders it returned to the assigned track.

A material list, on a form like that shown in Fig. 12, is also given to the foreman, who fills in entries for new material needed and turns the list over to the production clerk. The latter has with him a material clerk who makes out a requisition on the stores department on the form shown in Fig. 13. This material is moved by the moving gang to the assigned track. After all new material is delivered, and all parts repaired and returned, time cards are made out for assembly. A requisition for each article is made out on a separate form, and if one of the articles is not received, a tracer, see Fig 14, is sent for it.

When the work on the trucks has been completed, instruction sheets are made out for the overhauling of the electrical equipment, motor equipment and air equipment, and when the car is finished in the motor shop, a move order is given to transfer it to the carpenter shop, and time cards are made out for each operation as before. When these operations are all finished, the work being assigned by the office and time kept on the time cards as when the car was in the motor shop, the car is ordered moved to the paint shop, where a similar instruction card is prepared. When the car is finished it is moved out into the yard, and the chief clerk notifies the carhouse foreman to have it taken away and to bring in another car.



Form 571

Mechanical Department

MATERIAL LIST

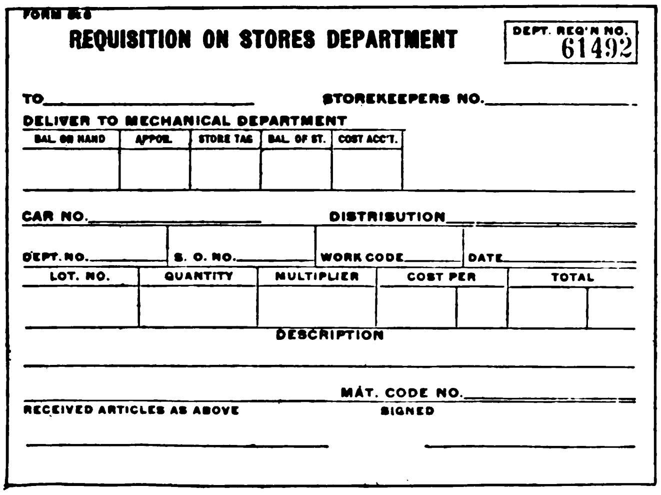
For

Shop Order No.

Distribution

QUANTITY	ARTICLES	LOT No.

PLANNING SYSTEM—FIG. 12, FORM FOR MATERIAL LIST



REQUISITION ON STORES DEPARTMENT

DEPT. REQ'N NO. 61492

TO

STOREKEEPERS NO.

DELIVER TO MECHANICAL DEPARTMENT

BAL. ON HAND	APPOR.	STORE TAG	BAL. OF ST.	COST ACC'T.

CAR NO.

DISTRIBUTION

DEPT. NO.

S. O. NO.

WORK CODE

DATE

LOT. NO.	QUANTITY	MULTIPLIER	COST PER	TOTAL

DESCRIPTION

MAT. CODE NO.

RECEIVED ARTICLES AS ABOVE

SIGNED

PLANNING SYSTEM—FIG. 13, FORM FOR REQUISITION ON STORES DEPARTMENT

It may be of interest to note the items which might appear on the six instruction sheets, to which reference has just been made. Such a list is given below.

INSTRUCTION SHEET NO. 1.—OVERHAUL CAR NO. 600—TRUCKS.

1. Jack up car and remove trucks.
2. Remove motors.
3. Dismantle trucks.
4. Repair truck irons — Weld brakehead.
5. Assemble trucks.
6. Replace motors.
7. Replace trucks and let car down.

INSTRUCTION SHEET NO. 2.—OVERHAUL CAR NO. 600—ELECTRICAL EQUIPMENT.

1. Inspect cables, leads, circuit-breakers, fuse boxes, contactors and reverse, and resistance.
2. Clean and oil controllers.
3. Inspect light and bell circuits.

INSTRUCTION SHEET NO. 3.—OVERHAUL CAR NO. 600—MOTORS

1. Clean outside.
2. Remove armatures and fields.
3. Repair armatures and fields.
4. Clean and paint inside.
5. Assemble.
6. Test.
7. Clean and repair gear and motor cases.

INSTRUCTION SHEET NO. 4.—OVERHAUL CAR NO. 600—AIR EQUIPMENT

1. Remove compressor, governor gages, valves, brake levers and rods.
2. Repair levers and rods.
3. Replace equipment.
4. Repair hand brakes.
5. Overhaul compressors.
6. Clean and repair valves.
7. Repair air fenders.

INSTRUCTION SHEET NO. 5.—OVERHAUL CAR NO. 600—BODY

1. Adjust sash curtains and doors.
2. Repair steps and put on safety treads.
3. Repair roof.
4. Repair overhead signs.
5. Tighten up under car body.
6. Repair seats.
7. General body repairs.
8. Repair body irons.

INSTRUCTION SHEET NO. 6.—VARNISH CAR NO. 600

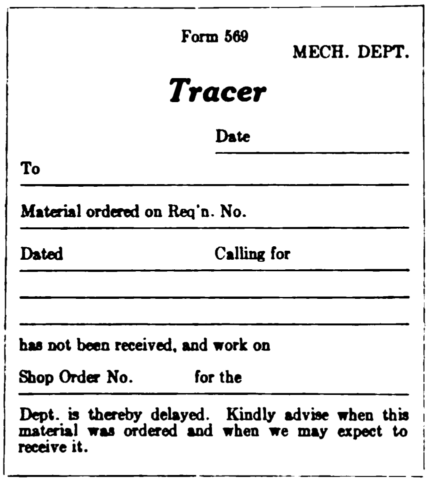
1. Wash.
2. Strip.
3. Body repairs.
4. Sand body and prime.
5. Remove varnish from sash and doors.
6. Putty body, sand, touch up first coat.
7. Sand, stain, varnish inside.
8. Paint and varnish sash doors and trimmings.
9. Sand sash and doors.
10. Touch up second coat, stripe and letter.
11. Varnish, first coat.
12. Varnish, second coat.
13. Trim.
14. Paint roof and deck.
15. Paint floor.
16. Clean and paint trucks and fenders.
17. Stripe trucks.
18. Varnish.
19. Clean glass.

It will be noticed from the instruction sheets that we were obliged to bunch the work considerably, which was necessary on account of having to teach all the office and shop force the new system. In four months we were able to make most of the instruction sheets in the office, as all types of cars had nearly the same work. At this time, we also had sheets of nearly all material manufactured in the shops. While the system at this time was crude, it was working very nicely, and we came to the conclusion that it was time to take the next stop.

THE EFFICIENCY FOREMAN

The foreman of the machine shop was a bright young man who had taken a great interest in the new system. It was decided to give him the title "efficiency foreman" in addition to his title as foreman of the machine shop. He was also given an assistant whose function was gradually to relieve him of the machine-shop work. The efficiency foreman was furnished with a stop watch, and he started to make time studies in the machine shop as well as to make instruction cards for each job in that shop. The first instruction cards which had been turned in were not satisfactory, as the time seemed too long. Although we had what we considered then a model shop with all conveniences, we believed that conditions in the shop would have to be bettered in order to shorten the time. The difficulty was that we had not studied the small details, and when we did so we found that there were many which could be improved.

The efficiency foreman was started in to watch each job, following up one at a time. He made a test and determined the proper tools to be used and the best way in which the job could be done. At the end of his study, he made out an instruction sheet. He also made a study, with the help of reference books, of the best shapes of tools and cutting speeds, determining experimentally which gave the best results. He found that it was necessary to change the speeds of most of the machines, and in some cases to put on larger belts.


Form 569
MECH. DEPT.

Tracer

Date

To

Material ordered on Req'n. No.

Dated Calling for

has not been received, and work on

Shop Order No. for the

Dept. is thereby delayed. Kindly advise when this material was ordered and when we may expect to receive it.

PLANNING SYSTEM—FIG. 14, TRACER FORM

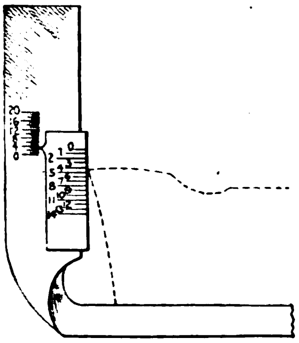
The efficiency foreman, after making a close study of the men, reported that too much time was lost when they were obliged to think about what they should do next. He was, therefore, instructed to get out instruction cards, on the forms like that shown in Fig. 11, of which the following is a sample.

INSTRUCTION CARDS FOR STANDARD PONY AXLES, C. R. STEEL, 3¾ IN.

1. Adjust lathe, machine L-2.
2. Put on dog No. 18.
3. Put in lathe.
4. Set tool No. 6
5. Cut to 3½ in., 13¾ in. long, speed 74, cut ⅛ in., feed 16¼.
6. Cut to 2-29/32 in., 8½ in. long, speed 60, cut 19/64 in., feed 16¼.
7. Set tool No. 1.
8. Cut to 3-15/32 in., 5⅝ in. long, speed 370, cut 1/64 in., feed 65.
9. Cut to 2⅞ in., 8⅛ in. long, speed 370, cut 1/64, feed 65.
10. Set roller No. 4.
11. Roll finish on journal, speed 300, feed 40.
12. Set tool No. 7.
13. Cut slot for check plate, speed 300, cut ¼, hand feed.
14. Change ends and repeat operations Nos. 4 to 13.
15. Take out of lathe.

Tools required: One tool No. 1, one tool No. 6, one tool No. 7, one roller No. 4, one lathe-dog No. 18.

The efficiency foreman was to get out these cards, paying no attention to the time, with the idea of making time studies later. He found it necessary at first to make tables of speed and feed for different machines, as is shown in Tables II and III, and a gage for setting tools, like that illustrated in Fig. 15. This necessitated that all tools be ground at a certain angle, and for this purpose we took one of our whet tool grinders and put on an angle plate. The table was provided with two indicators so as to show the correct angle for various types of tools and diameters of wheels. The foreman also found that different tensions in belts produced different results, so that we purchased a wire-belt-lacing machine, and made a pair of clamps with spring balances in order to keep the proper tensions.


PLANNING SYSTEM—FIG. 15, GAGE FOR SETTING TOOLS

All of the above was taking a great deal of time, and the efficiency foreman had opportunity to watch the men and note the small mistakes which they were making. He became discouraged in that he thought he was not getting along fast enough. We explained to him that it took time to study everything thoroughly, that haste would necessitate repetition, and that now, being relieved of the machine-shop work, he had an opportunity to note the details of all operations that were being performed incorrectly. He then started to straighten things out by getting out the instruction cards and having the men use them. The result was surprising, and our force was reduced so much in this department that if one man stayed away a day, it threw the work back for the other departments.

TABLE II—SPEED AND FEED FOR BELT-DRIVEN LATHE NO. L.3

Cone No's	1	2	3	4	5
Open belt	80	115	170	260	400
Back gear	8	12	18	28	42

FEEDS

Cone 1	Cone 2	Cone 3
40	60	80

EFFICIENCY STUDIES IN THE PAINT SHOP

As the foreman of the paint shop was to be off for several months, we next determined that we would have the efficiency foreman lay out the work in that shop. He decided to take one of the standard series of cars going through the shop at that time, and get out the appropriate instruction cards. As the cars were washed before being given a general repairing, he arranged to follow them through the carpenter and paint shops.

We first made out two general instruction cards, one for the carpenter shop, and one for the paint shop, dividing the work in the two departments into twenty-four general items. These are given below.

INSTRUCTION CARDS FOR VARNISHING CLASS NO. 500 P. A. Y. E. CAR

1. Strip car, one man.
2. Wash car, three men.
3. General body repairs, four men.
4. Scrape and repair roof, two men.
5. Repair steps, one man.
6. Sand body and prime, two men.
7. Scrape sash and doors, two men.
8. Putty body, two men.
9. Sand and touch up first coat, two men.
10. Sand, stain and varnish inside, two men.
11. Sand sash and doors, one man.
12. Paint and varnish sash and doors, one man.
13. Touch up body, second coat, two men.
14. Stripe and letter, two men.
15. Varnish outside, first coat, two men.
16. Varnish outside, second coat, two men.
17. Trim car, one man.
18. Paint roof and deck, two men.
19. Paint floor, two men.
20. Clean trucks, one man.
21. Paint trucks, one man.
22. Stripe trucks, one man.
23. Varnish trucks, one man.
24. Clean glass, three men.

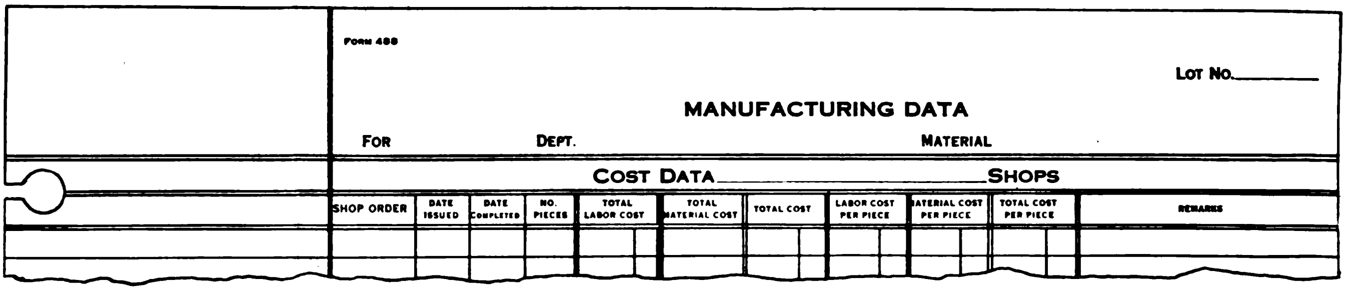
We next made out detail instruction cards for each general item, classifying the operation of each item as *A*, *B*, *C*, etc. The following is a list of the items covered by the general instruction sheets.

DETAIL INSTRUCTION CARD FOR STRIPPING NO. 500 CLASS P. A. Y. E. CAR FOR VARNISHING

1A. Remove all sash, entrance doors and two exit doors, one man.
1B. Remove door curtains, one man.
1C. Number window stops, one man.
1D. Mark curtains, one man.

TABLE III—HIGH-SPEED DRILL PRESS NO. D4 FOR DRILLING MILD STEEL

Cone No.	95 Feed	135 Feed
1		0 to ½
2	17/32 to ⅝	11/16 " ¾
3	21/32 " 1	1 1/64 " 1¼
4	1 17/64 " 1⅝	1 41/64 " 2



FORM 488

LOT NO.________

MANUFACTURING DATA

FOR DEPT. MATERIAL

COST DATA________________SHOPS

SHOP ORDER	DATE ISSUED	DATE COMPLETED	NO. PIECES	TOTAL LABOR COST	TOTAL MATERIAL COST	TOTAL COST	LABOR COST PER PIECE	MATERIAL COST PER PIECE	TOTAL COST PER PIECE	REMARKS

PLANNING SYSTEM—FIG. 16, COST CLERK'S SHEET

DETAIL INSTRUCTION CARD FOR WASHING CLASS NO. 500 P. A. Y. E. CAR FOR VARNISHING

(Three men assigned to wash car and clean glass.)
2A. Remove seats.
2B. Remove signs.
2C. Clean under seats.
2D. Clean sand boxes.
2E. Wash roof.
2F. Wash inside of car.
2G. Wash outside of car.
2H. Clean glass.

DETAIL INSTRUCTION CARD FOR BODY REPAIRS NO. 500 CLASS P. A. Y. E. CAR FOR VARNISHING

3. General body repairs, four men.
4. Scrape and repair roof, two men.
5. Repair steps, one man.
7. Scrape and repair sash and doors, two men.
17. Trim car, one man.

DETAIL INSTRUCTION CARD FOR FINISHING SASH AND DOORS NO. 500 CLASS P. A. Y. E. CAR FOR VARNISHING

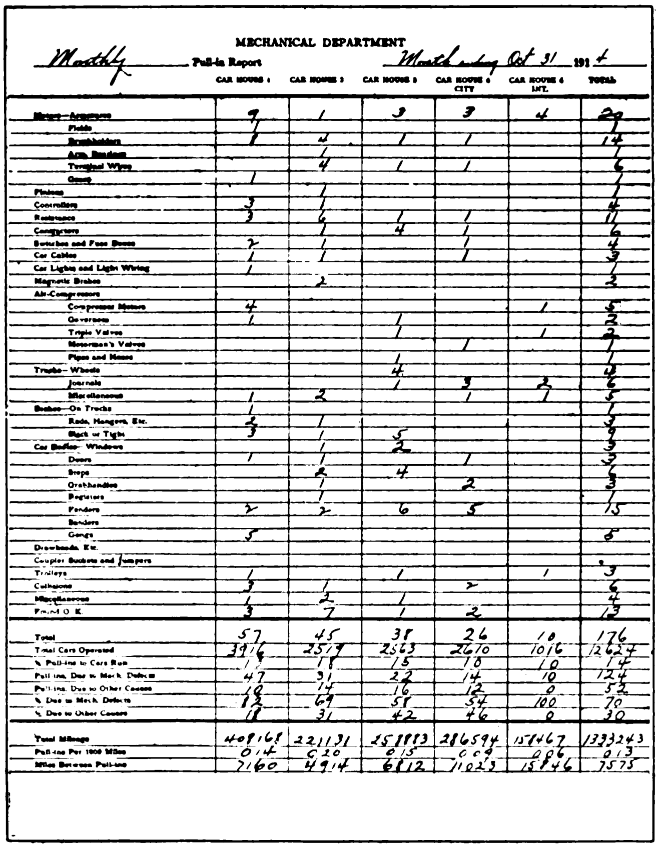
11. Sand sash and doors, one man.
12. Paint and varnish sash and doors, one man.
12A. Prime.
12B. Putty.
12C. Paint first coat.
12D Paint second coat.
12E. Stipple.
12F. Varnish first coat.
12G. Varnish second coat.

DETAIL INSTRUCTION CARD FOR VARNISHING OUTSIDE NO. 500 CLASS P. A. Y. E. CAR

6. Sand body and prime, two men.
8. Putty body, two men.
9. Sand and touch up, first coat, two men.
13. Touch up, second coat, two men.
14. Stripe and letter, two men.
15. Varnish body, first coat, two men.
16. Varnish body, second coat, two men.

DETAIL INSTRUCTION CARD FOR VARNISHING INSIDE NO. 500 CLASS P. A. Y. E. CAR

10. Sand, stain and varnish inside, two men.
10A. Sand inside.
10B. Stain inside.
10C. Paint brake-staff, pipes, etc.
10D. Varnish inside.



MECHANICAL DEPARTMENT

Monthly Pull-in Report Month ending Oct 31 1914

	CAR HOUSE 1	CAR HOUSE 2	CAR HOUSE 3	CAR HOUSE 4 CITY	CAR HOUSE 4 INT.	TOTAL
Motors—Armatures	9	1	3	3	4	20
Fields	7					7
Brushholders	8	4	1	1		14
Arm. Bearings		1				1
Terminal Wires		4	1	1		6
Gears	1					1
Pinions		1				1
Controllers	3	1				4
Resistance	3	6	1	1		11
Contactors		1	4	1		6
Switches and Fuse Boxes	2	1		1		4
Car Cables	1	1		1		3
Car Lights and Light Wiring	1					1
Magnetic Brakes		2				2
Air-Compressors						
Compressor Motors	4				1	5
Governors	1		1			2
Triple Valves			1		1	2
Motorman's Valves				1		1
Pipes and Hose			1			1
Trucks—Wheels			4			4
Journals			1	3	2	6
Miscellaneous	1	2		1	1	5
Brakes—On Trucks	1					1
Rods, Hangers, Etc.	2	1				3
Slack or Tight	3	1	5			9
Car Bodies—Windows		1	2			3
Doors	1	1		1		3
Steps		2	4			6
Grabhandles		1		2		3
Registers		1				1
Fenders	2	2	6	5		15
Sanders						
Gongs	5					5
Drawheads, Etc.						
Coupler Sockets and Jumpers						
Trolleys	1		1		1	3
Collisions	3	1		2		6
Miscellaneous	1	2	1			4
Found O. K.	3	7	1	2		13
Total	57	45	38	26	10	176
Total Cars Operated	3916	2519	2563	2610	1016	12624
% Pull-ins to Cars Run	1?	18	15	10	10	14
Pull-ins, Due to Mech. Defects	47	31	22	14	10	124
Pull-ins, Due to Other Causes	10	14	16	12	0	52
% Due to Mech. Defects	82	69	58	54	100	70
% Due to Other Causes	18	31	42	46	0	30
Total Mileage	409168	221131	251883	286594	158467	1333243
Pull-ins Per 1000 Miles	014	020	015	009	006	013
Miles Between Pull-ins	7160	4914	6812	11023	15846	7575

PLANNING SYSTEM—FIG. 17, MONTHLY PULL-IN REPORT

DETAIL INSTRUCTION CARD FOR PAINTING ROOF AND FLOOR OF NO. 500 CLASS P. A. Y. E. CAR

18. Paint roof and deck, two men.
19. Paint floor, two men.

DETAIL INSTRUCTION CARD FOR PAINTING TRUCKS NO. 500 CLASS P. A. Y. E. CAR

20. Clean trucks, one man.
21. Paint trucks, one man.
22. Scrape trucks, one man.
23. Varnish trucks, one man.

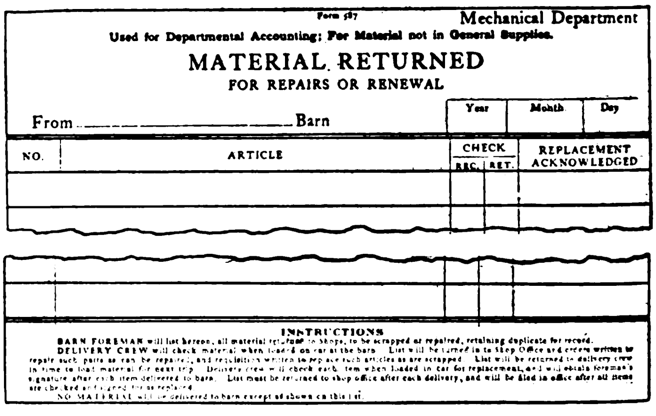
The above set of instruction-card items shows that we were now going into more detail, but not giving any time allowance, and we decided that we would not make any time studies until we had all of our instruction sheets made out in full, and then we could devote the necessary time to them.

The savings which we were able to make by the new system are illustrated by reference to the savings on one article. GE-57 axle brasses cost $6.86 in 1912, $6.40 of which was for material. In 1914 the cost was $5.006, of which $4.60 was for material. The weight of each pair of brasses was 32 lb. in 1912 and 23 lb. in 1914.

The costs are recorded on the cost clerk's sheet shown in Fig. 16. A sheet like this was made out for every article manufactured, and the costs were compared with manufacturers' prices, in order to show if it was costing us too much. After eight months' trial, although we had not had time to go into small details of time studies, nor to take up the bonus system, we had been able to stop a lot of leaks and to reduce the cost of maintenance of equipment, at the same time keeping the equipment in better shape. The monthly pull-in report reproduced in Fig. 17 shows a smaller percentage of pull-ins than we had ever had before, and the following four months showed a gradual decrease from this.

HANDLING MATERIALS

On account of the adoption of the planning and efficiency system at the shop we had been having some trouble in the handling of materials at the car houses. We had a delivery every other day, and materials sent in to be repaired were tagged and repaired, and then sent back.



Form 587 Mechanical Department

Used for Departmental Accounting; For Material not in General Supplies.

MATERIAL RETURNED

FOR REPAIRS OR RENEWAL

From ________________ Barn

Year	Month	Day

NO.	ARTICLE	CHECK		REPLACEMENT ACKNOWLEDGED
		REC.	RET.	

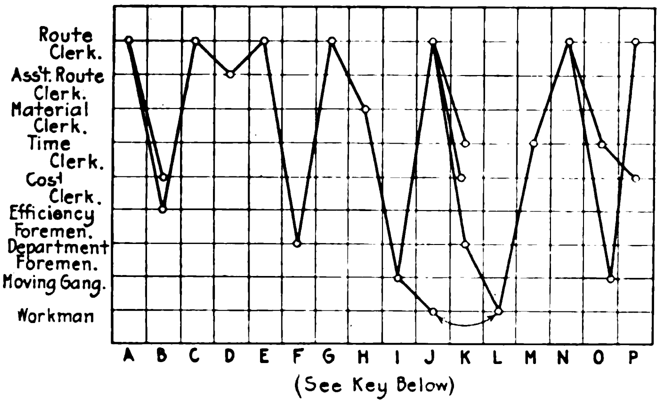
INSTRUCTIONS

BARN FOREMAN will list hereon, all material returned to Shops, to be scrapped or repaired, retaining duplicate for record.

DELIVERY CREW will check material when loaded on car at the barn. List will be turned in to Shop Office and orders written to repair such parts as can be repaired, and requisition written to replace such articles as are scrapped. List will be returned to delivery crew in time to load material for next trip. Delivery crew will check each item when loaded in car for replacement, and will obtain foreman's signature after each item delivered to barn. List must be returned to shop office after each delivery, and will be filed in office after all items are checked and signed for as replaced.

NO MATERIAL will be delivered to barn except as shown on this list.

PLANNING SYSTEM—FIG. 18, FORM FOR RETURNED MATERIAL



PLANNING SYSTEM—FIG. 19, ROUTEING CHART

A. Route clerk makes out instruction sheet in duplicate, giving original to cost clerk and retaining duplicate.

B. Efficiency foreman and route clerk in conference assign workmen and estimate time allowance for each operation, this to be obtained from previous records when possible. Cost clerk files original sheet in cost ledger.

C. Route clerk computes time when each operation will begin makes out routeing cards and files under proper date and hour in route case. He gives duplicate instruction sheet to assistant route clerk.

D. Assistant route clerk makes out instruction cards with duplicate time cards for each operation and returns same to route clerk.

E. Route clerk files instruction sheets numerically, files time cards numerically, files instruction cards in the order in which the work is to be done. He twice daily removes instruction cards for work to be done during the next period, and sends them to the department foreman with order-of-work sheets.

F. Department foreman makes out list of material required for each job, notifies route clerk of any absentees affecting assignments to work, and sends material list to route clerk.

G. Route clerk notes on instruction sheet that material has been ordered and gives material list to material clerk.

H. Material clerk writes requisitions for material in triplicate, and sends original and duplicate to store keeper, and triplicate to moving gang to be used as a move order.

I. Moving gang receives material from storekeeper, delivers material to the designated place and returns move order to route clerk.

J. One hour before work is scheduled to begin, route clerk ascertains if material has been delivered, or if there is any other reason for delay. If not, he sends the duplicate time card to department foreman, and the original to time clerk, and gives triplicate requisition to cost clerk.

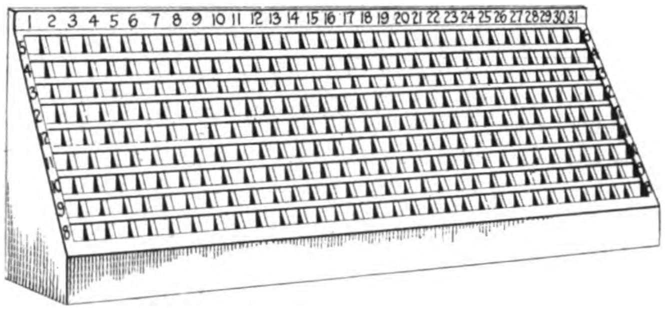
K. Department foreman puts time card in workman's pigeonhole in card rack in the sequence occupied by order-of-work sheet and gives instruction card to workman just before he finishes preceding job. Time clerk puts time card in rack, cost clerk files trip.

L. Workman notifies timekeeper when he is starting the job, performs operation and notifies timekeeper when finished.

M. Time clerk stamps both old and new cards in calculagraph, gives both to route clerk and notifies route clerk if there are no more cards in the rack for that particular workman.

N. Route clerk checks time cards with route cards, issues a move order to moving gang to move completed material to its next destination. If the work is not started or finished on schedule he ascertains reasons, rearranges schedule, notifies all concerned of delay and gives card back to time clerk.

O. Time clerk puts new cards in time rack, extends old cards, and gives them to cost clerk. Moving gang returns move orders to route clerk.



PLANNING SYSTEM—FIG. 20, CABINET FOR SLIPS FOR FOLLOWING JOBS

With the new system, the office was not always promptly notified regarding material sent in for repairs, and it would not be repaired until the foreman complained of not getting it back, thus making a delay. To overcome this difficulty an inventory was made of all the material at the carhouses, and also a list of what each carhouse was allowed to carry in stock. When the carhouses were short their stocks were filled, and when they were overstocked the surplus was returned. As we delivered every other day to the carhouses, the list was cut very close so that they would run short if they did not watch their materials closely.

. The foremen were notified that they would have to return piece for piece, as nothing would be sent out on the old orders, but must be entered on a "material returned" slip like that illustrated in Fig. 18. A list of materials on which there were no returns was furnished them; for example, tape, nails, screws, etc. These they were to write on the bottom of the list. In case pieces were lost from the car, the foremen were to write notes to the master mechanic, giving the car number and the items of material lost and these pieces would be replaced. This kept the office in close touch with everything that was lost from the car, and if the foremen were becoming careless, which would be indicated by their letters. We had very little difficulty in starting this return system and it has worked out nicely. Besides overcoming the difficulty at the shop, we were able to save in material, as all material was watched closely and all that could be repaired was repaired, cutting down the leak in that direction.

ROUTEING CHART

After some time we noticed that the office was beginning to put out the time cards ahead of time, some of the men having a number of cards in their box. The foremen would then tell them what jobs to do next. As this was going backward a routeing chart like that shown in Fig. 19 was made out, and the men were instructed to follow it. On the first day that this order went into effect, we had several men out of a job in ten minutes, but it showed the office force where they were "falling down" in routeing the work. While the office force was perfecting the routeing, the efficiency foreman made some time studies on the work in the machine shop.

The first job was 330 Brill-22 special truck spring-post bushings, and the shortest time taken for one piece by stop watch was one minute, eleven seconds. The total time was seven and one-half hours, making the time taken for one piece average one minute, twenty-two seconds. This was considered a good record as no time was lost for the workman to get a drink, move materials, etc. The record was that of a very good man. We then took the time of a young man on the turret lathe, a man with whom he had had trouble because of his habit of leaving his work and running around. The result of the record was as follows:

Operation, turning trolley wheels. Shortest time taken by stop watch, one minute, five seconds. Average time taken on five hundred wheels, two minutes, twenty-nine seconds.

Operation, making radius-bar roller bolts. Stop watch time, turning and threading, four minutes, forty-nine seconds. Average time taken on fifty pieces, ten minutes, forty-one seconds.

This test, as well as an incident that occurred in the blacksmith shop, brought very forcibly to our attention the fact that the time studies were very essential. The incident was this: Some time before the hour for quitting, the blacksmith at work on the forging machine had to stop work because he was tired out. He was making a very difficult forging, which necessitated using the hammer as well as the forging machine, and required a lot of walking. He had always had two pieces of iron in the fire at a time, and the largest number made in one day was ninety pieces. On this day, he

TABLE IV—TIME TAKEN FOR TRUCK AND MOTOR REPAIRS

	Truck Operations								*Motor Operations*					
Date	1	2	3	5	6	7	Total	Emp.	1	2	4	5	Total	Emp.
2 25-15	1.2	1.6	9.2	16.8	7.2	1.4	37.4	78–83	3.1	3.6	4.3	6.9	17.3	85
2-27-15	1	1.2	8.2	18.2	6.2	1.4	36.2	81–84	2.5	3.8	6	7.1	19.4	85
3-15-15	1	1.2	9.3	18	5.6	1.8	36.9	81–84 81–84	2.2	3.4	3.8	4.5	13.9	85
3-20-15	1.2	1.6	10	19.4	6	1	39.2	78–83	3	3.2	2.8	3.1	12.1	85

TABLE V—TIME TAKEN FOR REWINDING ARMATURES

Date	1	2	3	4	5	6	Total	Emp.
3-12-15	.4	1.1	1.8	.5	4.2	1.5	9.5	9
3-12-15	.3	1.1	1.5	2	5.9	.4	11.2	2
3-24-15	.7	1.6	1.3	2.7	3.8	1.4	11.5	9
3-27-15	.6	1.3	1.4	1.4	5.8	1.3	11.8	9
5-23-15	.7	1.3	1	3.2	7.5	1.5	15.2	7
5-28-15	.6	1.1	1.4	2.5	8.5	.4	14.5	7

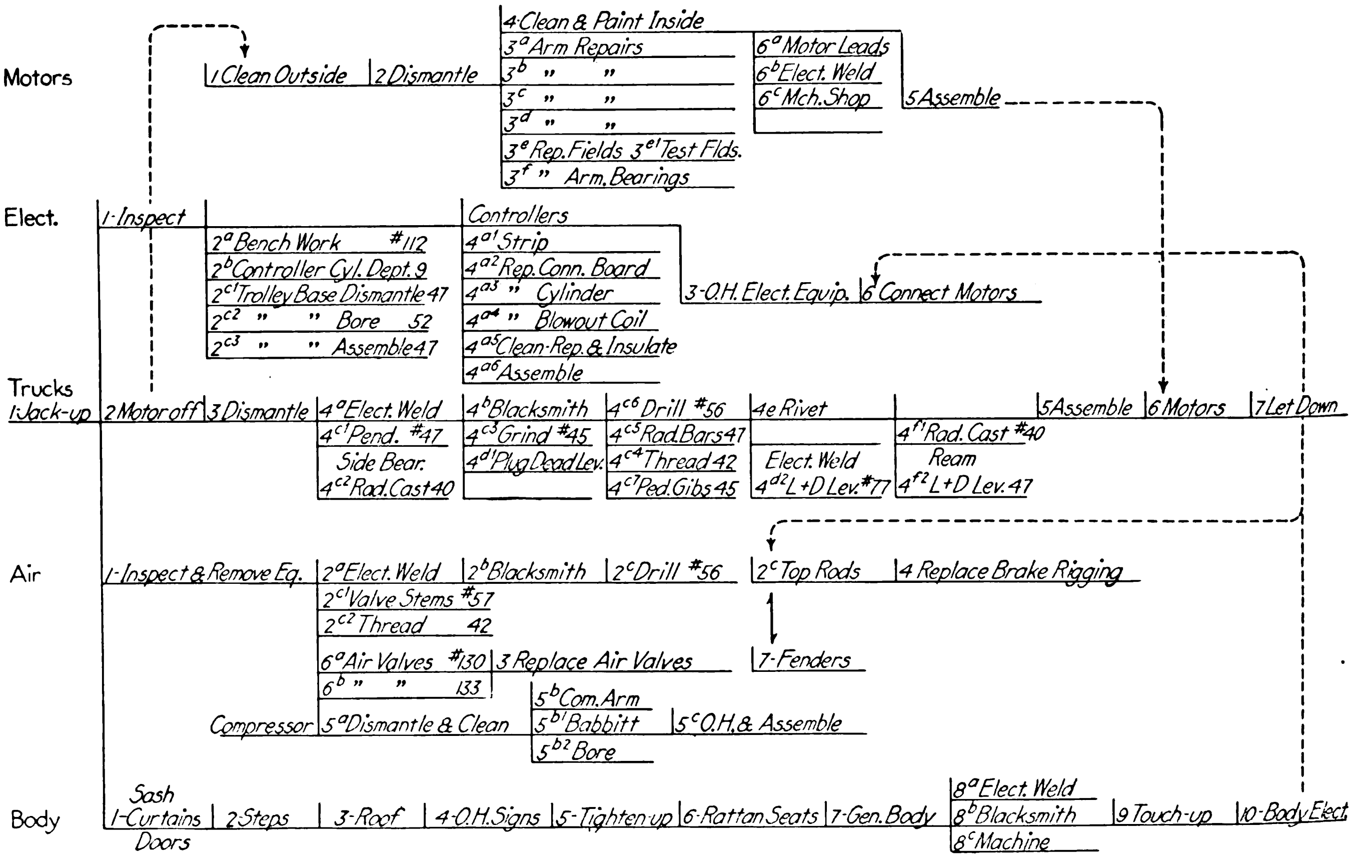
had three pieces in at one time, which made him work harder than he could stand, to keep them from burning. This raised his output to 110 pieces for that day. He was told not to repeat this procedure, but he said that he could do more than the two pieces. He was, therefore, instructed to put in three pieces for a while, and then to put in two until he rested up. He was thus able to get as many out and not be overtired by the end of the day.

THE SYSTEM AFTER A YEAR'S EXPERIENCE

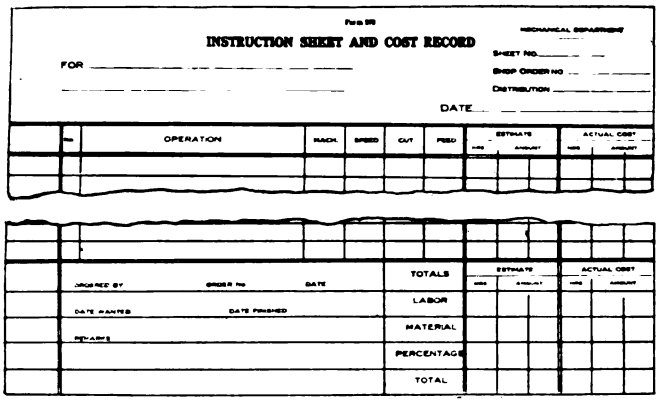
After the planning and efficiency system had been running for a little more than a year, we had been able to dispense with men in each department, and had been able to go farther and farther into details. This put more work on the office, but as the increase was not enough to require an additional clerk, the work was cut down by having two instruction cards made out for all of the regular work, one for the office, and one for the shop. The shop copy was shellacked and varnished so that the dirt would wipe off. Files were also prepared for these cards, and instead of making out an instruction sheet for each job, the number of the sheet was put on the time card, and the standard instruction card was used. As there were very few jobs that were not regular, this procedure greatly reduced the amount of work.

The route clerk was having trouble in keeping track of the material routed through the shop, so that work was not signed up in one shop before it was finished in another. He also had difficulty in keeping the work moving when finished, and a delay tied up the work all along the route. The source of this difficulty lay in the fact that we had no time limits on the different jobs. A cabinet, like that shown in Fig. 20, was therefore prepared, to permit the following up of the work. By estimating the time required, which by means of old records could be done very closely, putting this on the slip with the job number, and following the slip in the cabinet, some improvement was made. The clerk was not accustomed to the work, however, and found it difficult to look after so many slips. The main trouble was to watch the general overhauling, because there was so much material to route through the shop, and if this was delayed there would be nothing for the pitmen to do, while if they started on the job before all the material was returned, they would waste time.

To simplify this work, route sheets like that shown in Fig. 21 were made. One of these was used for each car that was in for general overhauling, and the time when it should be finished was put on the sheet at the end of the line covering each operation. As each job was signed out, the route clerk would indicate this by means of a red line at the proper place on the chart. When the operation was finished he would add another red line, and when the card was returned to the car he would put a red circle at the end. These sheets he kept before him, so that he could see at a glance what work should be followed up. This overcame the trouble, but it was introduced merely for the purpose of train-


Motors
1 Clean Outside
2 Dismantle
4 Clean & Paint Inside
3^a Arm Repairs
3^b " "
3^c " "
3^d " "
3^e Rep. Fields $3^{e'}$ Test Flds.
3^f " Arm. Bearings
6^a Motor Leads
6^b Elect. Weld
6^c Mch. Shop
5 Assemble
Elect.
1-Inspect
2^a Bench Work #112
2^b Controller Cyl. Dept. 9
$2^{c'}$ Trolley Base Dismantle 47
2^{c2} " " Bore 52
2^{c3} " " Assemble 47
Controllers
$4^{a'}$ Strip
4^{a2} Rep. Conn. Board
4^{a3} " Cylinder
4^{a4} " Blowout Coil
4^{a5} Clean-Rep. & Insulate
4^{a6} Assemble
3-O.H. Elect. Equip.
6 Connect Motors
Trucks
1-Jack-up
2 Motor off
3 Dismantle
4^a Elect. Weld
$4^{c'}$ Pend. #47
Side Bear.
4^{c2} Rad. Cast 40
4^b Blacksmith
4^{c3} Grind #45
$4^{d'}$ Plug Dead Lev.
4^{c6} Drill #56
4^{c5} Rad. Bars 47
4^{c4} Thread 42
4^{c7} Ped. Gibs 45
4e Rivet
Elect. Weld
4^{d2} L+D Lev. #77
$4^{f'}$ Rad. Cast #40
Ream
4^{f2} L+D Lev. 47
5 Assemble
6 Motors
7 Let Down
Air
1-Inspect & Remove Eq.
2^a Elect. Weld
$2^{c'}$ Valve Stems #57
2^{c2} Thread 42
2^b Blacksmith
2^c Drill #56
2^c Top Rods
4 Replace Brake Rigging
6^a Air Valves #130
6^b " " 133
3 Replace Air Valves
7-Fenders
Compressor
5^a Dismantle & Clean
5^b Com. Arm
$5^{b'}$ Babbitt
5^{b2} Bore
5^c O.H. & Assemble
Body
Sash
1-Curtains
Doors
2-Steps
3-Roof
4-O.H. Signs
5-Tighten-up
6-Rattan Seats
7-Gen. Body
8^a Elect. Weld
8^b Blacksmith
8^c Machine
9 Touch-up
10-Body Elect.

PLANNING SYSTEM—FIG. 21, GENERAL REPAIR CHART



MECHANICAL DEPARTMENT

INSTRUCTION SHEET AND COST RECORD

FOR

SHEET NO.

SHOP ORDER NO

DISTRIBUTION

DATE

	No.	OPERATION	MACH.	SPEED	CUT	FEED	ESTIMATE HRS	ESTIMATE AMOUNT	ACTUAL COST HRS	ACTUAL COST AMOUNT

ORDERED BY ORDER No DATE

DATE WANTED DATE FINISHED

REMARKS

	ESTIMATE HRS	ESTIMATE AMOUNT	ACTUAL COST HRS	ACTUAL COST AMOUNT
TOTALS				
LABOR				
MATERIAL				
PERCENTAGE				
TOTAL				

PLANNING SYSTEM—FIG. 22, FACE OF FORM FOR ASSEMBLING INSTRUCTIONS AND COSTS, DETAIL OF LABOR AND MATERIAL ON BACK

ing the route clerk as we consider the use of the slip box shown in Fig. 20 to be much better.

SOME RESULTS OF THE PLANNING AND EFFICIENCY SYSTEM

Some idea of the saving secured from this system can be obtained from the following examples. Before starting the system, the average time taken to overhaul motors and trucks on one of our standard prepayment cars, equipped with Brill maximum traction trucks, with two motors, was eighty-two hours. After starting in a crude way, this was reduced to fifty-nine and one-half hours, and after going farther into detail, and making a study of each operation, we were able to reduce the average to fifty-three and one-quarter hours

Table IV shows a record and comparison of different operations on trucks. In this table, operation No. 4 is omitted, this operation being the repair of parts in the blacksmith and machine shops, which is subdivided and kept track of according to the number of parts to be repaired. Also in motors, operation No. 3 is omitted, this being for necessary repairs to armatures and fields, also subdivided according to the work to be done.

In winding a standard armature, the time taken ran from twelve to eighteen and one-fifth hours, the average being fourteen hours. This was divided into operations as follows:

INSTRUCTION CARD FOR WINDING ARMATURES

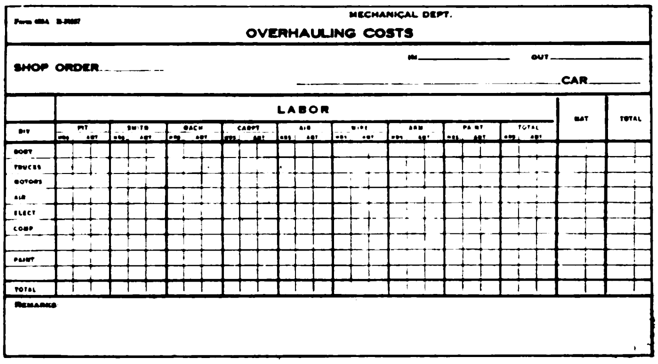
1. Inspect.
2. Strip.
3. Clean core.
4. Clean commutator.
5. Wind, connect, put on heads, and test.
6. Band and paint.

After the work was divided up, as above, we were able to get records like those shown in Table V. Some variation in time will occur in operation No. 3 in case the armature has been damaged by rubbing. This will also be true of operation No. 4 because commutators may be grounded, and may have to be taken off. In cases of this kind, to be fair to the workman, a reasonable time must be allowed.

Where more than one employee works on a job, different colored ink is used for each, the same colors being used in writing a man's number which is used in reporting the operation that he has done. In the truck gang two men work together—one pitman and one helper; in the motor gang, each man works alone.

OPERATION OF THE STANDARD INSTRUCTION SHEET

The standard instruction sheets are working out nicely for all regular work, relieving the foremen as well as the office force of the task of preparing any instruction sheets except those for irregular work. The following is an example of the way in which such work is taken care of.



MECHANICAL DEPT.

OVERHAULING COSTS

SHOP ORDER

IN OUT

CAR

DIV	LABOR PIT HRS	AMT	SMITH HRS	AMT	MACH HRS	AMT	CARPT HRS	AMT	AIR HRS	AMT	WIRE HRS	AMT	ARM HRS	AMT	PAINT HRS	AMT	TOTAL HRS	AMT	MAT	TOTAL
BODY																				
TRUCKS																				
MOTORS																				
AIR																				
ELECT																				
COMP																				
PAINT																				
TOTAL																				

REMARKS

PLANNING SYSTEM—FIG. 23, CARD FOR ASSEMBLING DATA ON OVERHAULING COSTS

We had a car damaged very badly by collision with an automobile truck. This car was ordered to the shop by the chief clerk, and was sent out in the regular way. Each foreman was given an instruction sheet to fill out, and these were turned over to the chief clerk who made out the various instruction sheets and turned them over to the route clerk.

The sheets made out by the several foremen contained the following items:

Electric and Pit Shops: Remove truck No. 1 end, circuit breakers, main switch, air switch, two light switches and controller, disconnect wires and turn back clear of vestibule. Repair one controller and spring posts. New parts: Two Brill 22 spring post bushings, and one pair of wheels. Estimated cost: Labor, $5.58; material, $30.68.

Carpenter Shop: Remove all damaged parts, and take off dash irons, bumper irons, platform floor, vestibule sash, two center posts, two corner posts, upper vestibule rim, end platform timbers, vestibule framework, draw head and slide. Repair bumper irons, straighten dash vestibule panels, two inside panels, one entrance door, entrance step and straighten angle-iron knees.

New parts: Two side and two center timbers, one corner post, two center posts, vestibule framework and new platform. Estimated cost: Labor, $97; material, $15.

Air Shop: Remove all damaged parts. Remove fender, brackets, cylinder and connection, motorman's valve and piping. Repair two fender screens, one fender trip shaft, one fender bracket, two trip levers, two adjusting rods, and one trip rod connecting with valve. New parts: One chain to air cylinder on fender. Estimated cost: Labor, $5; material, $3.

Paint Shop: Paint all new work as standard instruction. Vestibule floor, two coats of floor paint after new work is finished, vestibule to receive one coat of varnish. Estimated cost: Labor, $5; material, $2.

When receiving the instruction sheet from the chief clerk, the route clerk had time cards made out, and routed them through in the regular way. The chief clerk also made out an estimate of the cost of repairs.

We have recently started to make time studies of each operation, filling in the time on the instruction cards that we have in the office. We shall thus have an idea of how long it will take to perform each operation, and by comparing the men's time with the instruction cards, we shall be able to note the efficiency of each man. This will take care of the production part of the shop, but not of the wages. At present, the rate of pay of the men is being advanced according to the percentage of efficiency, although this is a very crude method. We expect to work out a bonus system, but this will take some time as we wish to have all of the time allowances filled out on the instruction cards before starting the system.

In closing, it should be urged that care be taken not to push the planning and efficiency system too fast, as it must be worked out very thoroughly and systematically to be successful.

Repair-Shop Applications of Oxy-Acetylene

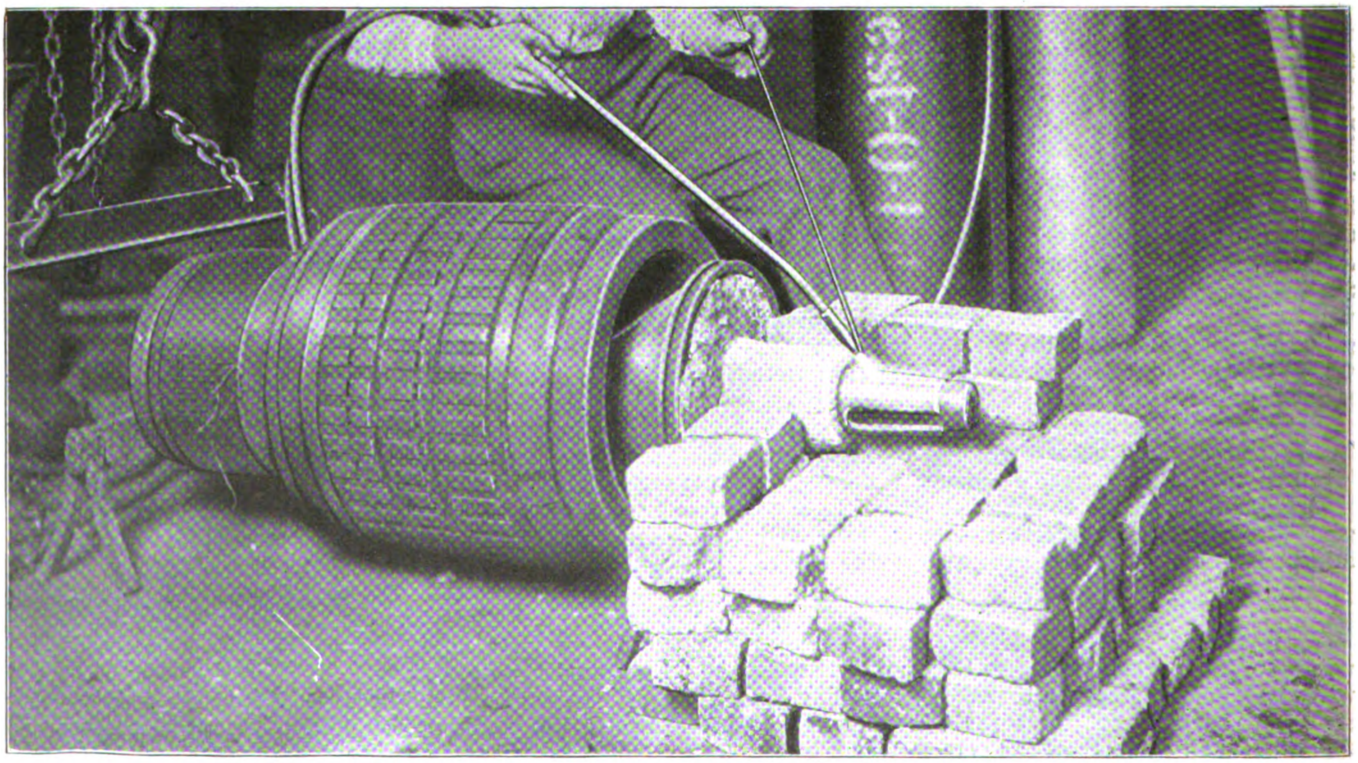
An Extraordinary Variety of Repairs by This Form of Autogenous Welding Is Now Made in Shops of Every Size, the Process Being Especially Convenient in Heavy Truck Repairs, Even Permitting Broken Parts to Be Restored without Removal from the Car

A PANACEA for innumerable ills of electric railway equipment has been supplied by the oxy-acetylene welder and cutter. Perhaps no other tool introduced into electric railway repair shops during recent years has made possible greater economies, since its ability to reclaim worn or broken parts has effected large savings in material without increase in the payroll and has made it unnecessary to purchase and carry in stock many of the most expensive of repair parts. In fact, in many instances, storerooms have even been replenished from the scrap heap. Descriptions of the more common of these methods have appeared in various issues of the ELECTRIC RAILWAY JOURNAL for the past three years, but owing to the constantly increasing scope of the work that may be accomplished by this process many novel applications have recently been developed, and outlines of a number of these are presented in the following paragraphs.

ARMATURE AND AXLE BEARING HOUSINGS RECLAIMED

It has been the experience on the Terre Haute, Indianapolis & Eastern Traction Company, of which M. F. Flatley is master mechanic, that armature bearing housings and frame heads can be successfully welded, and that in many cases even more satisfactory results can be obtained than if new parts are purchased. The reason for this is that the repaired casting can be overbuilt to compensate for the wear in the frame head, thus insuring a close fit when the parts are assembled. Since the wear is caused by movement between the frame and the housing, if a new housing is installed the difficulty is only partially remedied, because the new housing cannot be held tightly in place in the worn frame. In this case the bearing housings have their worn surfaces restored by building on new metal, after which the housings are turned in the lathe to about 0.01 in. larger than a new housing to fit the old frame. A cast-steel rod is used in the welding operation so that cast steel is built on cast steel, hence no difficulty is experienced in turning the housing in the lathe. The average cost of thus welding and machining a housing is $2.82,, whereas the cost new is $8.60.

Reference has been made in previous issues to the building up of worn axle seats for motors, but the Terre Haute, Indianapolis & Eastern Railway is going one step further by reclaiming worn axle caps from the scrap pile. This has been accomplished in many instances by filling up the dowel-pin holes and redrilling them at a relatively small cost. Previously some of these axle caps had been reclaimed by bushing the worn holes and providing new dowel pins, but the bushings frequently worked loose and wore into the axle cap in the same way as the dowel did before the bushing was inserted. The dowel-pin hole would finally become so badly worn that it would be impossible to insert a bushing large enough to fill the hole completely and thus prevent movement. When this occurred the service life of the axle cap was ended, and in cases of this kind, autogenous welding was the only possible means of reclamation.



OXY-ACETYLENE REPAIRS—RESTORING PINION SEAT ON OLD ARMATURE SHAFT

The average cost of renewing the two dowel-pin holes with the oxy-acetylene welder is 70 cents as compared with a cost of $10.03 for a new axle cap. This represents a saving of $9.33, neglecting scrap value, and the finished job should increase the life 100 per cent, because the welded metal is cast steel of the same quality as that in the axle cap. As a precaution against the dowel-pin wear in reclaimed axle caps, the caps are bolted in place, the caps and motor housings numbered in pairs, and each bearing is calipered for size. The cap is then planed off to reduce the bore so that when the bolts are drawn up the bearing will be clamped tightly in the housing, and thus the dowels are relieved of the work of holding the bearing secure. In one of the accompanying illustrations an axle cap is shown ready for welding and another is shown fully restored and ready for service.

Old armature bearings are also repaired very successfully by welding. If the collar is worn down it is built up with Tobin bronze and turned in a lathe to the standard size. If the bearing is cracked, a V-shaped groove is cut along the crack, and this is filled with bronze by the welder. Experience has demonstrated that bearings repaired and reclaimed in this manner are as good as new, and the average cost of repairing them, for both the pinion and the commutator ends of an armature, is $1.20. A new commutator-end bearing costs $4.19 and a new pinion-end bearing costs $7.78. The total average saving made by reclaiming a bearing of the type used by this company is thus $10.57 and the wear life is increased practically 100 per cent.

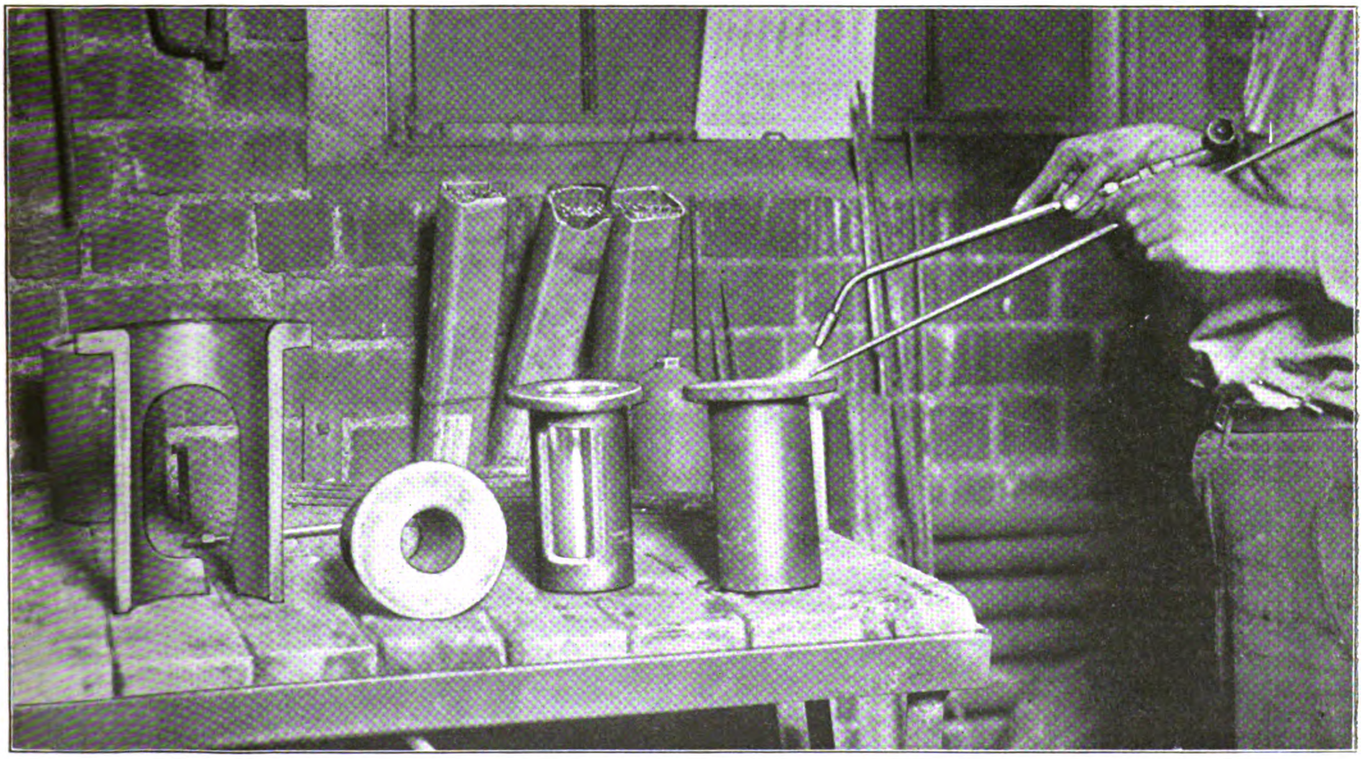
PINION SEATS AND KEYWAYS RESTORED

The restoration of worn pinion seats and keyways by welding is probably quite commonly known, but such success has been attained by this company in this practice that a description of its methods should be of interest, especially to those companies having many of the older types of motor involving the dismantling of the armature and its reassembly when a new shaft has to be installed. To obviate this difficulty and reduce the cost, the oxy-acetylene welder is employed.

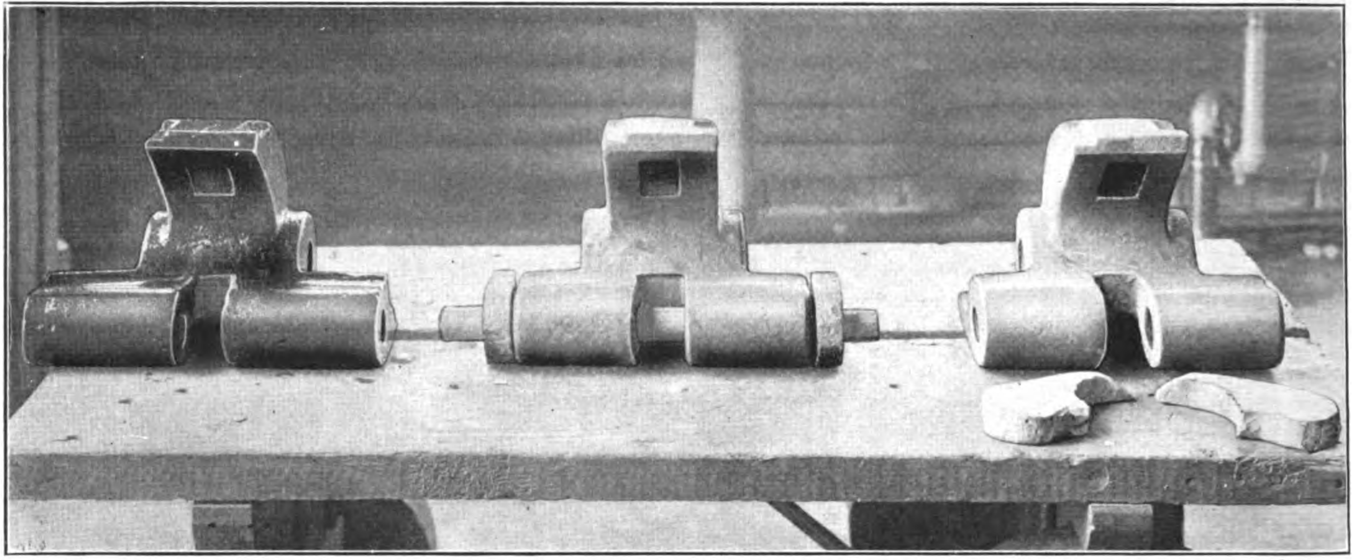
Preparatory to welding, the pinion end of the armature shaft is first thoroughly cleaned to remove all grease and dirt. Fire clay is then packed into the core head to prevent unnecessary heating of the armature core, which might affect the winding. The bearing seat of the shaft is also incased in fire clay and wrapped with asbestos paper to protect the surface from the intense heat which must be applied to the pinion seat during the welding operation. As a protection for the operator a fire-brick oven is built around the end of the shaft. After these preparations have been completed the shaft is brought to a white heat with a kerosene torch, in which condition the entire surface that forms the pinion and nut seats is built up by welding on vanadium steel and the old keyways are filled in. When the welded shaft has cooled, the armature is placed in a lathe where the pinion seat is turned to the standard size. After a new keyway has been cut the operation is complete. The total cost of the operation is approximately $7.60, while the cost of a new shaft for the particular armature shown in the illustration on page 550 would have been $58. The time devoted to this entire operation was approximately twenty-four hours, and it may be said here that the promptness with which a repair of this nature can be made also reduces to a minimum the number of extra armatures necessary to meet emergencies.

COUPLER KNUCKLES LENGTHENED

A very unusual application of welding that has been made by this company is found in its plan of lengthening coupler knuckles. Abnormal track surface conditions, truck-spring deflections and wheel wear had caused cars to uncouple, in a number of instances, indicating that the 11-in. face of the knuckles in the M. C. B. radial car couplers was too short. The difficulty became especially noticeable with interurban cars in train service at sharp changes in grades, particularly at approaches to bridges and in the city streets. Although the couplers and car heights were carefully examined and corrected to eliminate coupler failures, the mechanical department was unable entirely to overcome the



OXY-ACETYLENE REPAIRS—RESTORING FLANGES ON THE WORN BEARINGS



OXY-ACETYLENE REPAIRS—THREE STAGES OF LENGTHENING COUPLER KNUCKLE

trouble. After trying various remedies to no avail, it was decided to increase the length of the knuckle face from 11 in. to 13 in., and to safeguard the service it was considered desirable to make the change promptly. An investigation of the time required to obtain new knuckles indicated that about the only way to do so would be to make new patterns and have the knuckles cast at a local foundry. Such a move, however, entailed scrapping the old knuckles in addition to paying for the special knuckles. As an experiment one of the standard 11-in. knuckles was lengthened by welding on pieces with oxy-acetylene, and this proved so successful that it was decided to lengthen all the knuckles with the welder, the work being done at an average cost of $2.26 per knuckle.

The following procedure was adopted: A templet was first cut from a piece of sheet steel to the exact shape of the top of one of the standard knuckles, and from this templet pieces were cut from 1-in. x 3-in. steel bars with the oxy-acetylene cutting torch. These pieces were afterwards forged to fit the ends of the knuckle, to insure perfect contact, about 1 in. of the small end of the forging being beveled as shown in one of the accompanying illustrations, simply to improve the appearance of the finished knuckle. Auxiliary knuckle-pin holes were then drilled through both of the forgings, and they were pinned to the casting as shown in the view of the assembled knuckle and forgings. As an extra precaution against any chance of failure and to reinforce the weld, an additional hole ½ in. in diameter was drilled through each forging and into the knuckle for about 1¼ in., a small pin being driven tightly into the hole. This held the piece firmly in position during the welding operation, and assisted in strengthening the weld.

After the knuckle and forgings had been assembled, the entire casting was placed in a blacksmith's forge, and one end was brought to a white heat. In this condition the forging on that end was rapidly welded to the casting, the cast-steel rod being melted as far down in the joint as possible, and the metal being gradually carried up to the working face of the knuckle. When the weld was completed on one end the knuckle was again placed in the forge where the other end was heated and subsequently welded in a like manner. This preheating of the knuckles is considered to be a very important part of the operation, because when it is properly done the amount of gas necessary to make the weld is reduced about 50 per cent.

After the welded casting became cooled, all metal projections were chipped off with a chisel and hammer, and the face of the knuckle was finished with a file or portable emery wheel. The need for finishing, however, could be practically eliminated by the skillful use of the torch during the welding operation. An examination of a number of knuckles lengthened in this manner showed little or no evidence of how the work was done, as there was no line of demarcation indicating where the weld had been made. The distribution of the cost of the work follows:

Blacksmith labor	$0.28
Helper's labor	.18
Machinist's labor	.20
Welder's labor	.60
10 lb. of 1-in. x 3-in. steel	.18
1 lb. of filling rod	.10
18 cu. ft. of acetylene gas	.36
24 cu. ft. of oxygen	.36
Total	$2.26

The original cost of the 11-in. knuckle was $4.50, and if the mechanical department had decided to buy special knuckles the cost would have been considerably more than this. In addition there would have been the delay necessary to prepare the special pattern and to obtain the steel castings which are scarce and high-priced owing to the present conditions in the steel industry.

STEEL-CAR REPAIRS ON MICHIGAN RAILWAY

In the shops of the Michigan Railway at Albion, Mich., of which R. C. Taylor is master mechanic, the oxy-acetylene welding and cutting outfit has become indispensable in connection with steel-car repairs, the cutting torch being particularly useful in both construction and repairs to the all-steel car bodies. While the welding torch is used occasionally in this work it has been found more useful in reclaiming and repairing equipment and truck parts. In the oxy-acetylene welding and cutting department there is provided a complete stock of rods of all the different kinds of metal used in equipment parts which may become damaged or broken. While cutting is done by several of the workmen engaged in repairing steel car bodies, welding has been found to require the services of an expert, and accordingly it is done by one man. When the welding outfit was purchased this man received instruction in the various kinds of welding operations, and after about a year's experience he has become very skillful.

Innumerable repair jobs which, under ordinary conditions, would have been difficult, have become quite easy when the oxy-acetylene cutting and welding torches were brought into play. When this outfit was purchased, there were included several tips for cutting different thicknesses of metal and a special rivet-cutting torch. The latter has been found especially useful in removing and renewing damaged members in the steel cars, as rivet heads may be cut at the rate of three per minute.

In one instance a 7-in., 13½-lb., channel intermediate sill in an all-steel express car was badly twisted in a wreck. This channel was bent at right angles and the needle beam that was framed into it was also badly distorted. Under ordinary conditions it would have required two or three days to cut out this bent sill and needle beam with a hack-saw and chisel. Moreover, two sets of splice plates would have been necessary to replace the damaged section of the intermediate sill in the car-body underframe. With the oxy-acetylene cutting torch, however, the damaged section of the channel was quickly cut at two places and removed. The bent sill and needle beam were taken to the forge shop and straightened, and in a very short time they were ready to be replaced in the underframe. Instead of using splice plates where the bent section of the intermediate sill joined the sections from which it had been cut, an oxy-acetylene weld was made in twenty minutes, about 50 cents' worth of gas being used in the operation. Only about ten minutes were required to cut off the rivets and to cut through this channel in two places when it was removed from the underframe. Experience has shown that it costs about $1 an hour for the gas used in various welding operations, the quantity depending upon the size of the tip employed.

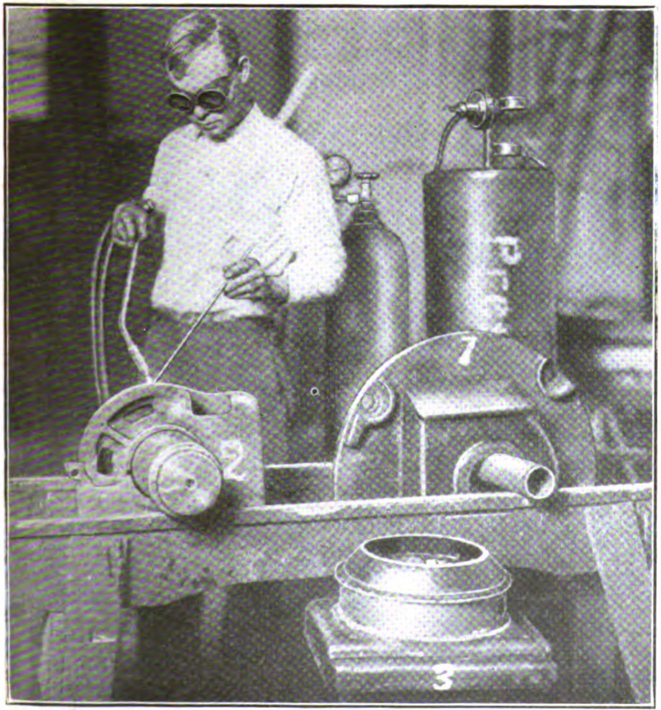
Innumerable other small cutting operations are necessary in steel cars in both construction and repair work. For instance, instead of suspending the conduits beneath the cross-bearers in the underframe, slots are cut through the webs of these members and the conduits passed through them. Damaged side plates are quickly removed by using the rivet cutter, which cuts the head of a rivet without damaging the plate. After the plates have been straightened in the blacksmith shop they are restored to their original position and welded in place. Similarly, many forging operations have been superseded merely by cutting out the parts from metal of the required thickness. For instance, body brake-levers, which were formerly made from 1¼-in. steel bars by forging them to the proper dimensions, are now cut from 1¼-in. plates. By this method the cost of manufacturing the levers is greatly reduced, since all that is required after the levers have been cut to a templet is to drill the necessary holes.

WORN JOURNAL BOXES RECLAIMED

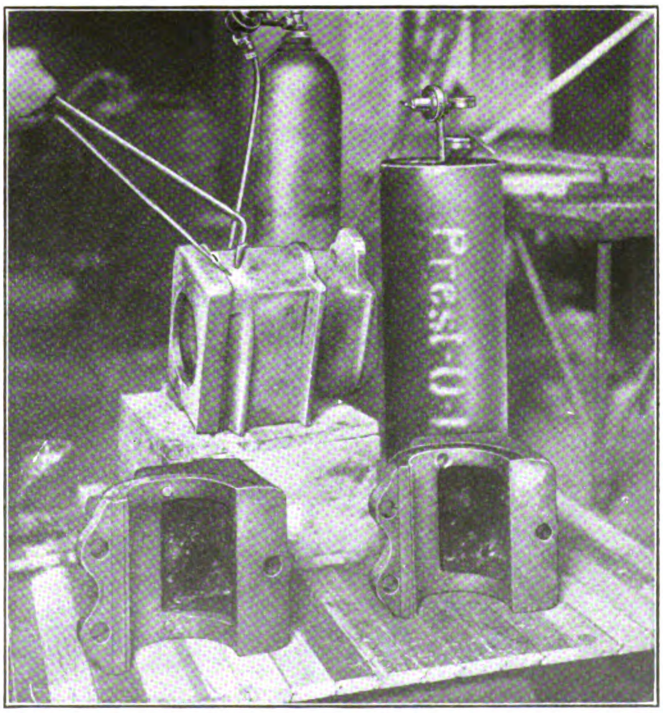
Prior to the advent of the oxy-acetylene welder worn journal boxes had to be scrapped and replaced with new ones. This waste of high-priced metal has been obviated by the Michigan Railway by providing new ⅛-in. sheet-steel chafing plates and welding them in the pedestal ways. In one of the accompanying illustrations are shown two 6-in. x 11-in. malleable-iron journal boxes, one of them being worn and the other having been repaired with the oxy-acetylene welder. As it has been found very difficult to weld malleable iron with malleable iron, Tobin bronze is employed to cheapen this operation, and the metal produces satisfactory results. The first cost of one of the journal boxes shown in the accompanying illustration is $6.25, while the cost of welding on new chafing plates is only 50 cents. Although the chafing plates have been riveted on successfully in some instances it has been found very difficult to make them oiltight, whereas when the plate is welded in place this requirement is readily met.

MISCELLANEOUS APPLICATIONS

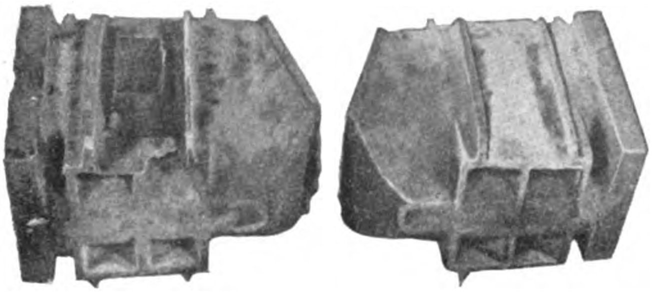
The heaviest weld that has been successfully made in the shop of the Michigan Railway has been on the cracked shanks of old Sharon type and Tomlinson radial type M.C.B. couplers. The approximate first cost of one of these coupler shanks is $12.50, and the cost to weld it is $2. Welds in simpler form are frequently made to obviate delays in the receipt of material, thus making it unnecessary to carry a large stock of spare parts in the storeroom. For instance, GE-239, 2400-volt, brush-holder receptacles that have been burnt in service are readily put in condition for operation. In



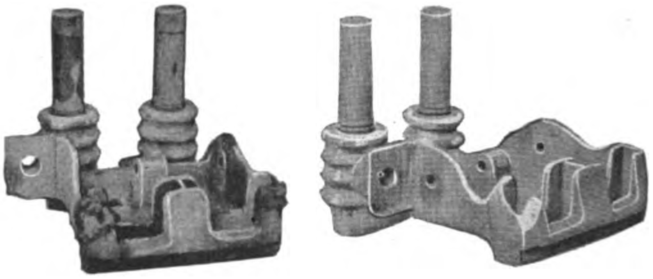
OXY-ACETYLENE REPAIRS—BUILDING UP MOTOR END-HOUSING WITH CAST STEEL



OXY-ACETYLENE REPAIRS—WORN AND RECLAIMED AXLE CAPS AND JOURNAL BOX one of the accompanying illustrations, one of these brush-holder receptacles in need of repairs is illustrated, together with one that has been restored. For this work a scrap brush is fastened to the receptacle during the welding operation to serve as a mold for the inner surface of the brush-holder receptacle. The cost new of one of these holders is $2.50, and the welding cost, including labor, material and gas, is about 25 cents. A similar case occurred in connection with a broken base on one of the Michigan Railway's pneumatic trolley bases. As shown in one of the accompanying illustrations, the base, which is made of cast iron, was cracked across one side, and to weld it cast-iron metal was poured into the crack. The cost new of one of these bases is approximately $25, but the cost of material, labor and gas for welding was about $1. In addition to the saving made by reclaiming the casting, it was important that the base be restored to service in a short time, and the welder readily met this condition.


OXY-ACETYLENE REPAIRS—WORN JOURNAL BOX REPAIRED WITH TOBIN BRONZE PEDESTAL WAYS

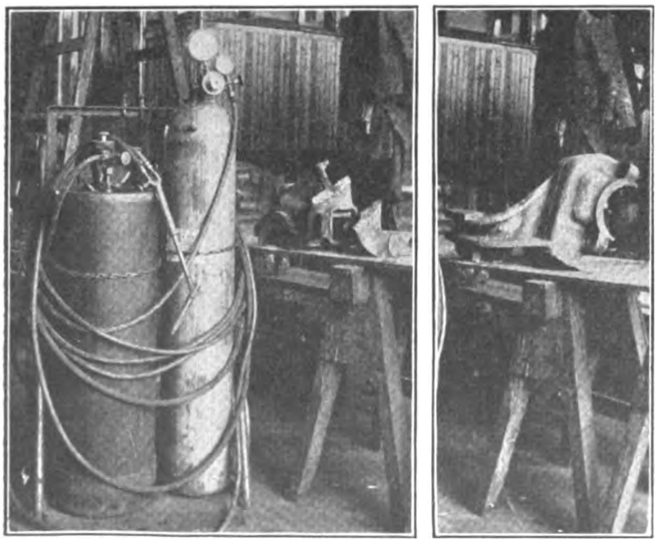
Again, a casting which was used in connection with the third-rail shoe mechanism, and which was broken in service, was practically impossible to replace promptly because of slow deliveries on steel castings. To restore the casting to service three welds were required, two across the end of the yoke formed by the casting and one where this yoke connects with the main casting. In the instance cited the piece broken out of the end of the yoke was lost along the roadway. It was necessary to prepare a short section of cast steel to take its place and weld it to the two sides of the yoke. The labor, materials and gas used in completing this job cost 50 cents. On another occasion a coil from a Peter Smith hot-water heater had burned out or burst by freezing and the oxy-acetylene welder was employed to restore it to service. At the time the repair was made the possibility of saving was not as important as the prompt provision of heat for the car. Still, the cost new of one of these coils was approximately $75, and the cost of welding was only $3. This work was very successfully accomplished, and the welded coil has been in service for several months. The saving made in this case was $72, and it was unnecessary to deduct anything from this figure for scrap value because the old tube was practically worthless as scrap.

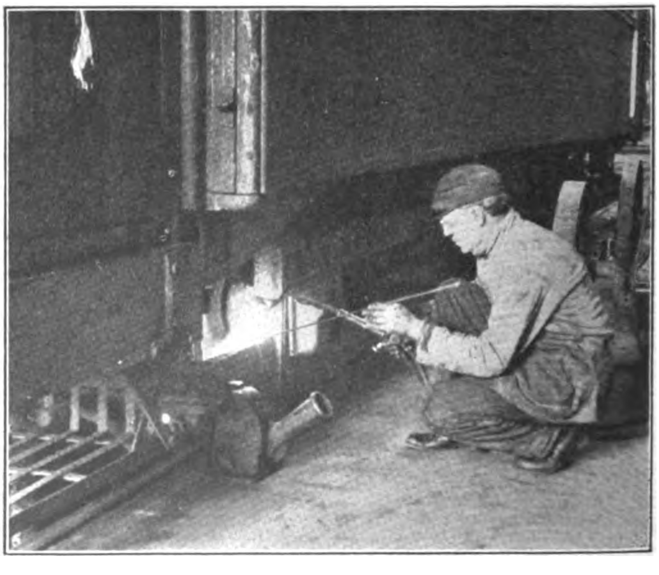

OXY-ACETYLENE REPAIRS—VIEWS OF DAMAGED AND RESTORED 2400-VOLT BRUSH-HOLDER

QUICK REPAIRS IN CHATTANOOGA

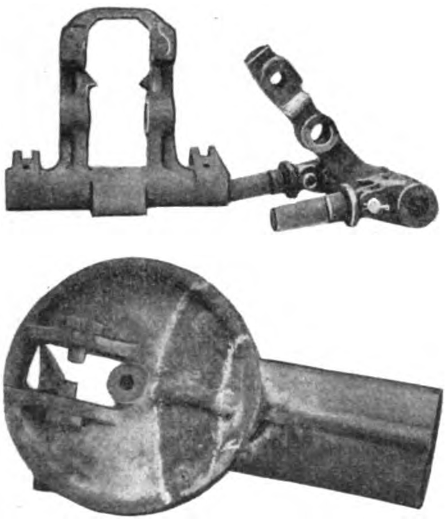
An example of quick repair work done in the shop of the Chattanooga Railway & Light Company is shown in one of the accompanying illustrations. In this case the repairs were made to a sandbox which had been broken near the bottom at the spout. As sandboxes rarely break, and extra ones are not kept on hand, the broken spout, under old conditions, would have meant either running the car without sand or else keeping it out of service for four or five weeks, because at present it is difficult to obtain electric railway material promptly after it is ordered and the cost of patching the break would have been all out of proportion to the value of the casting. With the oxy-acetylene welder, however, these difficulties disappeared. One of the illustrations shows the broken sandbox and another shows a shop man repairing it. Still another shows the finished job fifteen minutes after the work was begun, the total cost of labor and material for the work amounting to only 75 cents. In this case the car was ready for service about twenty minutes after the work was begun.

The acetylene welding outfit is used very generally


OXY-ACETYLENE REPAIRS—VIEWS OF BROKEN AND RESTORED AXLE CAP


OXY-ACETYLENE REPAIRS—BROKEN TRUCK FRAME WELDED IN PLACE

by this company for repairing heavy broken parts, such as truck frames, drawheads, brake hangers and body bolsters, and it is frequently used even for such odd jobs as repairing broken stoker castings. Recently one of the company's cars had a broken brake hanger carrier of ⅞-in. x 4-in. steel which was restored without taking the truck from under the car and even without taking the brake hanger off the truck. Its removal and welding in the blacksmith shop would have cost approximately $3, whereas the actual expenditure was 50 cents. Several broken truck frames have been repaired at a cost that averages between $1.50 and $3, the replacement of such pieces under ordinary methods involving a cost that ranged between $40 and $50.



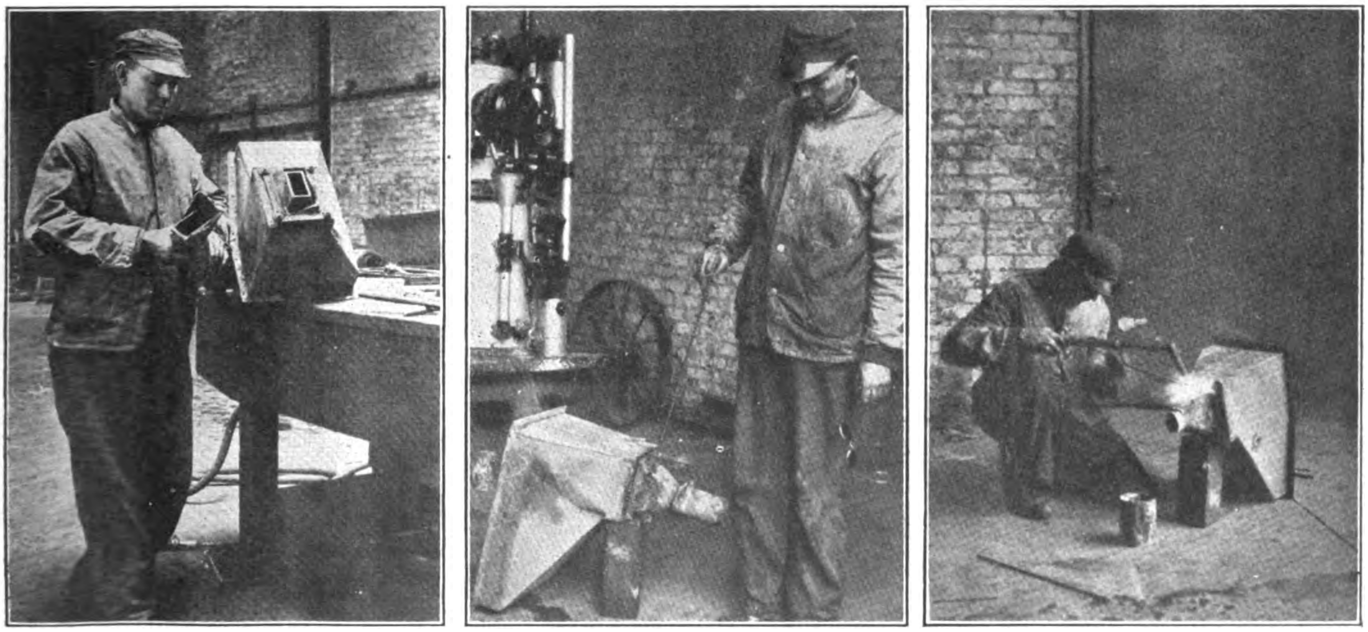
OXY-ACETYLENE REPAIRS — BROKEN AND RECLAIMED THIRD-RAIL SHOE-CASTING AND WELDED TROLLEY BASE

The heaviest work that is done at Chattanooga with the oxy-acetylene welding apparatus consists in repairs to body bolsters which are constructed of ⅞-in. steel plate 9 in. wide. These plates are bent at right angles at each end to form the support for the side sills, and it has been found that they display a tendency to break at the inside of the bends. To repair them originally cost $10, but with the oxy-acetylene flame the operation of repairing the break costs approximately $2.50.

W. S. Henry, master mechanic Chattanooga Railway & Light Company, states that the best way to train an operator appears to be merely to turn him loose with the machine after he has learned to regulate the flame. At Chattanooga originally a point was made of having the operator make one or more practice welds each day for some weeks so that his experience would be regularly developed without waiting for the occurrence of emergency jobs which form the greater part of the work that is done with the apparatus.

In The Milwaukee Electric Railway & Light Company's shops a novel application of the oxy-acetylene flame has been developed in the burning of lead to make lining material for storage-battery boxes. In connection with this work, as well as the regular welding operations that are carried on with the apparatus it has been found that the cost of work depends largely upon the element of time. H. A. Mullett, superintendent of rolling stock, states that the operating cost per hour ranges from 40 cents, when a No. 2 tip is used, up to $1.17 when a No. 7 tip is used.

On the Chicago Elevated Railways, H. A. Johnson, master mechanic, states that the uses to which it can be put to advantage have been continually extending, and in cases of emergency the value of the apparatus is considered to be not measurable in dollars and cents. Some of the work which is being done is as follows: Building up worn pinion fits, keyways, stripped threads on armature shafts and worn motor housings, welding broken motor shells, building up worn brush-holders, worn nose suspensions and many other jobs of a similar nature. The company has tried also the filling up of flat spots on steel wheels when the flat spots did not come close to the flange. Out of several operations of this kind one was found where the metal sloughed off, but as a whole the experience is considered to be satisfactory. It is considered that in many cases the actual cost of doing a welding job is not the most vital feature. In many cases time is the determining factor, especially in cases of broken machinery, where the replacement of a part would necessitate a long delay in the receipt of new castings. In Chicago the question of breaking in operators has not been a serious matter, as a shop employee may be sent to the establishment of one of the manufacturers of oxy-acetylene apparatus where repair work is handled, and he can work for three or four days beside an experienced operator, picking up in this way more knowledge than he could in the railway company's shops in a considerably longer time. For the welding operators, a knowledge of the welding and working of metals is considered to be a material help in the proper handling of the welding apparatus, and for this reason the company is using blacksmiths to do the gas welding.



OXY-ACETYLENE REPAIRS—WELDING BROKEN SAND BOX IN FIFTEEN MINUTES

New Type of One-Man Car

The Prominent Characteristic of the Latest Ultra Light-Weight Car, Recently Built for Stone & Webster in Accordance with the Birney Design, Is the Retention of Standard Forms of Construction, the Weight Complete Being 10,000 Lb., and the Seating Capacity Twenty-Nine

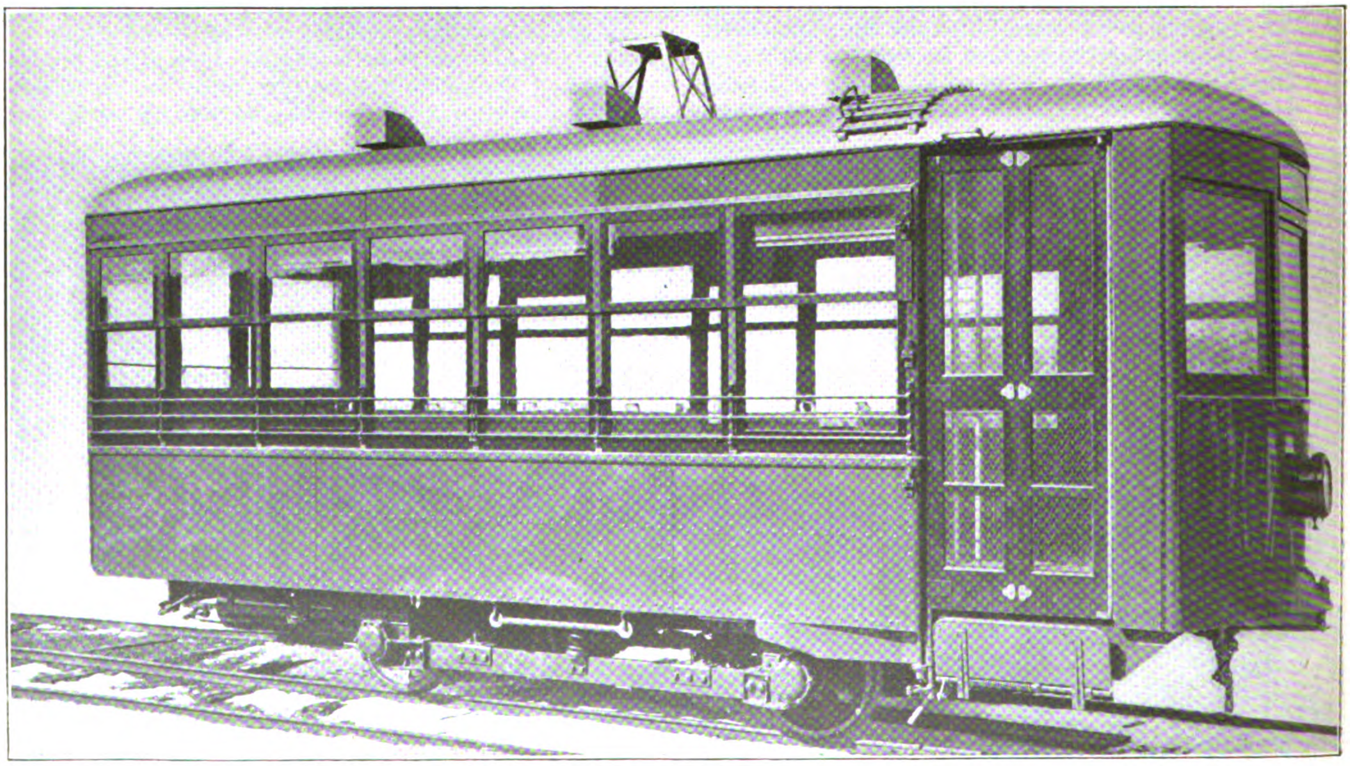
WITH the increase in popularity of one-man operation much attention has been devoted to the development of a design of car that would be best suited to this method of handling traffic, and a number of different types have been proposed. A few of them have been built and placed in service, and the latest addition to the list is the Birney one-man car which is about to be introduced on the Stone & Webster properties in the Puget Sound district. This car, which is described in the accompanying paragraphs, is the result of an extended study by its designer, C. O. Birney of Stone & Webster, Boston, Mass., of the factors governing the cost of handling traffic on systems of various sizes.

The study has included consideration of the increasing demands by the public for improvements in service and in conveniences, the increased cost of labor and material, the tendencies toward track extension and longer hauls, and the operation of automobiles, both private and jitney. Some of these elements have a tendency to reduce the purchasing power of the fare unit, and others incline toward reducing the earning power of the property. Yet recent analyses have indicated that the average load of a modern electric car for fifteen hours of each day ranges from seven to twenty passengers, the cars having capacity loads only in the rush-hour periods. In general, the present service is rendered by cars weighing from 24,000 lb. to 56,000 lb., with seating capacities ranging from thirty-two to sixty passengers. The cost of hauling such cars in addition to the wages of the platform men represents a direct loss to the company under the unfavorable loading conditions stated.

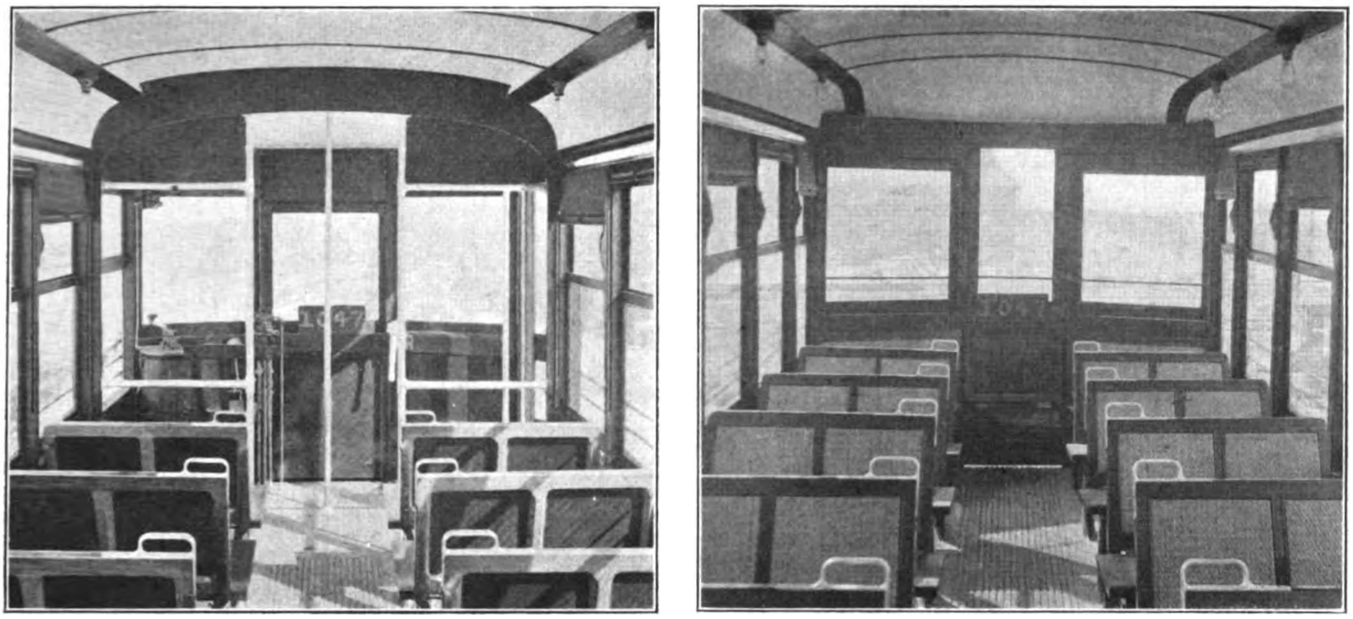
The provision of more satisfactory conditions with respect to the operation and net earning power of cars throughout the daily service involves a type of rolling stock that permits a considerable decrease in power demands as well as in platform expenses. Seeking these objects, Mr. Birney prepared designs for a single-truck car with a seating capacity of twenty-nine passengers, and a weight, equipped, of 10,000 lb. Two of these units have just been completed by the American Car Company, St. Louis, Mo., eight additional cars of the same type being on order. The design includes steel construction, with wood fillers, wood roof and wood interior finish, and the strength of the framing and associated parts is on an equal basis with the type of car construction generally employed on the Stone & Webster properties.

In consideration of the small passenger loads, the car has been designed and equipped so that it could be satisfactorily operated by one man under all conditions, and in addition to the savings thus derived, as well as because of the decrease in weight, it is expected that a considerable reduction in car and track maintenance will be effected.

The new cars are of the single-end, single-truck type, are provided with straight sides, round ends, arched roof, stationary top sash, lower sash arranged to raise, and have folding doors and steps, with the platform on



NEW ONE-MAN CAR—VIEW OF CAR COMPLETE EXCEPT FOR TROLLEY POLE AND HARP



NEW ONE-MAN CAR—INTERIOR VIEWS SHOWING FRONT PLATFORM AND REAR DOOR

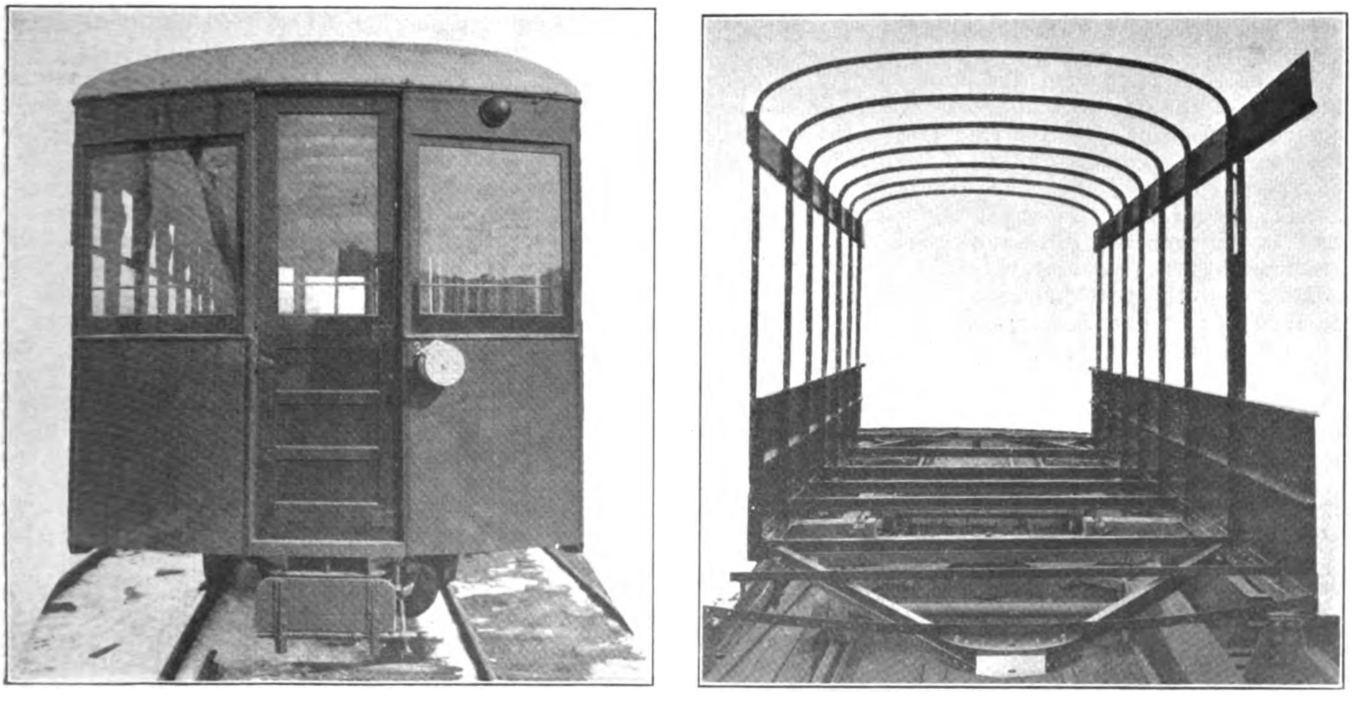
the same plane as the body floor. The principal dimensions and weights are given in the following table:

Length over all	22 ft. 10 in.
Length over dashers	22 ft. 4 in.
Length of platform over dasher	4 ft. 6 in.
Width over sheathing	7 ft. 6 in.
Width over all	7 ft. 10 in.
Height, rail to top of floor	2 ft. 3 in.
Height, rail to top of roof	9 ft. 9 in.
Seat and post spacing	2 ft. 4½ in.
Seating capacity	29
Height, floor to top of window rest	2 ft. 1 in.
Height, floor to bottom of top sash	4 ft. 2½ in.
Height, floor to point of arch	6 ft. 6 in.
Width of entrance and exit door, clear	2 ft. 6 in.
Width of emergency exit door in rear, clear	1 ft. 10 in.
Width of aisle	1 ft. 8 in.
Weight:	
Car body	4,050 lb.
Truck	3,000 lb.
Electrical equipment	2,333 lb.
Air brake equipment	617 lb.
Total	10,000 lb.

The cars are designed for near-side stops, with combined entrance and exit doors and a folding step. A rear emergency door of the swinging type operates in conjunction with a folding exit step. This door swings outwardly and is provided with manually and pneumatically operated locks, so that it cannot be opened except in emergency. At such times the pneumatically operated lock is automatically unlocked and the manually operated lock can be unlocked by persons attempting to leave the car from the rear. Special attention has been paid to ease of entrance and exit, and the 27-in. height from rail to floor requires the use of only one folding step, the riser being easily negotiated.

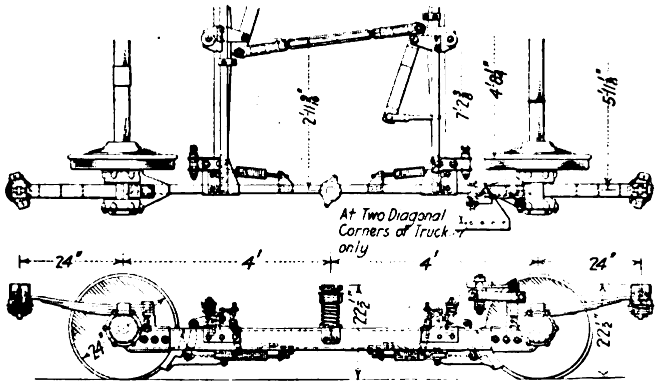
CAR-BODY ARRANGEMENT

The single-end arrangement was selected because it permits of the minimum weight per car unit, and while it was appreciated that double-end cars must be operated in some instances, the situation resolved itself into a comparison of the weight and cost of the single car, with necessary track facilities, versus the same elements in connection with double-end car construction. It was



NEW ONE-MAN CAR—REAR DOOR AND STEP; CONSTRUCTION VIEW SHOWING FLOOR, SIDE AND ROOF FRAMING estimated that a double-end car body having the same seating capacity would weigh 6000 lb. or that a double-end car of the same weight as the one actually adopted would provide a seating capacity of only twenty-four passengers. The weight of the single-end car body is but 4050 lb. and the greater weight of a double-end car would constitute a continuous tax against the operating company which would be in excess of the cost of driving the single-end equipment.

To gain the economies offered by one-man operation, it was considered necessary to equip the cars in such a manner that the degree of safety in service would be greater than that known heretofore, even under two-man operation. Because of the concentration of duties upon one man it was also considered necessary to provide all possible facilities, especially with respect to eliminating manually operated parts. Compressed air offered the desired flexibility, and the equipment has been arranged to that on emergency occasions the control of the power circuit, the operation of doors and steps, control of sand and application of brakes are automatically effected. The controller handle is so designed that in case the operator removes his hand from the handle in any position which permits current to flow to the motors, the current will be cut off by the circuit breaker. This causes the operation of a device which provides for the application of brakes, application of sand to the rails, the opening of the front exit door and the pneumatic unlocking of the rear emergency door.



NEW ONE-MAN CAR—ELEVATION AND HALF PLAN OF TRUCK

It was considered also that any action required on the part of the operator in an emergency should be as simple as possible, and for this reason the control of the doors and steps, as well as of the brakes and sand, has been combined into one device operated by one handle. Aside from the great importance of this feature in emergencies, the combination of control is of great assistance in ordinary service operation, since it eliminates to the greatest possible extent the parts to be handled in running the car, thus permitting undivided attention for the important duties of the operator. The device, which is visible in one of the interior views of the car displaces the ordinary motorman's brake valve, though its operation and appearance are along similar lines. The positions of the handle are arranged so that the car is brought to a stop in the usual manner without involving the operation of doors and steps. After the stop is made, the door and step are opened by moving the handle to another position. After the exit and entrance of passengers the door is closed, following which the brake is released and the car is ready to start. The weight of the complete air-operated equipment, including piping, is only 617 lb., and it may be said that these features can be applied to any type of car in passenger service, thereby permitting the extension of the economies secured to existing rolling stock.

The underframe is composed of steel channels and angles, the side sills being 2½-in. x 3-in. x 3/16-in. angles and the cross-sills of 3-in., 4-lb. channel iron. The dasher angles are of 1½-in. x 1½-in. x ⅛-in. stock, the seat-rest angles being of 1¼-in. x 1¼-in. x ⅛-in. steel. The center sills are of the same size as the cross-sills; the side posts are of 1½-in. x 1½-in. x 3/16-in. T-iron, the corner posts being of 1¼-in. x ¾-in. x ⅛-in. angle iron reinforced with oak. No. 18 sheet steel is used to form the side plates, and the letterboards are of No. 20 sheet steel. The sashes, doors and finish are of mahogany. The roof is of 5/16-in. poplar covered with No. 8, 16-oz. canvas, and the flooring is 13/16 in. thick, yellow pine being used under the seats and hard maple, grooved to form floor mats, in the aisle.

TRUCK DESIGN AND EQUIPMENT

On the truck are mounted two GE-258 motors, each rated at 18 hp. at 600 volts, mounted on a special Brill truck and wired to a K-10 controller. These motors are of the ventilated commutating-pole type. The armatures are mounted upon ball-bearings at both ends, lubrication being provided by a nipple through which grease is forced by means of a grease gun. The weight of the electrical equipment, including gears and gear cases, is 2333 lb.

The truck weighs 3000 lb., and has an 8-ft. wheelbase and 24-in. wheels. The journals are 3 in. x 6 in., the axle diameters being 3½ in. at the motor bearings and 4 in. at the gear seat. The height from the rail to the spring posts is 1 ft. 10 in., and from center to center of side frames is 5 ft. 9¼ in. The spring system consists of quarter-elliptic and spiral springs of the graduated type. A quarter-elliptic spring is mounted on each journal box, the band of the spring resting on the top of the journal box, and the inside end being bolted to the bracket or wing which forms a part of the box. The outside end of the quarter-elliptic spring is arranged with castings and pins to support the transverse swing links, which in turn support the graduated coil springs. These coil springs carry the light load of the car, which averages about two-thirds of the seated load. When this load is exceeded, the coil springs compress, causing the spring caps and seats to come into contact, and any additional load is borne on the quarter-elliptics.

Besides the above coil springs, an additional coil spring is provided at the center of each side frame, mounted on suitable seats. The top section is graduated and the spring acts similarly to those at the ends of the truck. The lower portion of this coil spring is of the same capacity as the quarter-elliptic springs and supports a portion of the maximum load. In order that the transverse swing of the car may not be excessive the truck is connected to the car body through the medium of links, which are attached to the truck at diagonal corners only, located on the journal boxes at a point about 12 in. within the wheelbase. The brakes are inside-hung, being supported by half-ball hangers, and the shoe heads are connected transversely by beams.

Other equipment on the car includes the Johnson fare box with transfer issuing device; Westinghouse air-brakes and safety features, Utility ventilators, Edwards sash locks, International cash register, Curtain Supply Company's pinch-handle curtains, transverse seats with hinged cushions and a folding seat on the inside of the rear emergency door, Esterline "Golden Glow" headlight, Feralun step treads, Keystone trolley catcher, Hunter signs, operator's seat, and Keystone pneumatic gong.

CLEVELAND TRACK COSTS—MIXING AND PLACING CONCRETE IN TRACK CONSTRUCTION

CLEVELAND TRACK COSTS—FINISHED TRACK WITH CONCRETE PAVEMENT IN DEVIL STRIP

Unit Track Construction Costs for Thirty-One Jobs

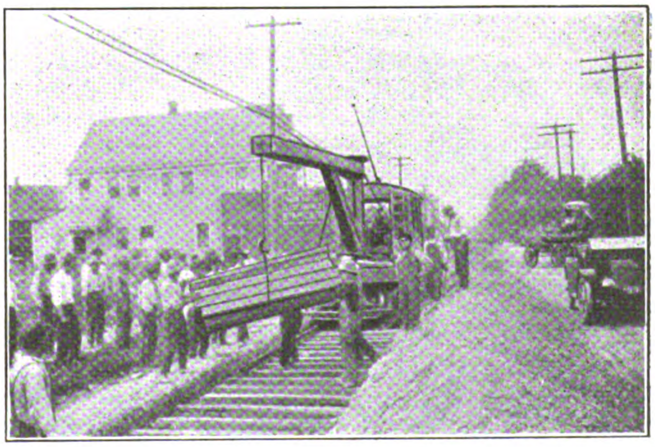
This Detailed Cost Distribution Kept by the Way Department of the Cleveland Railway Should Be Especially Valuable as a Guide to Others for Track Construction in Preparing Estimates

MORE than 25 miles of single track were constructed or rehabilitated by the way department of the Cleveland (Ohio) Railway Company during 1915, and in the accompanying table there are presented the costs per foot of track of the thirty-one different jobs which were included in this mileage. Very few companies have given as much attention to reducing construction costs in connection with their track work as the Cleveland Railway, and many forms of track labor-saving tools have been introduced in connection with this company's work. It is, therefore, of particular interest to have the unit results of a track department that has been a pioneer, in many instances, in the application of labor-saving tools.

All the track included in these jobs was of the Cleveland standard construction, and, unless otherwise stated, the data herein published apply to double-track line in paved streets. Cleveland standard track construction includes 95-lb., Section-400, high-carbon, T-rail with a chemical composition of 0.75 to 0.90 carbon and 0.10 metallic titanium. All the joint plates are 1⅛ in. thick, and they are made of the same steel as the rail. The joints are riveted with 1 1/16-in. rivets and the base is welded by the thermit process. This construction is known as the Clark joint, which has been previously described in these columns. International steel ties are used at the joints and Carnegie steel ties spaced at 4-ft. intervals are employed between the joints. The standard foundation construction is of the trough and beam type with 12 in. of 1:6 gravel concrete under the rail and 12 in. of concrete below the tops of the ties. Between the ties and the rails the concrete foundation is approximately 5 in. or 6 in. thick, and a 6-in. vitrified drain tile is laid beneath the devil strip. The track is paved with granite block, nosed to form the wheel flangeways, and the devil strip, unless otherwise stated, is paved with 1:1:2 granite concrete with 50 lb. of steel hardener to each barrel of cement used in the top 2½ in. of wearing surface.

Labor-saving equipment, which was an important factor in keeping down track construction costs, included the Clark pavement plow or rooter which was described

CLEVELAND TRACK COSTS—CLAMSHELL DERRICK CLEANING UP WORK



CLEVELAND TRACK COSTS—DERRICK CAR FOR HANDLING TIES AND RAILS

Cleveland Track Costs—1915 Cost Per Foot of Single Track.

	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
TRACK MATERIAL																				
Bolts	.....	.....	.....	0.0038	0.0153	0.0040	.....	.....	.....		0.0003	0.0053	0.0053	0.0095		.....	0.0005	0.0001		
Carbide	0.0006	.....	.....	.....	.....	0.0003	.....	.....	.....	0.0006	.....	.....	0.0001	0.0012	0.0008	0.0006	0.0007	0.0004	0.0007	0.0003
Cement	0.3195	0.2051	0.1685	0.1[illegible]0	0.3[illegible]81	0.3245	0.2394	0.3114	0.3204	0.3603	0.3138	0.2422	0.0418	0.1407	0.2540	0.3515	0.2571	0.2679	0.1948	0.1445
Cinders	0.0064	0.0021	0.0029	...	0.0197	0.0022	0.0122	0.0005	0.0022	0.0017	0.0009	0.0009	0.0118	.....	0.0031	0.0030	0.0015	0.0010		
Clips and bolts	0.0745	0.0755	0.0525	.....	.....	0.0437	.....	0.0491	0.0583	0.0388	0.0506	.....	.....	.....	0.0485	0.0501	0.0435	0.0492	0.0341	0.0460
Crushed stone	0.0115	0.0278	.....	0.3302	0.1816	.....	0.1741	0.0746	0.0055	0.0334	0.0335	0.3508	0.9327	0.2317	.....	0.0037	0.0435	0.0207	0.0971	.....
Drip boxes and covers	0.0089	0.0103	0.0895	.....	0.0249	0.0622	.....	0.0297	0.0223	0.0421	0.0304	0.0484	.....	.....	0.0325	0.0381	0.0318	0.0396	0.0237	
Gravel	0.3079	0.2636	0.1795	.....	0.1100	0.3328	0.0959	0.3137	0.2643	0.2978	0.2741	0.0507	0.0052	0.1761	0.3848	0.3025	0.2385	0.2518	0.1549	0.1374
Oxygen	0.0045	.....	.....	.....	.....	0.0027	.....	.....	.....	0.0037	.....	.....	0.0008	0.0089	0.0063	0.0042	0.0046	0.0039	0.0047	0.0021
Plank	.....	.....	.....	.....	.....	0.0018	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		
Plugging charges	0.0034	0.0024	0.0033	.....	.....	0.0021	.....	0.0032	0.0037	0.0032	0.0033	.....	0.0001	0.0015	0.0051	0.0032	0.0032	0.0031	0.0025	0.0021
Punchings	0.0003	0.0002	0.0003	.....	.....	0.0002	.....	0.0003	0.0003	0.0003	0.0003	.....	.....	0.0001	0.0004	0.0003	0.0003	0.0003	0.0002	0.0002
Rail, 95-400	1.1185	1.1181	1.1182	.....	.....	1.1182	.....	1.1182	1.1111	1.1180	1.1181	.....	0.0271	1.1182	1.1179	1.1183	1.1183	1.1182	1.1181	1.1185
Rail, 141-395	.....	.....	.....	.....	.....	0.0218	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0050	.....	
Rail, 80# tee	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.6971	.....	.....	.....	.....	.....		
Rivets	0.0192	0.0018	0.0138	.....	.....	0.0181	.....	0.0188	0.0221	0 0179	0.0199	.....	.....	0.0167	0.0185	0.0201	0.0216	0.0162	0.0153	0.0072
Splices, 95-400	0.0686	0.0684	0.0598	.....	.....	0.0803	.....	0.0639	0.0676	0.0572	0.0688	.....	0.0013	0.0558	0.0650	0.0661	0.0684	0.0698	0.0618	0.0630
Splices, 141-395	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0036	...	
Splices, 80# tee	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sand, lake	0.0037	.....	0.0020	0.0713	0.0505	.....	0.0500	0.0029	0.0007	0.0096	0.0220	0.0671	0.0001	.....	.....	0.0041	0.0014	0.0006	...	.....
Sewer pipe	0.0440	0.0220	0.0440	.....	0.0324	0.0386	0.0327	0.0220	0.0230	0.0263	0.0244	0.0442	0.0645	0.0200	0.0220	0.0237	0.0220	0.0220	.....	.....
Slag	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0019	.....	.....	.....	.....	.....	.....	.....
Spikes	0.0031	0.0009	.....	0.0441	0.0194	.....	.....	0.0041	0.0019	0.0045	0.0006	0.0195	0.0219	0.0175	0.0007	0.0011	0.0043	0.0028	0.0123	
Thermit	0.0577	0.0454	0.0562	.....	.....	0.0356	.....	0.0546	0.0635	0.0540	0.0556	.....	.....	0.0268	0.0703	0.0543	0.0446	0.0519	0.0431	0.0368
Tie rods	0.0500	0.0500	0.0500	0.0318	0.0488	0.0500	0.0156	0.0490	0.0490	0.0500	0.0500	0.0332	0.0004	0.0509	0.0490	0.0490	0.0500	0.0490	0.0500	0.0410
Ties, Carnegie	0.2919	0.3128	0.2777	.....	.....	0.2958	.....	0.2833	0.3209	0.2236	0.2385	.....	.....	.....	0.2854	0.2881	0.2495	0.2844	0.1963	0.2400
Ties, international	0.1324	0.1393	0.1357		.....	0.1192	.....	0.1260	0.1485	0.0756	0.1031	.....		.....	0.1228	0.1314	0.1124	0.1241	0.0637	0.1054
Ties, oak	0.0307	0.0227	0.0139	0.2338	0.4228	.....	.....	0.0330	0.0097	0.1011	0.0360	0.4032	0.4319	0.3813	0.0147	0.0255	0.0708	0.0454	0.2219	0.0612
Combination splices	0.0110	0.0017	0.0091	0.0075	.....	0.0033	.....	0.0036	.....	0.0205	0.0011	.....	0.0017	0.0878	0.0109	0.0187	0.0067	0.0081	0.0233	
Boñaaño	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0896	.....	.....	.....	.....	.....	.....	
Total	2.6793	2.3701	2.2769	0.9055	1.3135	2.5574	0.6199	2.5619	2.4942	2.5402	2.4453	1.2655	2.3354	2.3447	2.5127	2.5576	2.3952	2.4391	2.3186	2.0117
TRACK LABOR																				
Bonding	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
City of Cleveland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0022	0.0035		
Cleaning street	0.0312	0.0214	0.0321	0.0505	0.0413	0.0394	0.0437	0.0499	0.1063	0.0372	0.0437	0.0666	0.0097	0.1494	0.1143	0.0411	0.0431	0.1054	0.0368	0.0654
Concreting	0.1092	0.0619	0.0837	0.0633	0.1891	0.1192	0.0379	0.0901	0.1196	0.1575	0.0945	0.0658	0.0176	0.5125	0.0984	0.1273	0.0878	0.0863	0.0997	0.0509
Cutting rail	0.0055	.....	.....	.....	.....	0.0094	.....	0.0039	0.0009	0.0056	.....	.....	0.0020	0.0215	0.0094	0.0073	0.0044	0.0073	0.0165	0.0070
Drilling	.....	.....	.....	.....	.....	0.0052	.....	0.0006	.....	.....	0.0009	.....	0.0003	.....	.....	0.0005	0.0013	0.0025	0.0072	0.0070
Excavating	0.1845	0.3689	0.1385	0.2216	0.3389	0.1627	0.0897	0.1304	0.2226	0.2542	0.0949	0.2258	0.5926	0.3389	0.1973	0.1308	0.1757	0.1691	0.2271	0.1761
Grinding	.....	.....	.....	.....	.....	.....	.....	.....	0.0003	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Handling new material	0.1192	0.0509	0.0591	0.2051	0.0620	0.0805	0.0150	0.0871	0.0588	0.1182	0.0672	0.1552	0.0700	0.0431	0.0638	0.0626	0.0669	0.0515	0.0681	0.1240
Handling at store yard	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Laying drain tile	0.0512	0.0133	0.0568	.....	0.1061	0.0114	0.0268	0.0167	0.0248	0.0267	0.0258	0.0388	0.1014	0.0186	0.0235	0.0156	0.0178	0.0302	0.0141	
Laying plank	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Laying track	0.0600	0.0723	0.0222	0.0107	0.1890	0.0972	.....	0.1494	0.1049	0.1509	0.1306	0.0282	0.1546	0.1739	0.1358	0.0824	0.0703	0.0908	0.0883	0.0522
Loading	0.0340	.....	.....	0.0231	.....	0.0340	.....	.....	0.0019	0.0151	.....	0.0065	0.0146	.....	0.0385	0.0325	0.0191	0.0229	0.0055	
Plumbing	0.0461	0.0056	0.0828	.....	0.0198	0.0300	.....	0.0706	0.1002	0.0514	0.0456	0.0452	.....	0.0262	0.0455	0.0497	0.0701	0.0668	.....	
Reaming	0.0080	0.0031	0.0026	.....	.....	0.0087	.....	0.0112	0.0076	0.0132	0.0103	.....	0.0006	0.0279	.....	0.0076	0.0034	0.0054		0.0237
Riveting	0.0074	0.0087	0.0056	.....	.....	0.0127	.....	0.0075	0.0071	0.0036	0.0066	.....	.....	0.0126	0.0105	0.0094	0.0103	0.0066	0.0077	0.0059
Sawing ties	0.0074	0.0013	0.0049		.....	0.0099	.....	0.0071	0.0003	0.0061	0.0024	.....		.....	0.0048	0.0063	0.0071	0.0058	0.0031	0.0077
Surfacing and aligning	0.2094	0.1219	0.1598	0.2262	0.3636	0.0852	0.0502	0.0569	0.1106	0.0995	0.0474	0.2316	0.3875	0.2913	0.0457	0.0659	0.1440	0.0957	0.0971	0.0703
Teaming	0.0558	0.0544	0.0375	0.0394	0.0401	0.0159	0.0400	0.0637	0.0516	0.0313	0.0356	0.0367	0.0741	0.1384	0.0078	0.0215	0.0232	0.0471	0.0734	0.0469
Temporary track	0.0276	0.0254	0.0081	0.0185	0.0219	0.0099	0.1707	0.0124	0.0055	0.0348	0.0051	0.0207	0.0020	0.1667	0.0237	0.0672	0.0836	0.0673	0.0519	0.0065
Tearing up	0.0436	0.0023	0.0141	0.0117	.....	0.0682	.....	0.0101	0.0034	0.0955	0.0059	0.0777	0.0003	0.1461	0.1085	0.0668	0.0456	0.0532	0.0871	0.1477
Watching	0.3595	0.1033	0.1142	0.2482	0.2190	0.0858	0.1577	0.1112	0.0546	0.1236	0.0436	0.2407	0.0464	0.0807	0.1362	0.1224	0.1362	0.0892	0.1271	0.2377
Welding	0.0128	0.0076	0.0094	.....	.....	0.0080	.....	0.0088	0.0083	0.0077	0.0073	.....	0.0003	0.0085	0.0108	0.0072	0.0098	0.0078	0.0097	0.0136
Work train operation	0.0170	0.0178	0.0160	0.0098	0.0590	0.0140	0.0010	0.1346	0.0676	0.0161	0.0382	0.0380	0.0964	0.0156	0.0814	0.0366	0.0562	0.0210	0.0260	0.0136
Resetting curb	.....	.....	.....	.....	.....	.....	.....	0.0104	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...	
Puddling	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0164	.....	.....	.....	.....	.....	.....	.....	.....	
Total	1.3894	0.9401	0.8474	1.1281	1.6498	0.9073	0.6327	1.0326	1.0569	1.2482	0.7220	1.3775	1.5701	2.1719	1.1564	0.9607	1.0781	0.9459	1.0464	1.1160
PAVING MATERIAL																				
Block, dressed Medina	.....	.....	.....	.....	.....	.....	.....	0.0042	.....	0.0314	.....	.....	.....	.....	.....	.....	.....	.....		..
Block, redressed Medina	0.7907	.....	.....	0.8000	.....	0.1319	.....	0.0499	0.0154	0.1639	.....	.....	0.0124	0.5784	.....	.....	0.1266	0.0186	.....	.
Block, old Medina	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.9169	.....	.....		.....	.....	.....	.....	.
Brick, new	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		.....	.....	.....	0.0062					
Cement	0.1138	0.1871	0.1836	0.1373	0.6467	0.2223	0.0551	0.2242	0.2032	0.2148	0.1675	0.1462	0.0003	0.0988	0.0617	0.2237	0.1945	0.1784	0.1647	0.1510
Granite block	0.8590	1.5828	0.8600	.....	.....	0.8923	0.7997	1.0332	0.8402	0.9776	0.8958	.....	0.0091	0.8367	0.8673	0.9266	0.7775	0.8376	0.8543	0.8350
Granite, nosed	0.5818	0.5849	0.5754	.....	.....	0.5875	0.5701	0.6478	0.5731	0.5831	0.6118	.....	0.0035	0.5559	0.5862	0.5874	0.5824	0.5837	0.5845	0.5730
Granite, crushed	.....	0.1019	0.0052	.....	0.4476	0.1034	.....	0.0423	0.1500	0.1380	0.0650	0.1036	0.0189	.....	0.1521	0.1316	0.0916	0.0781	0.0111	.
Gravel	.....	.....	0.0732	0.0605	.....	.....	.....	.....	.....	0.0243	0.0229	0.0557	.....	.....	.....	0.0313	0.0124	0.0118	0.0167	..
Hardener for concrete	.....	0.0193	.....	.....	.....	.....	.....	0.0274	0.0206	.....	0.0216	.....	.....	.....	.....	.....	.....	.....	.....	
Sand lake	0.0192	0.0095	0.0159	0.0029	0.0005	0.0098	0.0076	0.0111	0.0138	0.0102	0.0113	0.0015	.....	0.0233	0.0273	0.0073	0.0079	0.0105	0.0075	0.0096
Sand cushion	0.0708	0.0636	0.0903	0.1102	0.0591	0.0832	0.0186	0.0737	0.0388	0.0861	0.0505	0.1072	0.0041	0.0817	0.0224	0.0673	0.0742	0.0528	0.0445	0.0424
Tar	0.1486	0.0289	0.0926	0.1136	.....	0.0167	.....	0.1053	.....	.....	.....	0.1628	.....	0.3456	.....	.....	0.0129	.....	0.2375	0.0310
Asphalt	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	...
Total	2.5839	2.5780	1.8962	1.2245	1.1539	2.0471	1.4511	2.2191	1.8551	2.2294	1.8464	1.4939	0.0483	2.5204	1.7232	1.9752	1.8800	1.7715	1.9208	1.6420
PAVING LABOR																				
Cleaning old material	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Grouting	0.0667	0.0355	0.0691	0.0769	0.0063	0.0393	0.1084	0.0584	0.0553	0.0505	0.0585	0.0213	0.0023	0.1119	0.0316	0.0526	0.0331	0.0358	0.0920	0.0775
Handling new material	0.2229	0.0433	0.1624	0.0953	0.0931	0.0396	0.0284	0.0516	0.0571	0.035[illegible]	0.0299	0.1047	0.0028	0.0598	0.0359	0.0204	0.1293	0.0276	0.0332	7 0276
Laying	0.1782	0.1051	0.2460	0.2270	0.0907	0.1489	0.1168	0.1943	0.1934	0.2557	0.1002	0.1309	0.0095	0.1512	0.0765	0.2238	0.1157	0.1482	0.4015	0.2832
Loading	0.0643	0.0003	0.0429	.....	.....	0.0298	.....	0.0267	0.0072	0.0301	0.0614	0.0152	0.0012	.....	0.0109	0.0477	0.0295	0.0278	0.0050	
Plowing	0.0025	.....			.....	0.0031		.....	.....	.....	.....	.....	.....	.....	.....	0.0041	0.0024	0.0036	0.0051	
Throwing on side	0.0531	0.0382	0.0544	0.0746		0.0500	0.0374	0.0830	0.0538	0.0078	0.0435	0.1148	0.0035	0.1591	0.0048	0.0733	0.0781	0.0632	0.1885	0.1555
Work train operation	0.0091	0.0089	0.0018	0.0005	0.0295	0.0070	0.0015	0.0673	0.0337	0.0091	0.0191	0.0195	0.0482	0.0078	0.0407	0.0183	0.0281	0.0105	0.0015	0.0058
Total	0.5968	0.2313	0.5766	0.4743	0.2196	0.3177	0.2925	0.4813	0.4005	0.3888	0.3126	0.4064	0.0675	0.4898	0.2004	0.4402	0.4162	0.3167	0.7268	0.5506
REPAVING MATERIAL																				
Medina block, redressed	0.3813	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Cement				.....	0.0392	0.0015	.....	0.0139	0.0047	.....	0.0014	0.0140	.....	.....	.....	0.0290	.....	0.0159	.....	0.0588
Sand, lake				.....	0.0123	0.0001	.....	0.0035	0.0004	.....	0.0001	0.0015	.....	.....	.....	0.0039	.....	0.0053	.....	0.0075
Sand, cushion				.....	0.0109		.....	0.0321		.....	0.0056	0.0089	.....	.....	.....	.....	.....	0.0056	.....	
Asphalt				.....	.....	0.3203	.....	.....	0.0373	.....	0.0993	.....						.....		.....
Granite block				.....	.....	0.1172	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		.....	
Tar				.....		.....	.....	.....	.....	0.0421	0.0902	.....	.....	.....	.....		.....	0.0246	.....	
Brick				.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.1198	.....	0.0996	.....	0.1090
Total	0.3813	.....			0.0624	0.4391		0.0495	0.0424	0.0421	0.1966	0.0244	.....	.....	.....	0.1567	.....	0.1510		0.1753
REPAVING LABOR																				
Laying		.....	0.1001	0.1749	0.1267	0.0267	.....	0.1466	0.0134	0.0102	0.0631	0.2485		0.1261	.....	0.1024	0.0145	0.1230	.....	0.1685
Cleaning old material		.....	.....	.....	0.0021	.....	.....	.....	0.0948	0.0024	0.0550	0.1109	0.0003	.....	.....	0.0049	.....	0.0017		..
Total			0.1001	0.1749	0.1288	0.0267	.....	0.1466	0.1082	0.0126	0.1181	0.3594	0.0003	0.1261	.....	0.1073	0.0145	0.1247		0.1685
Grand Total	7.1307	6.1195	5.6972	3.9073	4.5280	6.2953	2.9962	6.4910	5.9573	6.4610	5.6410	4.9271	4.0216	7.6529	5.5927	6.1977	5.7840	5.7489	6.0125	5.6641
Feet of single track	995.1	6,314.8	1,502.7	1,459.3	1,795.1	3,237.1	658.6	5,996.6	12,690.1	3,209.1	9651.7	5,111.2	12,787.5	501.2	2,006.0	3,525.6	4,915.2	16,955.8	941.9	832.5
Work order numbers	1585	1599	1589	1618	1538	1534	1028	1572	1616	1566	1587	1533	1558	1607	1610	1531	1532	1528	1565	1541
	1	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

Divided According to Jobs (Prices in Dollars)

23	24	25	26	27	28	29	30	31	32	33
TRACK MATERIAL										
0.0259	0.0106	.....	.....	.....	0.0051	.....	.....	.....	.....	.....
.....	.....	0.0006	0.0001	.....	.....	0.0007	.....	.....	.....	.....
0.3047	0.0005	0.1716	0.3012	0.2295	0.3722	0.2555	0.3976	0.4700	0.2835	0.2827
.....	0.0216	.....	0.0013	0.0189	0.0054	0.0029	0.0032	0.0053	0.0055	0.0023
.....	.....	0.0483	0.0527	.....	0.0217	0.0497	0.0425	0.0550	0.0536	0.0403
0.1491	0.0418	.....	0.0039	0.2014	0.2413	0.0082	0.0491	.....	.....	0.0335
.....	.....		0.0224	.....	0.0144	0.0365	0.0341	.....	0.0553	0.0380
0.1282	0.0006	0.1994	0.2927	0.1199	0.2628	0.2771	0.3326	0.5289	0.2721	0.3543
.....	.....	0.0041	0.0005	.....	.....	0.0048	.....	.....	.....	.....
.....	.....	.....	0.0001	.....	.....	.....	.....	.....	.....	.....
.....	.....	0.0027	0.0033	0.0028	0.0025	0.0032	0.0044	.....	0.0031	0.0035
.....	.....	0.0002	0.0003	0.0002	0.0003	0.0003	0.0004	.....	0.0003	0.0003
.....	.....	1.1196	1.1183	1.1191	1.1178	1.1180	1.1180	1.1181	1.1181	1.1180
1.6970	.....	.....	.....	.....	0.0369	.....	0.0368	.....	.....	.....
.....	0.7012	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	0.0163	0.0195	0.0168	0.0171	0.0205	0.0119	.....	0.0157	0.0194
.....	.....	0.0793	0.0677	0.0561	0.0511	0.0686	0.0684	0.0636	0.0663	0.0556
0.0756	.....	.....	.....	.....	.....	.....	0.0016	.....	.....	.....
.....	0.0729	.....	.....	.....	.....	.....	.....	.....	.....	.....
0.0309	.....	0.0231	0.0004	0.0722	0.0091	0.0021	0.0109	.....	0.0005	0.0034
.....	.....	.....	0.0220	0.0220	0.0200	0.0247	0.0322	0.0320	0.0440	0.0205
.....	0.0383	.....	.....	.....	.....	.....	.....	.....	.....	.....
0.0157	0.0204	.....	0.0006	0.0217	0.0151	0.0006	0.0022	.....	.....	0.0023
.....	.....	0.0461	0.0568	0.0473	0.0502	0.0542	0.0811	.....	0.0539	0.0579
0.0408	0.0001	0.0490	0.0490	0.0490	0.0500	0.0513	0.0500	0.0537	0.0490	0.0490
.....	.....	0.2782	0.3028	.....	0.1251	0.2871	0.2973	0.3174	0.3008	0.2249
.....	.....	0.1168	0.1347	.....	0.0555	0.1264	0.1349	0.1456	0.1368	0.1052
0.3723	0.3691	0.0555	0.0096	0.3966	0.3129	0.0235	.....	.....	0.0009	0.0419
0.1189	.....	0.0299	0.0014	0.0771	0.0356	0.0044	0.0042	.....	.....	0.0021
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2.9591	1.2770	2.2407	2.4618	2.4506	2.8221	2.4203	2.7134	2.7896	2.4594	2.4551
TRACK LABOR										
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....		0.0019	.....	.....	.....	.....	.....	.....	.....
0.1094	.....	0.1415	0.0214	0.0515	0.0922	0.1152	0.0629	.....	0.0415	0.0341
0.0367	0.0016	0.3525	0.1008	0.2122	0.1498	0.1005	0.1278	0.1299	0.0763	0.0921
0.0205	.....	0.0025	0.0025	.....	0.0077	0.0058	.....	.....	.....	0.0010
.....	.....	.....	0.0015	.....	.....	0.0028	.....	.....	.....	.....
0.1002	0.2448	0.2616	0.0947	0.5380	0.5047	0.2262	0.3064	0.3128	0.2396	0.3192
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	0.1048	0.0647	0.0468	0.1983	0.1064	0.1206	0.1064	.....	0.1085	0.0264
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	0.0155	0.0530	0.0405	0.0411	0.0581	0.0822	0.0419	0.0168
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0.1243	0.0761	0.2564	0.0693	0.1323	0.1859	0.0474	0.0951	0.0457	0.0353	0.0771
.....	.....	0.0036	0.0241	.....	0.0072	0.0074	.....	.....	.....	0.0007
0.0197	.....	.....	0.0356	.....	.....	0.0413	0.1776	0.0138	0.0036	0.1036
0.0162	.....	.....	0.0038	.....	0.0051	0.0174	0.0044	.....	0.0081	0.0086
.....	.....	0.0087	0.0075	0.0074	0.0095	0.0131	0.0052	.....	0.0066	0.0091
.....	.....	.....	0.0072	.....	0.0040	0.0098	0.0057	.....	0.0109	.....
0.1005	0.1068	0.1861	0.0696	0.1841	0.1468	0.1497	0.1599	0.1463	0.0768	0.0961
0.0921	0.0286	0.0794	0.0205	0.0934	0.0829	0.0431	0.0664	0.0314	0.0212	0.0691
.....	0.0014	0.0258	0.0735	0.1556	.....	0.1041	0.0024	0.0050	0.0081	0.0096
0.1070	.....	0.0294	0.0568	0.1170	.....	0.0969	0.0075	.....	.....	0.0051
0.0015	0.0332	0.3958	0.0613	0.1311	0.1090	0.1652	0.2035	0.0437	0.0787	0.0933
.....	.....	0.0058	0.0082	0.0091	0.0158	0.0118	0.0143	.....	0.0104	0.0078
0.0051	0.0042	0.0052	0.0462	0.0063	0.0615	0.0152	0.0416	0.0051	0.0014	0.0042
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0.7332	0.6015	1.8190	0.7687	1.8893	1.5290	1.2946	1.4472	0.8151	0.7689	0.9739
PAVING MATERIAL										
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	0.3471	.....	0.5222	0.1641	0.0482	.....	.....	0.7781	0.1957
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	0.2399	.....	.....
0.0664	0.0008	0.3433	0 0836	0.0131	0.2024	0.2667	0.2154	0.1300	0.1376	0.1563
0.8687	.....	.....	0.7983	.....	0.8911	0.7778	0.8620	0.8619	0.8502	0.9859
0.6302	.....	0.0088	0.5674	0.6069	0.5809	0.4149	0.5717	0.5716	0.5723	0.5809
.....	.....	0.5473	.....	.....	0.1682	0.1974	0.1962	.....	.....	0.0742
.....	.....	0.0267	0.0059	.....	0.0409	0.0036	0.0106	.....	0.0037	0.0137
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0108
.....	0.0001	.....	0.0071	.....	0.0082	0.0080	0.0050	0.0200	0.0135	0.0139
.....	0.0006	0.0460	0.0281	0.0302	0.0911	0.0612	0.1184	.....	0.0474	0.0668
0.3271	.....	0.0944	.....	.....	0.1232	0.0122	.....	.....	.....	0.0314
.....	.....	.....	.....	.....	.....	0.0844	.....	.....	.....	.....
1.8924	0.0015	1.4136	1.4904	1.1724	2.2701	1.8744	1.9793	1.8234	2.4028	2.0796
PAVING LABOR										
0.1038	0.0004	.....	0.0339	0.1033	0.0416	0.0391	0.0484	.....	0.0467	0.0696
.....	.....	.....	0.0238	0.0712	0.0115	0.1511	0.0645	.....	0.1667	0.0540
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0.1348	0.0009	0.1051	0.1238	0.1777	0.0384	0.1483	0.2039	0.5002	0.1286	0.1804
.....	.....	0.1042	0.0321	0.0289	0.0739	0.0333	.....	.....	0.0451	0.0276
.....	.....	0.0361	0.0022	.....	.....	0.0018	.....	.....	.....	0.0014
0.2221	.....	0.1882	0.0542	0.0289	0.0729	0.0403	0.1523	.....	0.1109	0.0223
0.0021	0.0021	0.0009	0.0462	0.0021	0.0031	0.0076	0.0092	0.0016	0.0004	0.0021
0.4628	0.0034	0.4345	0.3162	0.4121	0.2414	0.4215	0.4783	0.5018	0.4984	0.3654
REPAVING MATERIAL										
.....	.....	.....	.....	.....		.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	0.0157	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	0.0074	.....	.....	.....	.....	.....
.....	.....	0.0944	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	0.4392	.....	.....	0.4982	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	0.0029	.....
.....	.....	.....	.....	.....	0.0383	.....	.....	.....	.....	0.0388
.....	.....	0.0944	.....	.....	0.0614	0.4392	.....	.....	0.5011	0.0388
REPAVING LABOR										
0.0721	.....	0.0881	0.0026	.....	0.2571	.....	0.2943	.....	.....	0.0474
.....	.....	.....	.....	.....	0.0572	0.0109	.....	.....	.....	0.0042
0.0721	.....	0.0881	0.0026	.....	0.3143	0.0109	0.2943	.....	.....	0.0516
6.1196	1.8834	6.0903	5.0392	5.9244	7.2383	6.4609	6.9125	5.9299	6.6306	5.9644
184.7	15,419.4	367.0	7,986.5	570.5	1,543.9	2,464.8	2,663.3	1,176.9	2,445.1	5,170.8
1,614	1,559	1,573	1,542	1,625	1,550	1,549	1,557	1,545	1,583	1,598
23	24	25	26	27	28	29	30	31	32	33

on page 73 of the ELECTRIC RAILWAY JOURNAL of July 10, 1915. The concrete in the foundations and pavement was mixed with a Koehring mixer especially adapted for street-railway work. Whenever it was necessary to remove old track, the rails were cut in two with an oxy-acetylene cutting torch and loaded upon flat cars with a Brown Hoisting Machinery Company's derrick. All material, including the gravel and the paving block, was delivered to the different jobs in trains consisting of three 75-ton automatic dump cars.

In order to give the proper interpretation to the unit costs some explanation of the differences in the prices per foot for the various jobs is necessary. The complete unit cost data is shown in the accompanying tabulation. From this it will be noted that the costs are classified under headings including track material, track labor, paving material, paving labor, repaving material, repaving labor. Each of these classifications contains a detailed distribution of the various cost items, and the results obtained for each of the thirty-one track-construction jobs are recorded in the proper columns.

CHARACTERISTICS OF DIFFERENT JOBS

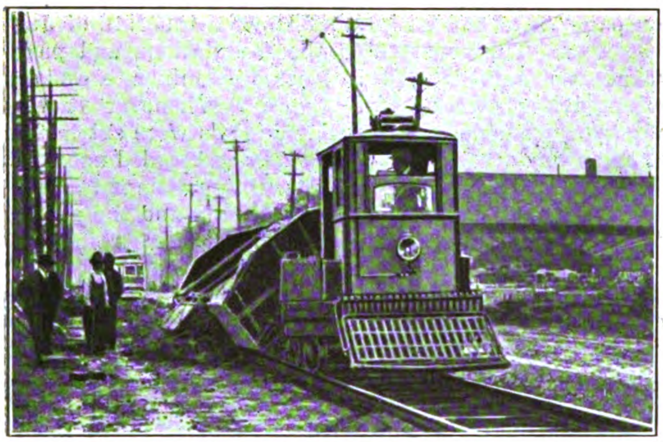
The data appearing in the table under job No. 1 applied to a stretch of single track laid in a double-track street, and this necessitated paving the old devil strip and laying a tile drain beneath the new track. In Job No. 3 the original surface of the street had been left high by a contractor, and the increase in cost was due to the unusual amount of excavation required. This piece of track was an extension of a double-track line through a dirt street. The low cost of Job No. 5 is due to the fact that it consisted mainly of resurfacing. Job No. 4 consisted of a single track laid beside the track that is included in Job No. 5. In connection with Job No. 6 it will be noted that the unit cost for watching is high, this being due to the fact that the work had to be kept open for eight months. In this job the track was taken up to permit the installation of a sewer and then was relaid and repaved with dressed Medina block.

The cost of track construction in the heart of the Cleveland business district, where traffic is heavy, is shown to be relatively high by the unit costs under Job No. 8. This work consisted of double track with the company's standard form of paving between the rails and in the devil strip, but with sheet asphalt on the sides of the street. The total cost of Job No. 9 is low because it included merely resurfacing and paving some track that had been laid over a sewer.

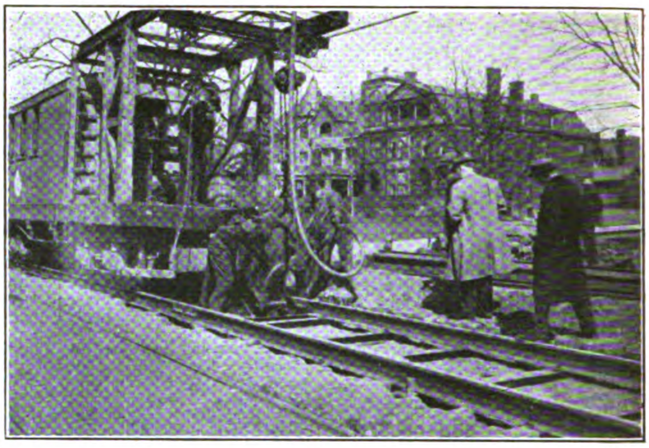
Frequently the city arranges with the Cleveland Railway's track construction forces to pave the entire street at the same time when the track is paved. This was the case in Job No. 10, where a new extension was laid through a brick paved street, the track forces repaving the sides of the street from the track to the curbs. When work of this kind is undertaken by the Cleveland Railway a careful distribution of cost is kept, and to this is added the other proper items of expense, including overhead, for the purpose of billing the city.

Job No. 11 was a double-track extension built for at least two-thirds of the length of an unpaved street. Job No. 12 included laying a double track in a street paved with macadam. The new track work was repaved with granite between the rails and in the devil strip.

The unit costs in Job No. 13 are high because this work, which included an extension in a street paved with Medina block, was delayed six weeks awaiting sewer connections. Job No. 14 was largely rehabilitation work in which the old track was resurfaced and provided with new ties. The joints were repaired and ground, and a 6-in. drain tile was laid beneath the devil strip. Eighty-pound, A. S. C. E. rail laid on wooden



CLEVELAND TRACK COSTS—AUTOMATIC DUMP CAR IN TILTED POSITION



CLEVELAND TRACK COSTS—PNEUMATIC RIVETER INSTALLING A CLARK JOINT

ties with 12 in. of crushed stone ballast was the type of construction used in connection with Job No. 15, the cost of excavation being relatively high because this track was built on a private right-of-way where the grading consisted of cuts and fills. The total cost of Job No. 16 is comparatively high because it involved little more than 500 ft. of track and it was necessary to do all the work during the night. In Job No. 17 all the excavation was done with a Thew automatic shovel, and the street, in some places, was lowered as much as 3 ft. In connection with this particular job a credit of 13 cents per foot should be deducted for excavating outside of the track allowance, which should have been done by the contractor.

Tracks formerly paved with brick were repaved with granite and the sides of the street were paved with brick in Job No. 18. This, of course, included the necessary material and labor for tearing up and rebuilding the new pavement. In Job No. 19 an old track paved with Medina stone was replaced with new track paved with granite block, and a drain tile was laid beneath the devil strip. The special features of Job No. 20 are the same as those for Job No. 18, namely, that a track originally paved with brick was repaved with granite block. Job No. 21 included a single track laid in a double-track street. In this job a drain was also provided, and it was necessary to pave the full width of the devil strip with granite concrete. Job No. 22 is the same as Job No. 19. The high cost of Job No. 23 is due to the fact that it was only 185 ft. long and all the work had to be done at night.

An especially low unit cost per foot is recorded against Job No. 24. It consisted of 80-lb. A. S. C. E. rail laid on oak ties spaced at 24-in. centers. The excavating is one of the largest single cost items, and it consisted of digging a trench in a dirt road beside a brick pavement. The ties were tamped with cinders and a space 4 ft. wide outside of the rail was filled with crushed stone and slag. The labor cost in Job No. 25 is high because the work was done in the congested business district where one track was laid in a double-track street. This work also included repaving the devil strip and placing a drain beneath it.

Job No. 26 included the removal of a temporary track and relaying new track over a sewer. In this instance the devil strip was paved by the city and the tracks were paved by the railway company which was afterwards reimbursed by the city. The track construction in Job No. 27 differed from the standard in that the rails were laid on wooden ties with 7 in. of crushed stone grouted beneath them. The old pavement was replaced with redressed Medina block and a tar filler. Job No. 28 was laid through an unpaved street which made the cost of excavation relatively high.

Job No. 29 differed from the standard in that a double track was laid in a street with a sheet asphalt pavement between the track and the curb. The pavement in one track was entirely of granite block and that in the other track included three different types of pavements laid for experimental purposes. One-third of this track was paved with granite block, one-third with asphalt block and the remaining one-third with granite concrete. Standard track construction was adopted for Job No. 30, which consisted of a new extension through a brick-paved street. In Job No. 32 a single track was laid beside one already in place to form a double track. This work included laying the drain tile and paving the devil strip. Job No. 33 was the same as Job No. 3.

CLEVELAND TRACK COSTS—PAVEMENT ROOTER IN OPERATION

CLEVELAND TRACK COSTS—SURFACING JOINTS WITH GRINDER

Wisconsin Association Meets

New Utility Legislation and Regulation of Security Issues Are Topics Which Were Discussed at Opening Session

NEW utility legislation and commission regulation of utility security issues were the two most important topics discussed at the opening session of the eighth annual convention of the Wisconsin Electrical Association, held in Milwaukee on March 16 and 17. More than 130 railway and supply men attended. President M. C. Ewing, manager Wisconsin Valley Electric Company, Wausau, Wis., presided. His annual address was referred to a committee for recommendations. The report of George Allison, secretary-treasurer, showed that the total receipts during the year were $5,113, with expenditures of $4,518, leaving a balance of $595. This report was referred to an auditing committee, which was also requested to report on the question of paying the secretary a salary.

J. B. Sanborn, whose address will appear in a later issue, then reviewed the State legislation during the last session. Answering an inquiry from F. W. Walker, general manager Milwaukee Northern Railway, Mr. Sanborn stated that in his opinion the law regulating jitneys did not apply to those competing with interurban railways. He did believe, however, that the laws of the various cities through which this class of jitneys operated, governed them. He felt that if the law applied only to jitney competition with street railways, it should be amended to protect all electric railways. President Ewing called attention to the provisions of one of the new laws which made it necessary for a contractor to obtain a permit and pay the cost of disturbing the property of a utility, while the city had the right to disturb any and all utility property without permission or reimbursement of the utility for the extra expense incurred.

Harold L. Geisse, secretary Railroad Commission of Wisconsin, then discussed the attitude of this commission on security issues. F. W. Walker, Milwaukee Northern Railway, opened the discussion by inquiring about the right of utilities to defer dividends and divert them into betterments and later make up for them from the proceeds of securities issued on these betterments. Mr. Geisse believed that this practice was within the law. Mr. Walker then said that he did not believe the present method of regulating security issues by commissions was just, for it allowed only a 75 per cent bond issue, and the remainder of the funds to pay for a property must be secured from stock issues. He believed that in view of the commission's authority to pass on security issues it should insist that the security-issuance value be the rate-making value. Mr. Walker also believed that, although the day of exploitation had passed in Wisconsin because no profit was allowed for exploiting purposes, exploitation was highly desirable in developing any business. Since the commission had no power to reimburse the failures, it should not limit the profit of the successes. The policy of the commission and the State should be to stimulate the extension of electric railways and power lines, to regulate them like banks and not limit their net earnings to 6½ per cent.

In rebuttal Mr. Geisse said that while security issues might form a rate-making basis in some cases, they would not in all, as in the case of competitive local utilities which later consolidated and reissued securities. The policy of the commission in regulating security issues had not retarded electric railway extensions. In fact, three companies authorized to issue securities for construction could not sell them to the public. Mr. Geisse believing that electric railway development had ceased because the operating ratio had increased through higher labor and material costs.

T. E. Lyons, member Wisconsin Tax Commission, closed the program for Thursday with an address explaining the tax methods in Wisconsin and the reasons why taxes have increased annually. On Thursday evening the annual banquet of the Electric Association and the Wisconsin Gas Association was held. L. J. Beauchamp, a famous Chautauqua lecturer, was the principal speaker.

Electrolytic Corrosion with Infrequently Reversed and Alternating Currents

Experts from the Bureau of Standards Present the Results of Investigations Showing the Electrolytic Corrosion Produced by Currents Reversed at Intervals of Different Lengths

AT a joint meeting of the American Institute of Electrical Engineers and the New York Section of the American Electrochemical Society held in New York on March 10, Burton McCollum and G. H. Ahlborn, of the National Bureau of Standards, presented a paper dealing with the subject of alternating current electrolysis. The researches covered by the paper included alternating currents of long period, such as are very common on portions of underground pipe systems of practically every city, due to the continual shifting of railway loads which causes the pipes within the large area, commonly called the neutral zone, to continually change their polarity with respect to the earth. The authors point out that alternation of current occurs not only in the ordinary negative systems of railways, but also to a greater extent and in a much larger territory in the case of negative return systems in which insulated negative feeders are used. In the latter case the potential differences between pipes and tracks can be greatly reduced, but this is accompanied by large increases in the area of the so-called neutral zone in which the polarity of the pipes is continually changing from positive to negative. With such types of three-wire systems which are now being seriously considered in some places for the prevention of electrolysis, there will also be large areas in which the polarity of the pipes will fluctuate between small positive and negative values. It has also been proposed that with the usual type of return the trolley be made alternately positive and negative on succeeding days in a week. In view of all these conditions, the authors have considered it to be of great practical importance to determine the extent to which the periodically reversed currents of these long periods will produce corrosion on subsurface metallic structures.

From the electric railway standpoint, the most important conclusions reached by the authors, after very elaborate tests, were as follows:

The coefficient of corrosion of lead, under the soil conditions described by the authors, when subjected to the action of direct current, was found to be only about 25 per cent of the theoretical value. This indicates that under the conditions of these tests, and probably under most soil conditions, the corrosion of lead is very considerably less than it was formerly considered to be.

The corrosion of lead reaches practically the maximum value with a frequency of reversal lying between one day and one week, while the corrosion of iron does not reach the maximum value until the period of the cycle is considerably in excess of two weeks.

In the so-called neutral zone of street railway networks where the pipes continually reverse in polarity, the damage is much less than would be expected from a consideration of the arithmetical average of the current discharged from the pipes into the earth. Where pipes are alternately positive and negative with periods not exceeding ten or fifteen minutes, the algebraic sum of the current discharged is more nearly a correct index of the total damage that will result than any other figure that can readily be obtained.

The reduction in corrosion due to periodically reversed currents appears to be due to the fact that the corrosive process is in a large degree reversible, so that the metal corroded during the half cycle when current is being discharged is in a large measure redeposited during the succeeding half cycle when the current flows toward the metal. This redeposited metal may not be of much value mechanically, but it serves as an anode surface during the next succeeding half cycle, and thus protects the uncorroded metal beneath.

Reducing Insurance Rates on Unsprinklered Property

Removal of Refuse and Waste Material and Installation of Fire-Fighting Apparatus Effect a 40 Per Cent Reduction in the Insurance Rate

AN intended increase in fire insurance rates was turned into a 36 per cent decrease by the Columbus Railway, Power & Light Company, Columbus, Ohio, by expending $10,000 in cleaning up the property. A rate of 75 cents per $100 of insurable property had been charged, and the warning that the rate was about to be increased caused the management to request the assistance of the Ohio Inspection Bureau to ascertain what could be done not only to maintain the existing rate but to obtain a substantial reduction. After a thorough examination of the property, a plan for reducing fire hazards was outlined which the company followed to the letter. All refuse and combustible waste material were removed, standard hose equipments, hydrants, fire extinguishers, fire and sand buckets were installed, and fire doors and walls were provided in several buildings. Wire glass was substituted for the ordinary glass in the skylights, and it was also necessary to rewire a number of the carhouses to meet the requirements of the Underwriters' code.

Aside from the changes in the buildings, metal lockers for the employees' clothing were provided in the various carhouses and shops, and a fireproof garage was built for the company's automobiles. Rigid instructions were issued to those in charge that the company's buildings must be kept clean at all times. In order to insure this result the management arranged for four surprise inspections a year. In addition a fire inspector examines the property for defects each month. A Western Union fire alarm system was also installed in the different buildings, and a watchman's service requiring daily reports was also provided. The effect of these changes was to reduce the rate from 75 cents to 46 cents per $100 of insurable property. This plan of reducing fire hazards, rather than protecting them by installing a sprinkler system, was adopted because some of the company's property was so old that such a system would have to be scrapped in a short time. On the other hand, the company contemplated rebuilding a number of these structures in the near future, at which time a complete sprinkler system will be installed and a further reduction in the rate will be requested.

An application has been made by a mining company in Spain to construct and operate a narrow-gage electric railway between Conquidor and Tuertollano.

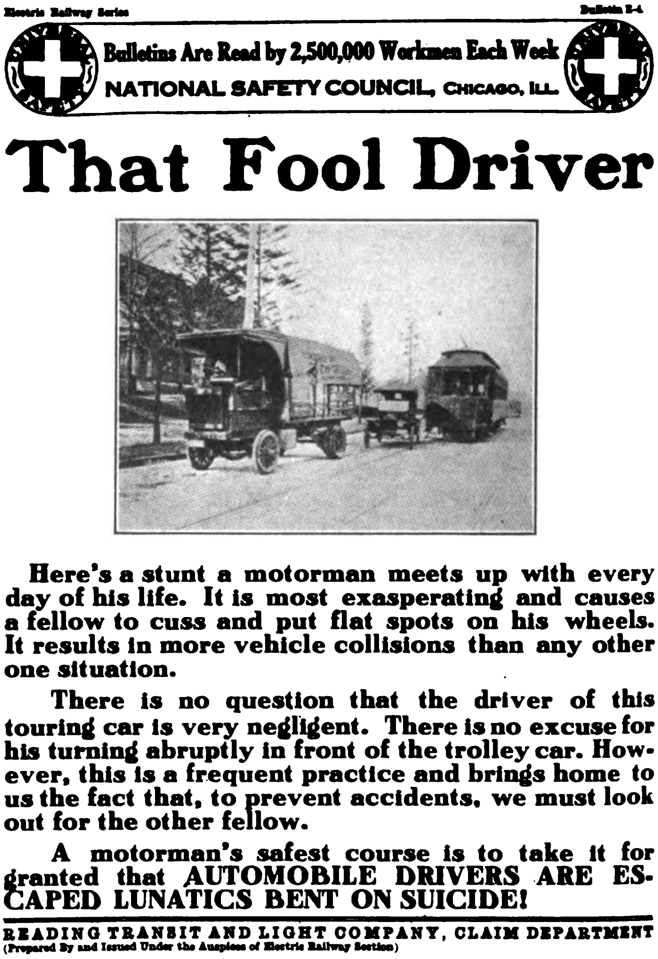
Electric Railway Section of National Safety Council

New Section Has Grown from Thirty-five to Sixty Members—Distribution of Bulletins and Other Safety Matter to Member Companies

THE membership of the electric railway section of the National Safety Council has now grown from thirty-five members, when the section was organized last October, to about sixty members, and reports from the membership campaign indicate a further substantial increase in the near future. The new membership is well distributed throughout the country and includes such companies as the Bay State Street Railway of Boston and the Pittsburgh Railways.

The electric railway section has begun a weekly distribution to its members of special bulletins dealing with the particular hazards of the electric railway industry in addition to the regular bulletins which have been an important feature of the work of the council. In addition to these bulletins a number of special distributions have been made to electric railway members, such as the 1916 safety calendar of the Brooklyn Rapid Transit Company, safety blotters distributed by the Chicago & Joliet Electric Railway, and copies of advertisements developed by the Beaver Valley Traction Company in a campaign to enlist the co-operation of the public.

The special weekly bulletins of the electric railway section deal with particular operating hazards such as those involved in car collisions, car and vehicle collisions, boarding and alighting accidents and cars striking persons. One appears below:



Electric Railway Series

Bulletin E-4

Bulletins Are Read by 2,500,000 Workmen Each Week

NATIONAL SAFETY COUNCIL, CHICAGO, ILL.

That Fool Driver

Here's a stunt a motorman meets up with every day of his life. It is most exasperating and causes a fellow to cuss and put flat spots on his wheels. It results in more vehicle collisions than any other one situation.

There is no question that the driver of this touring car is very negligent. There is no excuse for his turning abruptly in front of the trolley car. However, this is a frequent practice and brings home to us the fact that, to prevent accidents, we must look out for the other fellow.

A motorman's safest course is to take it for granted that AUTOMOBILE DRIVERS ARE ESCAPED LUNATICS BENT ON SUICIDE!

READING TRANSIT AND LIGHT COMPANY, CLAIM DEPARTMENT
(Prepared By and Issued Under the Auspices of Electric Railway Section)

SAMPLE POSTER FORMING PART OF THE RECENTLY INAUGURATED SPECIAL ELECTRIC RAILWAY SERVICE OF THE NATIONAL SAFETY COUNCIL

American Association News

Manufacturers' Association Executive Committee Outlines to Membership Important Changes in Organization—American Association Holds Important Meeting in New York—Public Relations Committee Formulates Tangible Publicity Plans

Letter Issued by Manufacturers' Association

A brief account was published in the last issue of this paper of the meeting of the executive committee of the Manufacturers' Association, which was held in New York on March 8 and 9. The most important action taken at that meeting was to decide about the future activities of the association in view of the amendments to the constitution of the American Electric Railway Association passed in Chicago admitting manufacturers to company memberships in that association. In addition to the members of the executive committee of the Manufacturers' Association who were in attendance at the meeting, Charles L. Henry and James H. McGraw were present by invitation, and urged the manufacturing companies to join the American Association as company members.

As a result of the meeting, it was decided that the executive committee should send an official letter to all of its members, giving the text of the amendments adopted at Chicago, and stating that the exhibits and convention arrangements at the 1916 convention would be handled directly by the American Association, that the present offices would be given up on May 1, and that the usual yearly dues would not be collected. Finally, it was decided to urge the members of the Manufacturers' Association to become company members of the American Electric Railway Association.

The letter, which is being mailed to all members of the Manufacturers' Association the latter part of this week, follows:

LETTER ISSUED BY MANUFACTURERS' ASSOCIATION

"*To All Members:*

"At the mid-winter meeting of the American Electric Railway Association held in Chicago on Feb. 4, the parent association issued an invitation to companies, firms or individuals engaged in the business of manufacturing or selling apparatus, equipment or supplies used in electric railway operation to join and become members of the American Electric Railway Association, and the constitution and by-laws of that association were amended to read as follows:

"III. The membership of this Association shall consist of the following classes:

"(a) Company members, consisting of American urban and interurban railway companies, or lessees, or individual owners of urban and interurban railways, or steam railways having electrified sections, and of companies, firms or individuals engaged in the business of manufacturing or selling material for electric railways or otherwise, subject to the approval of the executive committee, intimately related to electric railway operations. Each member company shall be entitled to one vote, which shall be cast by the properly accredited delegate.

"XIV. Company members shall pay an admission fee of Ten Dollars ($10.00) and annual dues payable in advance based on gross earnings from electric railway operation, or from the business of manufacturing or selling material for electric railways or from other electric railway operations during the preceding fiscal year of the respective members as follows:

"In the case of American urban and interurban railway companies, or lessees, or individual owners of urban or interurban railways, or steam railways having electrified sections.

Gross Receipts	Annual Dues
Under $50,000	$25
Between 50,000 and $100,000	50
Between 100,000 and 250,000	75
Between 250,000 and 500,000	125
Between 500,000 and 1,000,000	175
Between 1,000,000 and 2,000,000	225
Between 2,000,000 and 3,000,000	275
Between 3,000,000 and 4,000,000	325
Between 4,000,000 and 5,000,000	375
Between 5,000,000 and 6,000,000	425
Between 6,000,000 and 7,000,000	475
Between 7,000,000 and 8,000,000	525
Between 8,000,000 and 9,000,000	575
Between 9,000,000 and 10,000,000	650
Between 10,000,000 and over	750
In the case of all others:	
Under $50,000	$25
Between 50,000 and $1,000,000	125
Between 1,000,000 and 6,000,000	325
Between 6,000,000 and 10,000,000	525
Over 10,000,000	750

"The executive committee shall provide the form in which the return requisite to the computation of dues shall be made.

"A very complete explanation of the proposed plan was made by Charles L. Henry, president of the parent association, in an article appearing on page 317 of the Feb. 12 issue of the ELECTRIC RAILWAY JOURNAL.

"Discussion of the foregoing amendments before their adoption indicated that the parent association intended in no way to interfere with the activities of our association as it exists. At that time it was thought best by President Henry that the Manufacturers' Association should continue to perform the functions for the 1916 convention as heretofore, and we were so notified, but after further consideration of the subject we were informed on March 8 by President Henry of the parent association that his association had decided to handle the convention exhibits, entertainment, etc., for 1916, and he further stated that his present intention was to appoint a committee to handle this convention detail to be composed of both representatives from railway companies and from manufacturing companies who join under the revised by-laws.

"In the light of this position as taken by the parent association, your executive committee has suspended all preparation for handling exhibits, entertainment, etc.

"Inasmuch as our organization was formed primarily to function and co-operate with the parent association in providing the exhibition and entertainment, and, since these two duties will be assumed this year by the parent association with its enlarged membership, therefore, the Manufacturers' Association as it exists to-day has little work to perform, and your executive committee has planned in the interest of economy to move its headquarters on May 1 from its present offices to less expensive quarters, the location of which will be announced later.

"We feel that with our present balance there will be no necessity for the collection of the usual yearly dues of $30, bills for which have heretofore been sent out about this time.

"The regular annual meeting of the Manufacturers' Association will be held as in the past during convention week in the fall and consideration of our future usefulness can be determined upon at that time.

"The condition which confronts the electric railroads to-day is such that it calls for the unified endeavor of all branches of the industry. Therefore, it was the sense of your executive committee that this letter be written to inform the members of the Manufacturers' Association of the necessity for co-operation and to indicate the benefits to be derived from membership in the American Electric Railway Association.

"You will understand from the foregoing, of course, that in order that you may participate in the coming convention and exhibits, it will be necessary for your company to become a member of the parent association, the American Electric Railway Association.

"Very truly yours,
[Signed] Executive Committee,
"American Electric Railway Manufacturers' Association,
"By Thomas Finigan, President."

Committee on Use of Association Standards

The committee on the use of association standards has compiled a list of the standards and recommendations of the Engineering Association for the use of members of the association. This list is published herewith in the hope that the publication may assist in furthering the use of the standards along the line of the editorial printed in last week's issue. The first column contains the Engineering Manual section numbers.

BUILDINGS AND STRUCTURES

Section No.	
Bm 2c	Rules for instruction to employees for fire protection.

POWER DISTRIBUTION

Df 2b	Specification for galvanizing or sherardizing on iron or steel.
Df 3a	Design of cap and cone insulators.
Df 4a	Specification for overhead line material. (a) Iron and steel fittings. (b) Wood cross-arms.
Ds 1b	Specification for overhead crossings of electric light and power lines.
Ds 2b	Specification for 600-volt d.c. overhead trolley construction.
Ds 4a	Specification for wood poles. Part I—Chestnut poles. Part II—Eastern white cedar poles. Part III—Western white cedar poles.
Ds 5b	Specification for tubular steel poles.
Ds 6a	Diagram of clearances for overhead working conductors.
Dw 1c	Sections of grooved trolley wire.
Dw 2c	Copper wire tables.
Dw 3b	Specification for round and grooved high conductivity trolley wire.
Dw 4c	Specification for high voltage, three-conductor, paper insulated lead covered cable.
Dw 5b	Specification for single conductor, paper insulated, lead covered cable for 1200 volts.
Dw 6b	Electric wire and cable terminology.
Dw 8a	Specification for rubber insulated wire and cable for power distribution purposes.

EQUIPMENT

Eb 1a	Brakeshoes, brakeshoe heads and keys.
Eb 4b	Specification for air-brake hose.
Ec 1b	Dimensions for cars, including heights of couplers, bumpers and platforms. Part I—Height of couplers for city cars. Part II—Height of platforms for interurban cars. Part III—Height of bumpers for city and interurban cars.
Ec 2b	Automatic couplers for interurban cars and radial draft rigging, including M. C. B. specifications for couplers.
Ec 4a	Specification for the location of end connections on interurban cars engaged in the interchange of cars.
Ee 10a	Taper for bore of pinions.
Et 1a	Journal boxes.
Et 2a	Journal and journal bearing keys.
Et 3a	Design of axles.
Et 4a	Design for tread and flange of wheel.
Et 7a	Dimensions of rolled-steel wheels.
Et 9b	Specification for quenched and tempered carbon steel axles, shafts and similar forgings.
Et 10a	Specification for cold-rolled steel axles.
Et 11b	Specification for annealed carbon steel axles, shafts and similar forgings.
Et 12a	Specification for solid wrought carbon steel wheels for electric railway service.
Et 14a	Specification for case-hardened forged steel gears.
Et 15a	Specification for quenched and tempered forged carbon steel gears.
Et 16a	Specification for case-hardened forged steel pinions.
Et 17a	Specification for quenched and tempered forged carbon steel pinions.

POWER GENERATION

Gb 1a	Specification for lap welded and seamless boiler tubes.

BLOCK SIGNALS

Section No.	
Ss 2a	Use of semaphore signals.
Ss 3a	Fundamental indications in signaling.
Ss 4a	Aspects in three-position signaling.
Ss 5b	Light aspects in three-position signaling employing signals operated by contactors.
Ss 6a	Light aspects for car spacing signals operated by contactors.
Ss 7b	Use of continuous track circuits for the control of automatic signals for high-speed interurban service.
Ss 14a	Design of signal apparatus.

WAY MATTERS

W3d 1c	Location of and clearances for third-rail working conductors, structures and rolling equipment.
W3d 2b	Third-rail terminology.
W3d 3a	Protection of contact rail where protected third-rail is used.
Wf 1a	Designs of proper foundation for tracks in paved streets.
Wm 2a	Symbols for recording surveys.
Wm 3a	Specifications for splice bars for girder and high T-rails.
Wm 4b	Design for joint plates for 7-in. girder grooved and guard rails.
Wm 5a	Design for joint plates for 9-in. girder grooved and guard rails.
Wm 6a	Design for joint plates for 7-in. 80-lb. and 90-lb. plain girder rails.
Wm 7a	Drilling for standard section rails.
Wr 1b	Recommended designs for plain girder rails for use in paved streets. Part I—Use of plain girder rails in paved streets. Part II—Designs of plain girder rails.
Wr 2c	Specification for the manufacture of open-hearth girder and high T-rails.
Wr 3b	9-in. girder grooved rail.
Wr 4b	7-in. girder grooved rail.
Wr 5a	9-in. girder guard rail.
Wr 6a	7-in. girder guard rail.
Ws 1a	Layouts for track switches, mates and frogs.
Ws 2a	Rules for determining gage of track on curves.
Ws 4a	Specifications for special work.

American Association Executive Committee

A meeting of the executive committee of the American Association was held in New York on March 10 with the following in attendance: Charles L. Henry, president; L. S. Storrs, first vice-president; John J. Stanley, third vice-president; E. B. Burritt, secretary-treasurer; T. P. Kilfoyle, president Accountants' Association; R. E. MacDougall, acting president Claims Association; H. H. Vreeland, past-president; W. Caryl Ely, past-president, and C. Loomis Allen, past-president.

The president was authorized to appoint such committees as seem to him proper in connection with the forthcoming convention. A general discussion of the topics to be considered at the convention followed.

The secretary was directed to co-operate to the fullest degree with the Utilities Publication Committee to secure a wide circulation of the Public Utilities Reports Annotated. It is considered that these reports are of the greatest value to member companies in keeping them in touch with commission decisions.

The committee directed that copies of a letter be sent to the executives of all member companies urging that the men to be sent to the convention as delegates be required to attend the business sessions and to make reports of attendance and such other reports as the companies desire regarding the sessions and exhibits.

It was decided that in case of manufacturer company members dues should be assessed only on the gross receipts from business in the United States, Canada and Mexico.

Public Relations Committee

An important and resultful meeting of the public relations committee of the American Association was held in New York on March 15. Concrete plans and specific recommendations were discussed.

A resolution was passed adopting a definite plan of action for the education of electric railway employees and the general public to the necessity of solving justly in the public interest many of the acute problems now confronting the electric railway industry. This plan contemplates the adoption of definite methods for making it easy and simple for all member companies to co-operate extensively and fully. The details of the plan as adopted were left in the hands of a sub-committee to be worked out and reported on at a later date.

COMMUNICATIONS

The First Company Publication

FORD, BACON & DAVIS
NEW ORLEANS, LA., March 10, 1916.

To the Editors:

I notice one or two letters in recent issues of the ELECTRIC RAILWAY JOURNAL in regard to the publication of weekly or semi-weekly folders by electric railway companies and their distribution on street cars. I believe that the New Orleans & Carrollton Railroad was the first company in the United States to follow this practice. It was done by means of a box placed at each window containing possibly as many as twenty pamphlets and the number of boxes per car corresponding, of course, with the number of windows. This gave a larger circulation for the publications of the company than the combined newspapers of the city of New Orleans. In general this is true in any city where this method of distribution of the company's publications has been used. The date of the first appearance of these publications on the cars of the New Orleans & Carrollton Railroad was about 1897.

GEORGE H. DAVIS.

Adequate Return on Investment

BOARD OF RAILROAD COMMISSIONERS
DES MOINES, IOWA, March 10, 1916.

To the Editors:

It seems to me that erroneous ideas may be gathered from a consideration of the declining amount of new electric railway construction in the last few years. In every great new industry there is a long period when the percentage of new construction is necessarily large. When that industry becomes more established, the percentage of increase necessarily declines. This is true of steam railroad construction in all European countries, as well as in the United States. The same principle is present in the banking industry in well-settled communities, as compared to new districts. The same principle prevails with regard to construction of telephone lines and manufactures of all sorts. During the early development stage the increase is more rapid than during the later well-established condition of affairs.

There has been a slight increase in the interest rate in the electric railway industry, but this condition will also be found to be true as to bonds of European and American governments before the present war commenced. The same thing is true as to municipal bonds and other securities of almost all kinds.

What I suggest is simply the fact that the decline in the rate of increased mileage and the increase in the interest rate are not controlling on the problem of whether adequate return is being offered as an inducement for the investment of capital. On the other hand, the decline in the new construction or the increase in the interest rate may be at such a rate as to justify the conclusion that there is not an adequate inducement for capital. In other words, there is a line beyond which one does find evidence of declining credit. In order to test the adequacy of railway securities as attractive to capital, we made a rather comprehensive review of the market prices on railway, industrial, municipal and government securities during a period of fifteen years. It seems to me that no just conclusion could be arrived at in relation to electric railway securities, as a whole, without a similar analysis.

CLIFFORD THORNE, Chairman.

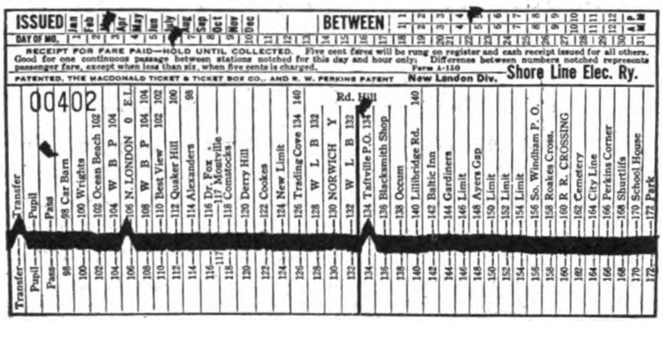
Copper Zones in Norwich, Conn.

THE SHORE LINE ELECTRIC RAILWAY COMPANY
NORWICH, CONN., March 7, 1916.

To the Editors:

I have read with some interest your editorial in the March 4 number of the ELECTRIC RAILWAY JOURNAL, as well as the article by William J. Harvie.

It may interest you to know that we are now using the copper-zone system on the 240 miles of property operated from this office. This system was described in your issue of Sept. 11, 1915, but at this time I want particularly to call your attention to its application in our city service in Norwich. The accompanying sketch will, I think, make this perfectly clear.



ISSUED | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov | Dec | BETWEEN | 1 1 | 2 2 | 3 3 | 4 4 | 5 5 | 6 6 | 7 7 | 8 8 | 9 9 | 10 10 | 11 11 | 12 12 | A. P. M. M.

DAY OF MO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31

RECEIPT FOR FARE PAID—HOLD UNTIL COLLECTED. Five cent fares will be rung on register and cash receipt issued for all others. Good for one continuous passage between stations notched for this day and hour only. Difference between numbers notched represents passenger fare, except when less than six, when five cents is charged. Form A-150

Shore Line Elec. Ry.

PATENTED, THE MACDONALD TICKET & TICKET BOX CO., AND R. W. PERKINS PATENT New London Div.

00402

Transfer | Pupil | Pass | 98 Car Barn | 100 Wrights | 102 Ocean Beach 102 | 104 W B P 104 | 106 N. LONDON 0 E.L. | 108 W B P 104 | 110 Best View 102 | 112 Quaker Hill 100 | 114 Alexanders 98 | 116 Dr. Fox | 117 Montville | 118 Comstocks | 120 Derry Hill | 122 Cookes | 124 New Limit | 126 Trading Cove 134 140 | 128 W L B 132 | 130 NORWICH Y | 132 W L B 132 | 134 Taftville P.O. 134 Rd. Hill | 136 Blacksmith Shop | 138 Occum | 140 Lillibridge Rd. 140 | 142 Baltic Inn | 144 Gardiners | 146 Limit | 148 Ayers Gap | 150 Limit | 152 Limit | 154 Limit | 156 So. Windham P. O. | 158 Roakes Cross. | 160 R. R. CROSSING | 162 Cemetery | 164 City Line | 166 Perkins Corner | 168 Shurtlifs | 170 School House | 172 Park

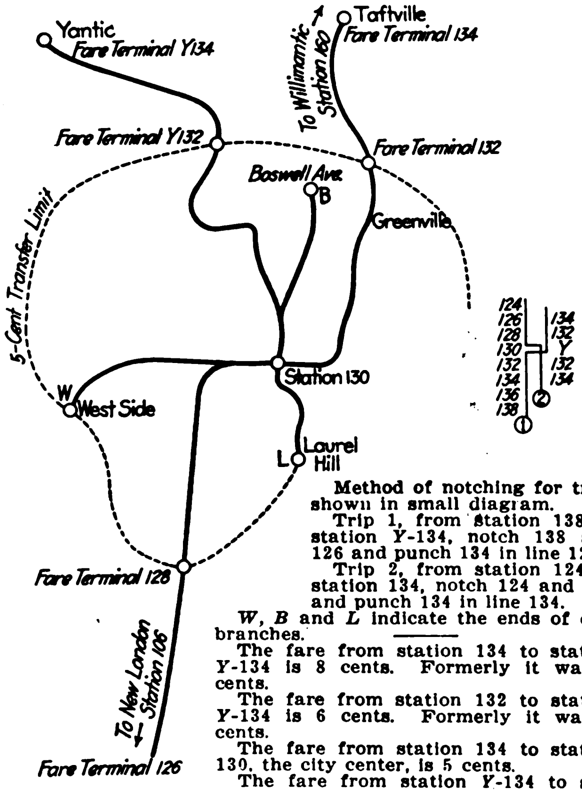
Transfer | Pupil | Pass | 98 | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 114 | 116 | 117 | 118 | 120 | 122 | 124 | 126 | 128 | 130 | 132 | 134 | 136 | 138 | 140 | 142 | 144 | 146 | 148 | 150 | 152 | 154 | 156 | 158 | 160 | 162 | 164 | 166 | 168 | 170 | 172

FARE RECEIPT, NEW LONDON TO YANTIC

Station 106 to Y 134, 28 cents. Rate is fixed by main line numbers 106 and 134. The punch at Y 134 indicates transfer at Norwich

We have three branch lines that we treat as single zones and two branch lines that we treat as double zones. This retains the nickel as the unit of fare from the civic center to the outlying villages immediately adjacent to Norwich, allows a transfer to and from any point within the city limits, and exacts a payment equivalent to 1 or 3 cents for a transfer where the ride is extended into three or four zones.

R. W. PERKINS, President.



LAYOUT OF LINES AT NORWICH

Method of notching for trips shown in small diagram.

Trip 1, from station 138 to station Y-134, notch 138 and 126 and punch 134 in line 126.

Trip 2, from station 124 to station 134, notch 124 and 134 and punch 134 in line 134.

W, *B* and *L* indicate the ends of city branches.

The fare from station 134 to station Y-134 is 8 cents. Formerly it was 5 cents.

The fare from station 132 to station Y-134 is 6 cents. Formerly it was 5 cents.

The fare from station 134 to station 130, the city center, is 5 cents.

The fare from station Y-134 to station 130, the city center, is 5 cents.

The fare from W to 134 or to Y-134 is 6 cents. Formerly it was 5 cents.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Contact for a Portable Welding Machine

BY G. H. MCKELWAY
Line Engineer Brooklyn Rapid Transit System

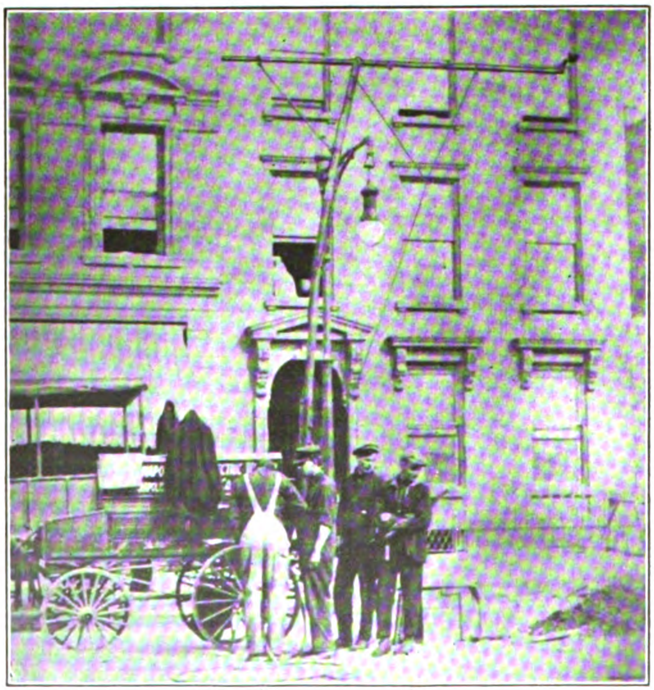
In the last few years many street railways have made considerable savings in their track maintenance costs by building up badly worn and pounded special work and joints by means of the Indianapolis portable welder, which consists primarily of a bank of resistance grids mounted on a light wagon and with connections for receiving current from the trolley wire and transmitting it to the rod of iron which is used as one terminal of the arc.

The chief objection which the writer has heard urged against the use of this machine is that the heavy current, about 180 amp., generally used in making the welds, anneals the trolley wire even if it does not actually burn it down.

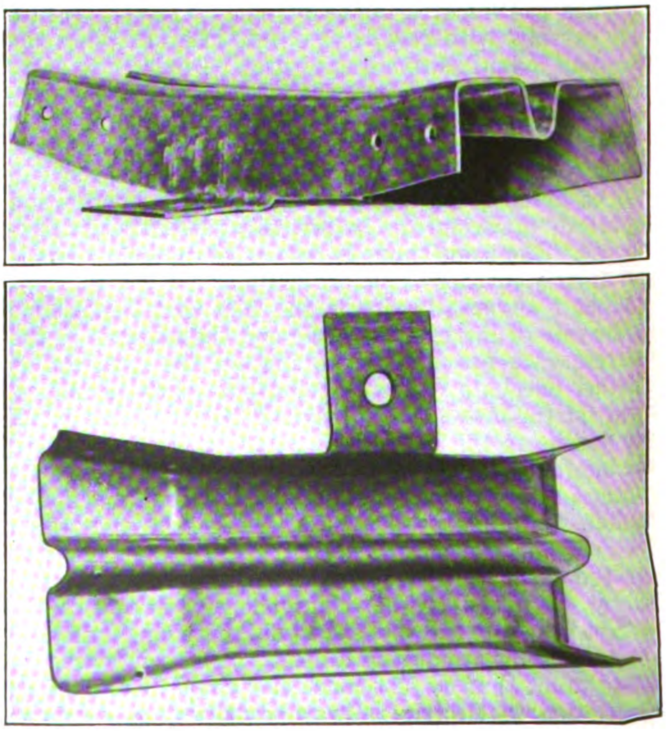
This is an accident that will occur quite often if the usual careless method of using merely a long pole with an iron hook at the end connected with a wire running to the welder is permitted. Such a contrivance was tried in Brooklyn with very poor results. An improvement on the hook was a regulation trolley-wire ear placed at the end of the pole and used with an inclined sheet metal guide which permitted quick placing of the ear on the wire with the latter in the groove of the former. This gave more contact surface than the hook but still not enough for safe operation. The next plan was to make the contact of two or more pieces of spring copper shaped so as to fit tightly around the wire when pulled down over it by means of the pole. There was no trouble with the contact obtained by this device, in fact, the great trouble with it was that the contact was too good and there was great difficulty in removing it quickly from the wire in order to let cars pass. If the spring of the copper was weakened sufficiently to allow of easy removal from the wire the contact was not good enough and the wire slipped up too far between the leaves.

The present contact was devised by E. L. Matthews, engineer of surface lines, and is working very satisfactorily. Three views of this contact, two of the contact alone and one of it in use with the welder, are shown in the accompanying illustrations. As will be seen, the contact is made from a sheet of copper shaped so that its upper surface presents a groove in which the trolley wire rests while the trolley wheels run on the bottom of the pan, which is supplied with flanges so as to prevent the wheels getting out of line while crossing the contact and then not taking the wire properly at the end.

A long bamboo pole supports a horizontal arm to which the contact is attached at about the height of the trolley wire under normal conditions, and a spring running between the pole and the arm insures that the contact will not only reach the trolley wire under all conditions but will also make good contact with it. The current required for the operation of the welder is led from the trolley wire to the resistance grids through a wire fastened at intervals to both the arm and the vertical pole. Careful observation of this contact when in operation has shown no tendency for it to either injure the wire or throw the trolley wheels from the wire. Thus there is no necessity for removing it from the wire when cars are passing and therefore the work is less frequently interfered with than it would be with the other plans mentioned.



WELDING MACHINE AND CONTACT MAKING DEVICE



COPPER PAN FOR ELECTRIC WELDING DEVICE

Steel Siding Substituted for Wood Stiffens Car

BY H. H. BUCHMANN
Master Mechanic Indianapolis, Columbus & Southern Traction Company, Greenwood, Ind.

Difficulty in obtaining good-quality poplar siding and the necessity for stiffening the old wooden framing of a number of interurban cars resulted in the mechanical department of the Indianapolis, Columbus & Southern Traction Company, Greenwood, Ind., substituting steel siding for wood. This change was made in remodeling a number of old wooden-frame cars that had been in service ten or twelve years. The poplar beaded siding had become so badly damaged that it was unsightly, and a No. 14 gage sheet steel was placed over it and fastened with screws. The sizes of the steel sheets, as well as the length and spacing of the screws, were carefully selected so that all screws would penetrate the oak framing. This made the steel serve to reinforce the car sides and thus eliminated the weaving which had developed from long years of service.

VIEW OF COMPLETED CAR WITH SHEET STEEL SIDING

Before placing the sheet steel siding it was carefully sanded and primed on the side that came in contact with the wood. All plates were made of a standard size and drilled to templates so that the various pieces were interchangeable. After the steel siding had been fastened in place, a 1.8-in. x 2-in. belt rail, continuous from corner post to corner post, was placed over it. This was fastened with two rows of screws, one of which penetrated the old belt rail and the other passed through the steel siding to the belt rail. Vertical battens, ⅛-in. x 3½-in. in size at the joints in the siding, butt against this steel belt rail and are held in place with two rows of screws which also pass through the steel siding. Two rows of screws varying in length from 2½ in. to 3 in. secure the siding to the sills. All the screws used were No. 14 round head, blue, and after they had been put in place the slots were fitted with putty so that the screws would look like rivets. In the old underframes ½-in. round tie rods extended between the side plates and the sills at the panel posts, and three more tie rods were added on each side of the car.

In connection with the reconstruction work, it is interesting to note that the bodies were placed on horses with jacks under the center of each side sill to give a 1¾-in. camber. While in this position the tie rods were tightened and the steel siding was put in place. When this work was completed the jacks were let down until the entire car-body load was supported on the framing. All adjustments in the framing were taken up when the camber in the sills was reduced to 1 in. In addition to the siding, 6-in. I-beams were placed below the body framing at the points were the truss-rod struts rested against the sills. These needle beams were securely bolted to the underframe and to the struts, and greatly increased the transverse stiffness of the body. The steel increased the weight of these cars approximately 950 lb., but this was reduced to approximately 500 lb. net by the elimination of useless metal in the remodeled trucks.

When these cars were restored to service it was found that weaving in the body framing had been entirely eliminated, and, at the same time, the body offered much greater resistance to torsional strains. One of these remodeled cars is shown in the accompanying illustration.

Why Trolley Wire Wears Out

BY S. L. FOSTER
Chief Electrician United Railroads of San Francisco

With the price of new unmanufactured copper climbing rapidly toward 30 cents per pound a brief discussion of the causes of trolley-wire wear seems in order considering that the consumption of this metal in the shape of trolley wire alone costs the electric railway companies a very considerable sum now.

Although the difference between the price per pound of new trolley wire and that of the old wire considered as scrap may be assumed to be constant, when new copper in the shape of trolley wire costs 30 cents per pound electric railway companies will be paying about 40 per cent more per pound net for their wire than when it costs 20 cents, because the old trolley wire taken down weighs only about half as much as the new wire used to replace it.

With a wheel rolling without appreciable friction under a trolley wire one would not expect much wear to result. The reasons that wear does result and very rapid wear, too, are several. In the JOURNAL for Jan. 22, 1916, page 174, appeared an admirable explanation of how the pin friction in the purely up-and-down motion of the trolley base increases the wear on the trolley wire. This has long been understood in a general way. To avoid the trolley wire abrasion effects of this pin friction all overhead men aim to install the trolley wire at as nearly an absolutely uniform height as possible, and to maintain it as nearly level as they can by pulling it up and maintaining it at its maximum safe tension.

The trolley-base pin friction is, however, not the only cause of the trolley wire wear. For instance, there are the long-lived trolley wheel craze, the sluggish-acting retriever, insufficient contact pressure between trolley wheel and trolley wire, excessive contact pressure between trolley wheel and harp spring, the unlubricated vertical trolley-base shaft bearing, trolley wheels of unsuitable sizes, track rails out of level, the original elevation lost in the outer rail of track curves, lack of co-ordination between track and line departments, and lack of adaptation of curve trolley wire to car equipment, track curvature and elevation.

Wheel Mileage.—Mileage records for trolley wheels are a hobby with some car maintenance men. Tool-steel wheels, cast-iron wheels, "tempered" copper wheels and steel-flanged wheels are tried in the effort to get greater mileage, while in many cases the destruction of copper in the trolley wire undoubtedly far exceeds not only any possible saving in cost of trolley wheels but exceeds the total cost of all the wheels used. When one considers that in three consecutive years the total gross cost of trolley wire bought for purely maintenance purposes on one road averaged seven times that of the gross cost of all the trolley wheels on the system it is seen how relatively unimportant small trolley wheel savings are. Nearly the full weight is recovered as scrap when the trolley wheel is condemned for further use, whereas not much more than 50 per cent of the trolley wire is left when it is finally taken down.

In the d.c. arc lamp the positive carbon burns away just twice as fast as the negative one. When one notes the characteristic green color or volatilized copper in the arc at the trolley wheel of a passing car at night it is easy to understand why the trolley wire wastes away.

It would seem wiser to expend effort in keeping the annual cost for maintenance of trolley wire plus the cost for maintenance of trolley wheels a minimum, rather than to try, as at present, to get record mileage from the wheels and stolidly continue to replace the seven times more costly trolley wire as it wears out.

The use of ordinary brass trolley wheels with no attention to mileage would probably help out an electric railway company's net earnings better than efforts to get record mileage from wheels with no attention to the trolley-wire wear.

The Retriever.—The retriever was hailed by all electric railway men as an advance in the art—a mechanical device that was almost human, that reeled in the trolley rope when it was slack, thus preventing it from catching on sundry protuberances about the car, and paid it out when needed to round a curve or to let the wheel follow the 22-ft. wire over a steam railroad crossing. Unfortunately it does not always do these things. Either the strength of the spring varies or the work to be done varies, giving un-uniform results. The retriever tension required to wind up, or the reluctance to pay out, varies greatly, depending on whether the trolley rope is new or is old, or is wet or dry. Sometimes it will not pay out at all and before the car can proceed the rope has to be cut out of the retriever. As trolley wire is not strung exactly level, but more or less in festoons, this sluggishness of the retrievers causes increased pressure between trolley wheel and trolley wire between span wires, and reduced pressure at the spans. This reduced pressure at the ears conduces to increasing the arc at this point and, as the safe life of trolley wire chiefly depends on its condition at the ears, the use of retrievers undoubtedly increases the trolley wire cost per car-mile whatever it may save in other ways.

That some retrievers tend to pull the poles off at the frogs and even in the curves, and therefore tend to excessive wear of the curve wire is shown by the many wise conductors who are seen to pull slack rope out of their retrievers upon approaching such points and to hold it out until the location is passed so that the wheel will be free to adapt itself to the overhead conditions as it was expected to do by the linemen. The vagaries of these retrievers justify careful watching and maintenance of uniform pull.

Insufficiency of Contact Between Wheel and Wire.—A "4-in." wheel is used in much city work. Such a wheel is about 2¾ in. in diameter where the trolley wire bears upon it. To roll along the wire at 10 m.p.h. such a wheel would have to revolve at more than 1200 r.p.m. At 20 m.p.h. it would have to turn more than 2400 times each minute. If it lagged a particle behind the theoretical rotative speed it would be practically sliding along the trolley wire. What takes place when one metal slides on another with an electric current passing is known to anyone familiar with the old copper brushes on the dynamo commutator. If the sparking was not checked in time the "cutting" and resultant destruction of brushes and commutator bars was very rapid and extensive.

If the pressure between the trolley wheel and the trolley wire is not sufficient to keep the wheel rolling, or if the pressure between harp contact and wheel hub acts enough as a brake on the wheel's revolution, or if the retriever's downward pull offsets the upward push of the base springs sufficiently to prevent this theoretical rolling of the wheel, the wheel will slide. That they do slide is proved by the "flats" found on many of them. When these flat wheels slide they increase the wear unnecessarily, and by bouncing up and down due to their lack of circularity they increase the arcing and burning of the wire.

The logical remedy for this sliding is to take better care of the conditions that cause it and to try to prevent the sliding while retaining the 4-in. wheel. Another and popular cure is to increase the size of the wheel to 5 in., 6 in. or even 8 in. on suburban trains. This latter move is probably the cheaper one although it involves two penalties. The extra weight in wheel and harp renders extra strength in the base springs necessary, and the extra weight at the end of the trolley pole adds to the inertia of this top hammer, and not only causes the wheel to leave the overhead frogs more readily at curves, but does more damage to the overhead construction when it does come off.

Excessive contact pressure between wheel and wire will be more likely than deficient pressure to conduce to minimum trolley-wire wear. Thirty pounds net upward pressure between wheel and wire for heavy city cars is generally considered reasonable. All trolley ropes should be tested with a spring balance or a fixed weight at least once a month to see that this pressure is maintained, as steel springs suffer from "fatigue" and change considerably with age.

Unlubricated Base Shafts.—The latest trolley bases are equipped with roller or ball bearings. Such bases turn readily and permit the trolley wheel to adapt itself to the trolley wire on curves. Many companies still retain some of the older types of bases in which the moving element rotates on a vertical shaft. If this shaft is not kept well lubricated the trolley wheel is prevented from following the curve wire as freely as it should. The wheel not only scrapes the wire savagely but comes off at the trailing frogs and sometimes even in the curve itself. This insufficiency of lubrication of the base shaft is mostly to be watched for during rainy weather, when the lubricant is washed off by the rain. Renewal of trolley wire in curves is the most expensive kind of trolley repair work per foot, considering both labor and material.

Track Out of Level.—The rules for locating the trolley wire over curves in accordance with the elevation of the outer rail apply equally rigidly to the straight track, although seldom or never so applied. If one rail is lower than the other, the car sags to the lower side and the trolley wheel scrapes on the trolley wire located, as usual, over the center of the straight track. On old unballasted lines unlevel track may very considerably shorten the useful life of trolley wire for, like a chain whose strength depends on its weakest link, if several thin places are found in a stretch of trolley wire much quite serviceable wire has often to be taken down for safety in order to get out the bad spots.

Reduced Elevation.—Engineers carefully calculate the correct elevation for the outer rail on curves of high-speed lines and, with standard gage and 19-ft. trolley, linemen locate their trolley wire 4 in. toward the center of the curve for each inch of elevation. The track foreman then permits, or circumstances beyond his control cause, this rail elevation to subside. For every inch it goes down the trolley wire is left 4 in. out of its correct position. The trolley wheels scrape, and sometimes they leave the wire. Usually the overhead construction receives all the blame for the interruption to service. With a meandering right-of-way, full of curves, this neglect to maintain correct outer rail elevations at all times greatly shortens the life of the trolley wire.

Lack of Co-ordination.—It sometimes happens on a large system that in the march of improvement the centers on a stretch of straight track are changed, leaving one or both trolley wires slightly off their correct location and the linemen are not informed of the conditions. Again, a curve may be changed from a circular to a parabolic form, and again the trolley wire is left out of place. The trolley wheels somehow get around the curve and the change may not be noticed by the linemen for a long time, until it is brought to their attention by the unusually rapid wear at that point.

Obviously the line department should be kept informed of all changes of track location, however small, as otherwise their existence may greatly increase the wear of the trolley wire at the points where the changes are made.

Curve Location.—As has been shown, the proper location for the trolley wire on curves, in order to secure the minimum of wear for the trolley wire, is a function of nine variables, five of the car equipment, one of the wire and three of the track. If a whole railway system were equipped with absolutely similar cars there would exist the ideal conditions for the linemen in locating the trolley curves. As such conditions are seldom or never met, the curves have to be located to suit as nearly as possible the numerous types of cars that pass by their location. The best that the men can do is a compromise, poor at the best. The conditions are rendered more difficult and more extravagant of trolley wire when every new lot of cars put in service involves a change in some of the variables, roof height, pole-base location, truck centers, wheelbase of trucks, etc.

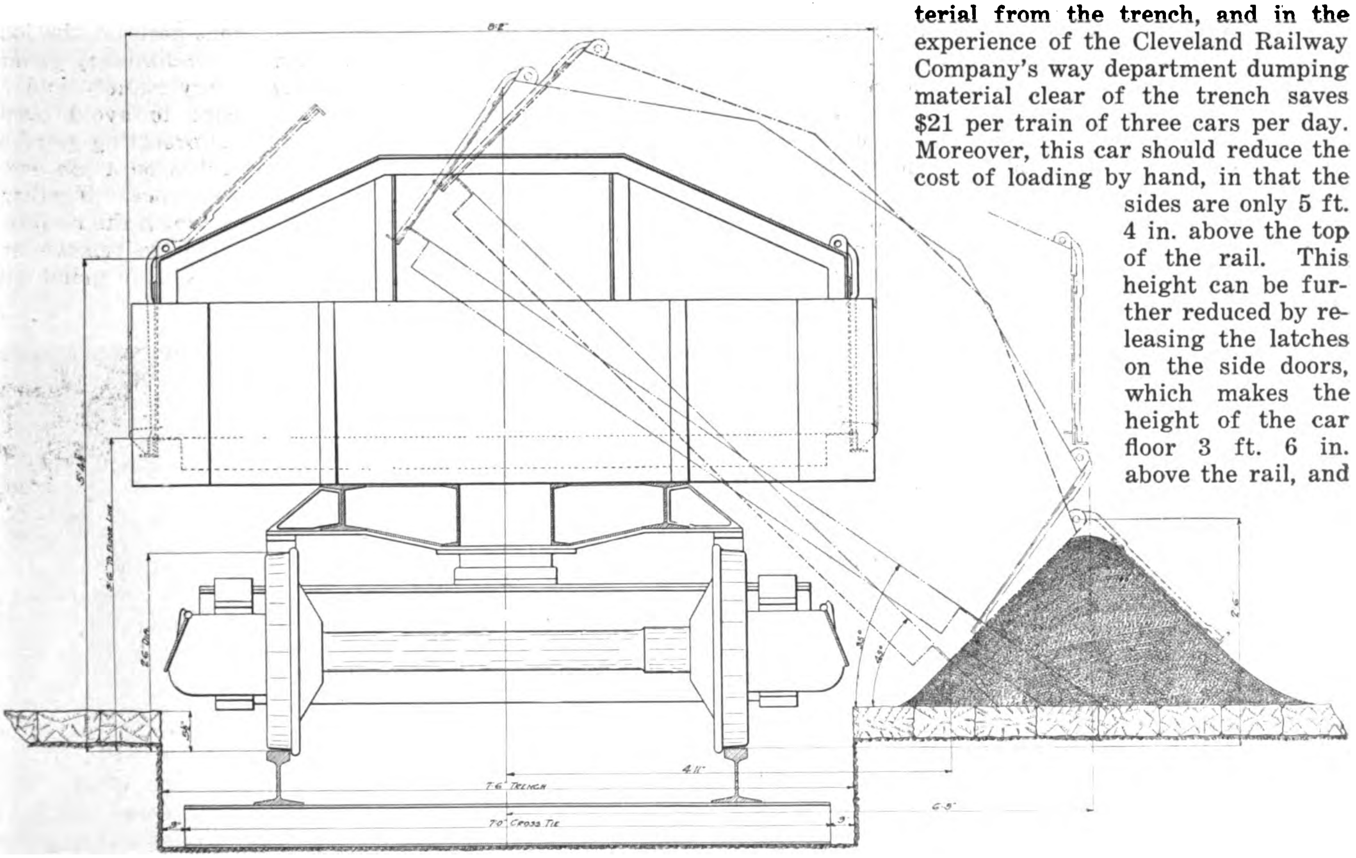
Finally, it should be kept in mind that the wages of linemen when working and their compensation when injured are usually nearly twice as large as those of trackmen or carhousemen. Therefore anything that tends to reduce the time required for the company's linework counts far more than savings in housemen's or trackmen's time.

Such subjects as soldered versus clinch ears, soft versus hard overhead construction, short versus long ears, etc., as affecting trolley wire wear have not been referred to in this article. It has been assumed that these subjects are well understood and that the linemen apply their knowledge in the most efficient manner.

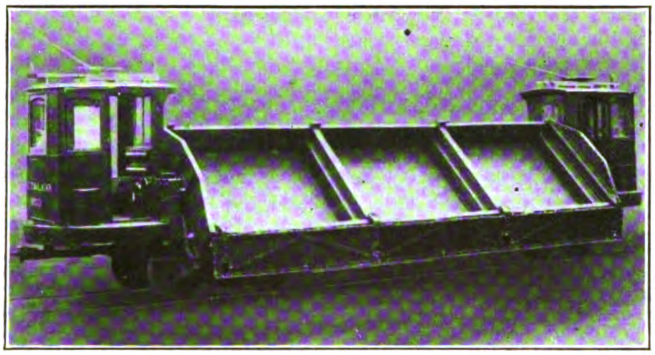
Low-Side Automatically-Controlled Dump Car

A light-weight, all-steel, low-side, electrically-controlled, 18-cu. yd. dump car with other unusual features incorporated to facilitate the handling of loose materials has just been put on the market by the Differential Car Company, Inc., Nashville, Tenn., and 141 Broadway, New York. The "Differential Electric Dumping Car," which is the trade name of this equipment, was invented by H. Fort Flowers, president and general manager of the Differential Car Company, Inc. The car shown in the accompanying illustrations is one purchased by the East Liverpool (Ohio) Traction & Light Company, and it is used in transporting coal from one of the company's mines to its power plant. This particular car weighs 46,000 lb. equipped with four 50-hp. motors, and the body is divided into three sections which hold about 6 cu. yd. of material each. The car is 39 ft. 6 in. long over the end sills, 8 ft. 2 in. wide over all, and the sides are 5 ft. 4 in. above the top of the rail. This height is low for cars of this kind and it greatly facilitates loading by hand.

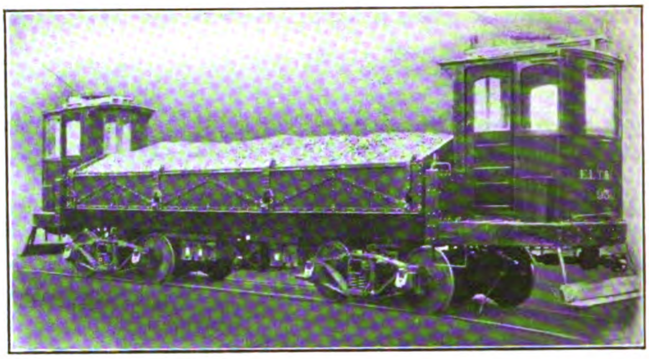
Undoubtedly the greatest claim for this car, aside from its low height, is that the body may be shifted to either side so that material may be dumped clear of the track trench. The normal and dumping positions of the body are shown in the cross-section of the car. This feature is important because it saves recasting material from the trench, and in the experience of the Cleveland Railway Company's way department dumping material clear of the trench saves $21 per train of three cars per day. Moreover, this car should reduce the cost of loading by hand, in that the sides are only 5 ft. 4 in. above the top of the rail. This height can be further reduced by releasing the latches on the side doors, which makes the height of the car floor 3 ft. 6 in. above the rail, and



CROSS-SECTION OF CAR BODY SHOWING EXTREME DUMPING POSITION



VIEW OF CAR IN DUMPING POSITION



VIEW OF CAR WITH BODY IN NORMAL POSITION

material may be loaded as easily as though it was a flat car. Still another reduction in the loading height may be obtained by tilting the body to a dumped position with the sides latched. This makes the height of the sides only 2 ft. 6 in. above the top of rail.

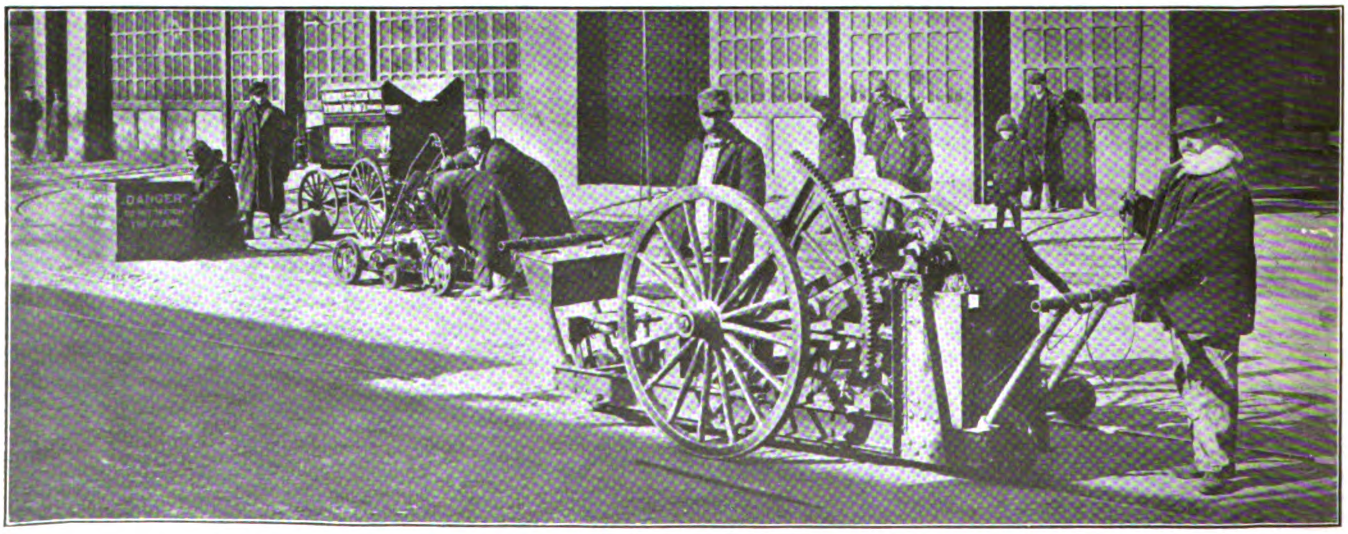
Another important feature in the construction of this car is that it weighs only 46,000 lb. complete and ready for service, although it is of all-steel construction. Essentially the car consists of an under or supporting frame to which the trucks are attached and an 18-yd. body mounted on this frame so that it may be moved sidewise by a motor-driven dumping mechanism. The mechanical features are unique, and no part of the dumping mechanism is exposed when the car body is in the normal or central position. The dumping mechanism is so arranged that the body when either loaded or empty automatically balances in all positions. The body can be loaded while tilted and then revolved and moved to the normal position for transporting it over the line.

Movement to the side permits this car to dump material at about 6 ft. 6 in. from the center line of the track. Shifting the body to either side on the underframe automatically releases the side doors when it assumes a tilted position of about 40 deg. from the horizontal. All movement of the body is controlled by the motor through a set of cables and gears. The body is stopped automatically when it has moved the maximum distance to either side, where it assumes a 45-deg. tilted position. As the body is restored to the horizontal position the side doors are automatically latched and held tight to the sides of the car by a toggle door-latch mechanism. This is operated from the end platforms and the side doors may be opened all at one time or separately. The control of the dumping mechanism is so arranged that the motorman can discharge the entire load while his car moves along the track. In the normal or central position the body is automatically locked so that it is secure for transportation.

Three of these cars have been purchased by the way department of the Cleveland (Ohio) Railway and, as previously mentioned, one has been purchased by the East Liverpool Traction & Light Company. The Third Avenue Railway, New York City, and the New York State Railways, Rochester, N. Y., have also purchased some of these differential electric dump cars.

Grinding Practices of the Connecticut Company

The accompanying illustration is somewhat unusual in showing the entire line of equipment which is used by The Connecticut Company to build up and regrind cupped joints. At the extreme left is the Indianapolis welder, then is shown the Seymour wheel grinder, and finally the reciprocating grinder of the Railway Track Work Company. The Connecticut Company finds that the best results are obtained by using the two types of grinders for different parts of the job. With the Seymour grinder the heavy preliminary grinding is done. This grinder works very rapidly and is easy to maintain, but demands care to avoid over-grinding. On the other hand, the reciprocating grinder can be used to put the finishing touches on a job even when handled by men of little experience. Further, because of the fine gradation of work which the reciprocating grinder permits, it is also used to remove inequalities at the junctions of new rail and to grind out incipient corrugations.



CONNECTICUT COMPANY'S EQUIPMENT FOR BUILDING UP AND REGRINDING CUPPED JOINTS

A Gentle Hint Eliminates Useless Weight

In conspicuous locations in the blacksmith, machine and carpenter shops of the West Penn Railways at Connellsville, Pa., are displayed posters printed in large type which read as follows: "It costs 5 cents per pound each year to haul unnecessary weight in cars. If capitalized this equals $1 per pound as the premium on keeping down weight. Trim off every pound of extra weight on all parts of the equipment unless it is absolutely necessary for strength and safety. (Signed) DANIEL DURIE, Master Mechanic." This gentle hint to the various shop employees obtained their hearty co-operation. Aside from the elimination of useless weight in various car parts, changes in design were suggested which accomplished the same end. On one particular type of car which was being constructed in these shops, the elimination of useless material reduced the weight approximately 4000 lb.

An Improved Retriever

To improve still further the operating advantages of the Earll retriever and to make its maintenance negligible, C. I. Earll, New York, has brought out Types 4-A and 5-A. Earll retrievers have been installed by thousands during the past fifteen years so that the new types are the outcome of a highly specialized experience.

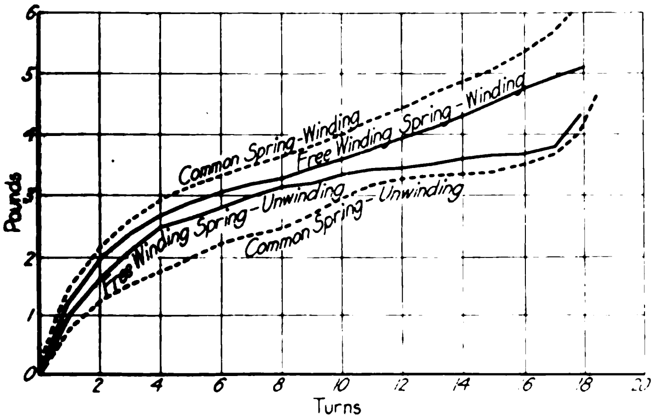
Type 4-A is a retriever for city cars which weighs but little more than a catcher and costs no more to maintain. Its higher first cost is trifling compared with its greater ability to prevent damage. It is recommended in preference to catchers for city service where running speeds exceed 15 m.p.h.

Types 4-A and 5-A differ only in that the first has no emergency release. Otherwise the two styles have their working parts interchangeable, including the socket, an advantageous feature on combined city and interurban systems.

The main features of Earll retrievers are:

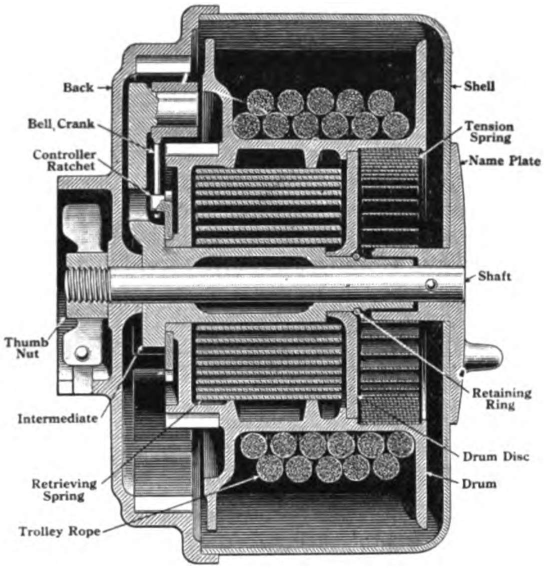
Quick positive operation. The retrieving action is certain. Instead of one, two or four teeth in the back this retriever has twelve, so that the drum cannot turn more than one-twelfth of a revolution after the centrifugal pawl has swung out before retrieving begins.

Ratchet winding. To rewind the retrieving spring of any retriever after the pole has been pulled down it is necessary to pull out the rope. With the Earll retriever it is not necessary to do this by one long continuous pull, to which conductors so much object and which makes it dangerous, if not impossible, to rewind the retriever while the car is in motion. With this retriever the rewinding may be accomplished by ratcheting or reciprocating the rope in and out, in as long or short strokes as convenient.



CURVES SHOWING FORCE EXERTED BY ORDINARY SPRING AND NEW FREE-WINDING SPRING

The emergency release. The emergency release makes it possible under any conditions to withdraw rope and run up the trolley pole at any speed. If a car should become stalled on a steam road crossing with the pole down, the pole could be run up to the wire instantly. By means of the emergency release the conductor can, by merely holding the release lever down, run up the trolley to the wire as fast as he chooses. Even if the operating mechanism should get out of order, the emergency release is always available to run the pole up to the wire. It is never necessary to cut the rope where this retriever is used.



CROSS-SECTION OF NO. 4-A RETRIEVER

The emergency release consists merely of a loose ratchet ring in the back, normally held by the release lever but capable of being released when the lever is depressed. The teeth in the ratchet ring take the place of and perform the same function as the teeth which are cast solid in the back where this feature is not used.

The emergency release is also a great convenience in handling the retrievers in the shop. When a retriever has to be overhauled it is both safer and quicker to trip the retriever by a sharp jerk on the rope and then to withdraw the rope without rewinding the retrieving spring, by means of the emergency release, before taking the retriever from the car. The emergency release also makes it unnecessary to send a man to the roof of the car to detach the rope from the pole when the retriever has to be sent to the shop.

Improvements. The teeth on the drum have been made larger and stronger, their wearing surfaces having been increased 50 per cent. The rear web of the drum is now cast integral with the drum, thereby making it impossible for it to slip out of place and thus interfere with the proper action of the controller. The improved drum runs on the intermediate, as shown in the cross-section.

The new and stronger intermediate now passes clear through the drum and runs directly on the shaft. The check pawl is made of drop-forged steel from new dies The end which engages the teeth of the drum, like those teeth, has been increased 50 per cent in strength. The set pawl, formerly made of malleable iron in two parts, is now made of drop-forged steel in one piece and its shape has been improved.

An entirely new form of tension spring has been adopted. This spring is made of one piece and is slipped in place without the use of pins, screws or any other device for securing either end. It is so constructed that it winds and unwinds much more concentrically, and therefore with much less friction and wear of the coils upon each other, than the common types of spring.

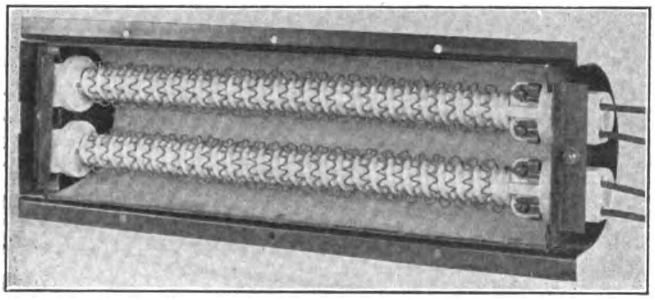
To ascertain the exact difference in the action of the two types of springs a series of tests was made, taking the reading of the force exerted at a radial distance of 2 in. for every quarter-revolution from complete relaxation until the springs were wound up tight. Then readings were taken in the reverse order until the springs were completely relaxed again. The curves plotted show the much greater efficiency of the new type —the free-winding spring.

Everyone has observed how frequently both catchers and retrievers fail to take in wet trolley rope. Yet operators object to the use of stronger springs, as every pound added to the end of the pole means a good many pounds at the trolley base, and that means a heavier pole and heavier trolley base equipment. The advantage of increased efficiency in the tension spring which merely has to take in the slack rope is that, given two springs adjusted to have adequate strength to take in a wet rope, the more efficient spring will require less force for pulling out the rope, and therefore put less strain on the trolley pole and base. The free-winding spring also lasts longer, and cannot be broken by overwinding.

New Features in Electric Car Heaters

The New York Municipal Railway Corporation will use thirty Consolidated heaters of a new type on its multiple side-door cars. The appearance of the new heater is shown in the accompanying illustration.

In the first place the heater coils are removable by taking out a single screw, as shown. Again the asbestos lining in the back of the heater has been treated with a special waterproof solution which will prevent the absorption of water. A special fire wall has also been placed on the end of the case, so that there is no danger that anything outside the heater will be set on fire if a coil breaks. This feature greatly reduces the insurance risk.



ELECTRIC HEATER FOR MULTIPLE SIDE-DOOR CAR OF NEW YORK MUNICIPAL RAILWAY CORPORATION

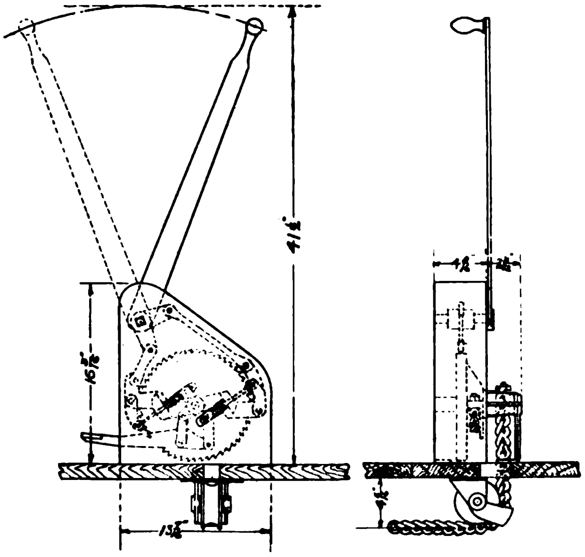
The heaters are bolted to the riser or heel board, which is made of steel, and which has perforations provided for the escape of heat into the car body. Spring terminals are provided on the coils so that the coils can be easily connected with or disconnected from the circuit.

The Union Traction Company of Indiana, Anderson, Ind., has inaugurated a study of safety methods in the public schools of towns and cities along its routes. Safety clubs will be organized in school rooms where there are children under twelve years of age. Five hundred safety primers will be distributed to teachers by the claim department of the traction company.

A New High Power Hand Brake

The Lord Manufacturing Company of New York City has placed on the market the new Horne double-acting brake which is especially adapted to one-man care on account of its compactness and lightness. The accompanying reproduction from drawings show the details.

The essential mechanical features are the eccentric drum by means of which the brake-rod tension increases automatically with the chain travel from 1200 lb. to 2600 lb., a double-acting ratchet mechanism with a vertical hand lever which renders all motion effective, and an independent release mechanism which permits the vertical handle to remain in any operating position.



A QUICK-ACTING, DOUBLE-RATCHET HAND-BRAKE ESPECIALLY ADAPTED TO ONE-MAN CARS

The manufacturer claims for the new brake that it is simple and self-contained, no accessory parts being required, and that it effectively combines the features of quick action and high brake pressure. The slogan "The double ratchet does it" aptly characterizes the brake.

Cost of an Electric Express Building

From data filed by the Bay State Street Railway with the Massachusetts Public Service Commission in the pending fare case are taken the following first-cost figures of an electric express station owned by the company and located on Perkins Street.

The station was completed about two years ago; it is about 25 ft. x 60 ft. in dimensions, and is a one-story frame building without basement, erected on a concrete foundation with clapboarded walls and a tar and gravel roof.

Excavation	72 cu. yd.	$0.75	$54
Concrete foundation	49 cu. yd.	7.00	343
Concrete piers	5 cu. yd.	8.00	40
Brick chimney	700	24.00	17
Timber—framing	6,700 bd. ft.	45.00	302
Timber—wall sheathing	2,300 bd. ft.	50.00	115
Timber—wall sheathing	1,400 bd. ft.	60.00	84
Timber—roof sheathing	3,400 bd. ft.	50.00	170
Timber—2-in flooring	2,800 bd. ft.	45.00	126
Timber—flooring—hard pine	200 bd. ft.	60.00	12
Timber—miscellaneous	....	....	69
Timber—clapboards	1,862 sq. ft.	.08	149
Roofing—tar and gravel	1,680 sq. ft.	.06	101
Wrought-iron pipe	....	....	5
Millwork—door	333 sq. ft.	....	128
Millwork—window	250 sq. ft.	....	125
Electric lighting	....	....	38
Plumbing	....	....	150
Sheet metal	....	....	35
Painting—oil	255 sq. yd.	.18	46
Painting—cold water	348 sq. yd.	.12	42
Varnishing	168 sq. yd.	.25	42
			$2,193
Fixed charges during construction, 14.5 per cent			318
Total			$2,511

NEWS OF ELECTRIC RAILWAYS

STORMY SESSION OF NEW YORK COMMITTEE

Committee to Meet Twice a Week Hereafter—Messrs. Whitney and Hervey Confirmed as Commission Members

At the session on March 11 of the Legislative Committee which is inquiring into transit matters in New York the disorder was so great at one point that it was charged that a deliberate attempt had been made to stampede the meeting. The storm centered around Timothy S. Williams, president of the Brooklyn Rapid Transit Company. In a passage of words between Colonel Williams and Frank Moss, counsel for the committee, Colonel Williams accused Mr. Moss of lying, while Mr. Moss retorted by calling Colonel Williams a comedian. A spectator, a former assistant counsel for the commission, after the meeting also made some disparaging remarks regarding Mr. Moss. He was promptly haled before the committee and required to apologize.

At the morning session on March 11 a letter was introduced in testimony, indicating that the Interborough Rapid Transit Company stood ready in March, 1910, to build the new subways with its own money and had made a proposal to that effect to the Public Service Commission. It was subsequently shown that this communication was a matter of public discussion at the time it was written five years ago and that it was nothing but a letter setting forth possible terms and conditions.

On March 10 Travis H. Whitney, secretary of the commission, and Richard Reid Rogers, counsel for the Interborough Rapid Transit Company, were the witnesses. Mr. Whitney was questioned more particularly with respect to the changes in route of rapid transit lines in Brooklyn. Mr. Rogers said all the previous contracts led up to the making of the present contract so that all his services in the four years of negotiation were properly charged against the final contract. He said it was a matter of law that legal services are a part of the preliminary cost of construction. When Mr. Moss read the clause defining "construction" and "legal services in and about construction" Mr. Rogers insisted that this latter phrase warranted the payment to him of the $50,000 as extra compensation.

During the week ended March 11 the Legislative investigating committee announced that on account of the need for the presence of members of the committee at the legislative session in Albany the hearings before the committee would for the present at least be held on Friday and Saturday of each week. It was also announced that a public hearing would be held on March 17 to which the Mayor and other city officials would be invited as well as representatives of the Public Service Commission and civic organizations generally. Immediately following this public meeting the committee expects to submit a preliminary report to the Legislature. In this, it will be recommended that jurisdiction over all construction work on subway lines be taken from the Public Service Commission and be lodged either with the Board of Estimate, with the Borough Presidents or with a board to be appointed by the Mayor and confirmed by the Board of Estimate.

The Senate finance committee voted recently to report without recommendation, either for or against confirmation, Governor Whitman's nominations of Travis H. Whitney and Charles S. Hervey as members of the Public Service Commission for the First District, but on March 16 after a debate lasting five hours the nominations were confirmed. The vote on Mr. Whitney was twenty-seven to twenty-three and on Mr. Hervey thirty-one to nineteen. Oscar S. Straus, who is chairman of the commission, had announced his determination to resign from the commission if he was deprived of Mr. Whitney's services.

On March 14 Lamar Hardy, Corporation Counsel, announced that he would begin suit at once against the Interborough Rapid Transit Company and Alfred E. Craven, chief engineer of the Public Service Commission, to recover for the city about $4,000,000 charged by the Interborough as a "prior-determination expense" against the cost of building the dual subway. This means that the city refuses to approve of the payment of $150,000 bonus to President Shonts, $50,000 bonus to R. R. Rogers, counsel to the Interborough, and $10,000 bonus to E. F. J. Gaynor, auditor of the Interborough, which sums the company put into charges against bonds issued to pay for construction. Alfred E. Craven, chief engineer of the Public Service Commission, is made a defendant with the Interborough because it is alleged that Mr. Craven passed upon the items in the charges submitted by the company as "prior determination expenses."

HUDSON & MANHATTAN RAILROAD RECEIVES TRAVELERS' MEDAL

The gold medal presented by the Travelers' Insurance Company each year to the American employer who has done the most during the year to safeguard his employees and the public was awarded this year to the Hudson & Manhattan Railroad. The presentation was made at the annual dinner of the American Museum of Safety recently after a jury of award named by the museum had chosen the railroad to receive the medal "for achievement in accident prevention among its personnel and for promoting safety for the traveling public."

The Hudson & Manhattan Railroad is better known as the Hudson Tubes. These tubes carry a large proportion of the Jersey commuters in and out of New York every day, as well as large numbers of women shoppers from the Jersey suburbs and the most inconsiderable number of people who leave the Pennsylvania Railroad at Manhattan Transfer. They have been in operation for eight years and in that time have carried 400,000,000 passengers, or about four times the population of the United States, but in all that time there has not been a single loss of life attributable to train operation.

The system is operated between four distinct terminal points, and within a mileage of 7.91 miles there are fifteen junction points. In a year's time 660,000 passenger trains, or an average of 1800 a day, are operated in conformity with a regular schedule. During the rush hours trains are dispatched from all the terminals under a ninety-second headway with only one minute at the terminals for loading and unloading of passengers. This could not be done without separate platforms and stairways for loading and unloading. Practically all of the system is underground and artificially lighted, but there has never been an accident in the tunnels which would be attributed to a lack of illumination. As to the efficiency of the block signal system, in the year ended June 30, 1915, there were only fifty-four cases of failure in 63,866,450 signal movements.

In a letter of congratulation written by L. F. Butler, president of the Travelers' Insurance Company, to Wilbur C. Fisk, president of the railroad, Mr. Butler said:

"It seems to me that the man who so conducted the operations of the railroad that 400,000,000 passengers could be transported without a single fatality is equally entitled to commendation, not only for the safeguards installed in shops and power stations, which have proved most efficient, but for the organization of a working force so trained as to thus fully protect people against the hazards of railroad travel and also against their own careless actions.

"Indemnity for the results of accidents was the first purpose of the Travelers' Insurance Company. Constant observation of the conditions led us to believe that it also behooved us to do what we could to prevent accidents. Experience in this line, through our engineering and inspection division, enables us to understand and appreciate the value of your efforts in this direction."

The first award of the Travelers' medal was in 1910, when it was presented to the United States Steel Corporation. Subsequent awards have been as follows: 1911, Pennsylvania Railroad; 1912, New York Edison Company; 1913, New York Telephone Company; 1913, Allgemeine Elektricitäts Gesellschaft of Berlin, Germany (special award); 1914, Commonwealth Edison Company, Chicago; 1915, Hudson & Manhattan Railroad.

ALTERNATIVE TORONTO COMMISSION PLAN

As stated in the ELECTRIC RAILWAY JOURNAL of March 11, page 513, City Solicitor Johnson of Toronto, Ont., in a report made to the Board of Control said that special legislation would have to be secured before a permanent transportation committee could be established.

The personnel of the commission proposed by the Mayor was the works commissioner, corporation counsel, or city solicitor in his absence, the city treasurer, the manager of the Toronto Hydro-Electric System, and the chief engineer of the harbor commission. It was intended to have the commission advise the City Council regarding the action to be taken in preparation for the acquisition of the Toronto Railway and the Toronto electric light system at the expiration of the respective franchises in 1919 and 1921; advise on all matters relating to transportation, including the radial problem within the city limits, and manage and operate civic car lines and the other systems when taken over.

In view of the city solicitor's report the latter clause has been deleted and a recommendation sent on to the Council that the officials mentioned and a member of the Council to be elected by that body, and the Mayor ex-officio, be appointed to act in an advisory capacity. The reason advanced for taking this action was the impossibility of securing legislation this year, and secondly that the work that can be accomplished by the commission this year will be sufficient to demonstrate to the public and the Legislature the need of such a body for the efficient handling of the transportation systems in the city.

The City Council of Toronto, Ont., on March 6 approved the appointment of an advisory transportation commission, consisting of the Mayor ex-officio, one member of the Council to be named later, Works Commissioner Harris, City Solicitor Johnston in the absence of Corporation Counsel Geary, Acting City Treasurer Black until a new treasurer is appointed, Engineer E. L. Couzens of the Harbor Board and General Manager H. H. Couzens of the Civic Hydro System.

INTERNATIONAL RAILWAY TO SPEND $1,150,000

Edward G. Connette, president of the International Railway, Buffalo, N. Y., announces the expenditure of $1,150,000 for the improvement of its lines in Buffalo, Niagara Falls and Lockport during 1916. All of this amount will be expended for the maintenance and improvement of roadbed, new track and other necessary features, but none will be used for new equipment. The most important construction work will be the laying of new track, concrete sub-base and paving between the tracks from the Cold Spring station in Main Street to Fillmore Avenue, a distance of almost 2 miles. This work will be started as soon as the frost is out of the ground and will cost upward of $200,000. Forty other stretches of new track will be laid, including part of the new Bailey Avenue work, a franchise for which has already been granted, and for work in the vicinity of the new Lackawanna passenger terminal at the foot of Main Street. Mr. Connette says that a plan has been worked out by the engineering department whereby the new Main Street track will be laid without inconvenience to traffic on this busy thoroughfare. Continuing the statement says:

"The entire engineering and official force are deeply engrossed in the plans for the construction and operation of the new line to Niagara Falls, which has already been started in the city of Tonawanda. This is a mammoth construction feat, especially because the original plans prepared by engineers had to be completely changed. The new line will comprise 16 miles of double track between the Buffalo city line and Niagara Falls. The road will be built entirely upon private right-of-way, and specially designed cars which will have no equal in the entire country for speed and comfort will operate over the route.

"Structural engineers say the new Niagara Falls line will not only be the most efficient interurban road in the country, but one of the most picturesque. Catenary construction will be used from the Buffalo city line over the entire route. The concrete suspension towers will be placed 200 ft. apart. The new line also involves additional power-plant facilities and seven 1000-kw. rotaries will be installed at various points along the route. It is planned to beautify the right-of-way with trees and grass plots. Construction work has been in progress in Tonawanda for several months, and with the opening of spring the construction will be pushed speedily, as it is the intention of the officials of the company to complete the road before the end of the present year."

PLANS AND ESTIMATES SUBMITTED FOR SEVEN RADIAL LINES

The engineers of the Hydro-Electric Power Commission of Ontario have submitted plans and estimates to Sir Adam Beck covering seven radial railway lines in western Ontario. Surveys and estimates of the cost of construction, operation and traffic data have been completed on the following lines, except in the case of the route through Hamilton, which is awaiting a decision as to the various routes through the city, under consideration. (1) Toronto, Port Credit and Oakville to Hamilton; (2) Hamilton, Grimsby and St. Cathariens to Niagara Falls; (3) St. Catharines, Welland and Port Colborne; (4) Dunnville, Port Colborne, Fort Erie, Bridgeburg and Niagara Falls; (5) Elmira, Waterloo, Berlin, Preston, Galt and Hamilton; (6) Owen Sound, Chesley, Brussels, Seaforth, Woodham and Kirkton. According to Sir Adam Beck the commission is prepared to recommend these projects to the municipalities separately or as a system. The next move will probably be the calling of special meetings of municipal representatives.

CENTRAL RAILWAY CLUB BANQUET HELD IN BUFFALO

Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, New York City, presided at the annual banquet of the Central Railway Club held in Buffalo, N. Y., on March 9. The members of the club and the New York City delegation showed their appreciation of Harry D. Voght, New York, who for twenty-five years has been executive secretary of the organization, by presenting to him a purse of gold and a bundle of bills. Incidentally it was Mr. Voght's silver wedding jubilee.

Among the speakers at the banquet was John J. McInerney, Rochester. He advocated courses in practical electric railroading in colleges and universities. He said that if the sons of railway executives would follow in the footsteps of their fathers, they would be able to reach the highest points of success in the railway field. He suggested the establishment of a railway college, endowed by large steam and electric railway systems to train young men desirous of entering the service. He also advocated wholesome publicity for railroads.

PLANS FOR OPENING EAST BOSTON TUNNEL EXTENSION

The Boston (Mass.) Elevated Railway completed plans to open the West End extension of the East Boston Tunnel on March 18. The extension is about a half mile long and provides a rapid transit outlet from the Scollay Square district westward through one of the most congested areas in the city. The extension carries the East Boston Tunnel under Bowdoin Square to an incline in Cambridge Street near Russell Street, and provides continuous tunnel tracks from Maverick Square, on the east side of Boston Harbor, to the vicinity of the lower portion of the Charles River Basin. The extension contains a station under Bowdoin Square, with a loop for reversing cars from East Boston. Through service will be inaugurated between Orient Heights and Central Square, Cambridge, via the tunnel and its extension, which will facilitate travel to and from Revere Beach with respect to western suburbs of Boston. Provision has been made for the reversal of Cambridge cars at a lower level in the Scollay Square station.

MASSACHUSETTS COMMISSION RECOMMENDS REPEAL OF EXCISE TAX

The Massachusetts Public Service Commission has addressed a report to the Legislature recommending the repeal of the present excise tax upon street railways and urging that the burden be placed upon the companies of paying for the work actually done each year by municipalities in maintaining such portions of any paved streets, roads and bridges as are occupied by railway tracks and similar portions of unpaved public ways plus 18 in. on each side thereof. The commission recommends that instead of actually doing the work, the companies be required to pay for the work performed by the city and town authorities, upon the theory that the latter ought to have undivided authority over their highways. No change in the provisions for snow removal is considered necessary. The board points out that it may be urged against its recommendations that the result would be to substitute for a regular and dependable charge upon the companies an irregular charge varying widely from year to year. This difficulty, the commission points out, may be obviated if the companies will establish reserve funds for meeting such charges, to which regular amounts are yearly contributed, the practice of most of the companies in the case of snow and ice removal. To overcome the possibility of the municipalities charging the companies unreasonably for such work, the commission suggests provision for an appeal to the county commissioners in case of disagreement.

FURTHERING RAPID TRANSIT IN CINCINNATI

The Federated Improvement Associations of Hamilton County, at the regular monthly meeting at the Hotel Gibson, Cincinnati, on March 9, approved the proposed $6,000,000 bond issue for the construction of a municipal rapid transit loop. This was done after reading a resolution signed by three members of the Rapid Transit Commission to the effect that none of the funds from the bond issue will be expended until a plan of operation of the road had been determined and approved by the voters.

The bond issue will be presented to the voters on April 25 for their approval. The plan of operation will then probably be submitted at the fall election.

PRESIDENT PELLISSIER AGAIN ON STAND

L. D. Pellissier, president of the Holyoke (Mass.) Street Railway, was again called to the stand on March 14 as a witness in the pending wages arbitration proceedings. The evidence on that day concerned itself largely with the differences between the company and the men which led to the strike of last summer. Under the 1912 agreement the men contended that they were entitled to a full day's pay regardless of the number of hours worked. Mr. Pellissier pointed out that the company took the view that it should pay only for work actually performed. The witness believed that on the average the Holyoke company paid as high wages as any other railway in the State. On some small roads a greater percentage of every dollar received was paid in wages than on some of the larger systems. It is expected that Prof. A. S. Richey of the Worcester Polytechnic Institute will conclude the principal evidence for the company. He will discuss the cost of living in rebuttal to the union testimony.

PRESIDENT LILIENTHAL FOR COMPROMISE

Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., returned to that city from New York on March 6. He was quoted in the San Francisco *Bulletin* in part as follows:

"I personally am not anxious to sell the branches west of the tunnel. Now is the time they should begin to be profitable because the city is growing in that direction. If the city authorities are anxious to buy, I have concluded, after much thought, not to make opposition. There is a fair price and it can be readily found out in the negotiations should any be commenced.

"It is the experience of cities that a street railway system cannot be a pronounced success unless it has a monopoly of city transportation. San Francisco has made a good start for municipally owned lines. The United Railroads has a big system. They are competitors, and, as such, are working against each other's financial good.

"As the president of the United Railroads, it is my duty to look after and honestly to guard vested property rights. No one realizes the situation better than I. Perhaps some owners of securities in the United Railroads have been criticising my policy. That is their right. We are all subject to criticism. I am trying to do my duty as I think it is best to be done for all the property as a distinct entity.

"I am a believer in good business compromises where we have two such conflicting aims and purposes as are embraced in the dual street railway propositions."

MUSCATINE-IOWA CITY LINE BEGINS OPERATION

March 19 was set as the date of beginning operation with gasoline-electric motor cars on the Muscatine & Iowa City Railway's line between Muscatine, Iowa City and Montezuma, Iowa. A fifty-year lease has been consummated by this company with the Chicago, Rock Island & Pacific Railroad for 104 miles of its lines, as announced in the ELECTRIC RAILWAY JOURNAL of Oct. 30, 1915, page 926. Regular service will be inaugurated with two General Electric passenger motor cars, two steam passenger and three steam freight locomotives. Two more General Electric gasoline-electric motor cars are expected to be received about April 10, when the two steam engines used in passenger service will be released. Later in the year two gas-electric locomotives for freight service will be purchased to release the steam freight engines.

Holyoke Municipal Ownership Bill Rejected.—The committee on street railways of the Massachusetts Legislature has submitted an adverse report upon the bill authorizing the city to purchase the Holyoke Street Railway.

Michigan Railway Using 1200 Volts.—Since about the first of the year, 1200 instead of 2400 volts have been used on the section of the Michigan Railway between Kalamazoo and Grand Rapids described in the ELECTRIC RAILWAY JOURNAL of June 19, 1915. The engineers are making some changes in the electrical equipment.

Illinois Legislature Investigates Home Rule.—An investigation of the public-utilities and home-rule questions in Illinois by a special legislative commission will be undertaken. This decision was reached despite the fact that the Supreme Court ruled that such a commission was without legal authority to subpœna witnesses. Hearings will be held in Springfield and Chicago, and the commission will rely on voluntary witnesses.

Storm Interrupts Long Island Traffic.—The most serious result of the storm in New York on March 15 was the crippling of the service on the electric zone of the Long Island Railroad for several hours. At 7.45 a. m. one of the high-tension feed wires on the Woodside-Winfield cutoff short-circuited and traffic on all electrified lines was brought to a standstill. All of the freight locomotives and switching engines which could be spared were pressed into service to relieve the tie-up of passenger traffic. The New York, New Haven & Hartford Railroad and the New York Central Railroad reported only such delays on their electric divisions as would naturally be incident to the storm conditions which prevailed.

Senate Passes Water Power Bill.—The United States Senate on March 8, after four weeks of debate, passed, by a vote of forty-six to twenty-two, the Shields bill to provide for the development of water power in navigable waters by private capital. As adopted, the bill permits the construction of dams in navigable waters under licenses issued by the Secretary of War, and gives to grantees the right to operate power plants for fifty years, after which time the federal government may take over the plant after giving two years' notice and paying a fair value, to be determined by the Secretary of War and the owner, or by proceedings in the United States courts. Regulation of rates and services is placed with the States in which the plants are located, or, if interstate commerce is involved, with the Interstate Commerce Commission on appeals when the states involved are unable to agree on reasonable rates and adequate service. The bill also provides that no works shall be operated in any combination to limit the output of electric power or in restraint of trade.

Washington Wage Terms Settled Without Arbitration.—Agreements signed on March 12 between officials of the Washington Railway & Electric Company and the Capital Traction Company, Washington, D. C., and committees representing their respective employees settled all differences between the two parties without recourse to arbitration. The agreements are dated March 11, 1916. The wages of all motormen and conductors of the Washington Railway & Electric Company are to be as follows: first year, 23½ cents an hour; second, third, fourth and fifth years, 24½ cents an hour; sixth, seventh, eighth, ninth and tenth years, 25½ cents an hour; after ten years, 27 cents an hour. The wages of all motormen and conductors of the Capital Traction Company are to be as follows: first year, 23½ cents an hour; second, third and fourth years, 24½ cents an hour; fifth and sixth years, 25½ cents an hour; seventh, eighth and ninth years, 26½ cents an hour; tenth year and after, 27 cents an hour. The bonus system of the Capital Traction Company and the profit-sharing system of the Washington Railway & Electric Company automatically end. The new scales apparently assure an average increase in remuneration about the same in each company over the former average compensation of bonus and wages or profit and wages combined.

PROGRAMS OF ASSOCIATION MEETINGS

Illinois Electric Railways Association

The next meeting of the Illinois Electric Railways Association will be held at 10 a. m. on March 31 at the La Salle Hotel, Chicago. The program includes a paper entitled "Power Saving in Car Operation," by G. T. Seely, assistant general manager of the Chicago Elevated Railways, and a paper on the power dispatching system of the East St. Louis & Suburban Railway by G. W. Welsh, superintendent of power of that company.

American Railway Engineering Association

The seventh annual convention of the American Railway Engineering Association will be held at the Congress Hotel, Chicago, Ill., on March 21, 22 and 23, 1916. During the week of this convention the National Railway Appliances Association will have its exhibit at the Coliseum. The address of the president, report of the secretary, report of the treasurer and the reports of standing and special committees will be presented on March 21, while at the evening session on that day there will be an illustrated lecture by Robert W. Hunt, entitled "The Nick and Break Test in the Inspection of Steel Rails" and an illustrated lecture on "Tests of Douglas Fir Stringers," by H. B. MacFarland.

On March 22 the reports of standing and special committees will be presented and announcement made of the result of the ballot for officers for 1916.

The annual dinner will be held in the gold room of the Congress Hotel at 6:30 p. m. on March 22.

On March 23 the reports of standing and special committees will be presented and the officers installed.

On March 24 the delegates will visit the exhibit of the National Railway Appliances Association in the Coliseum.

Southwestern Electrical & Gas Association

The executive committee of the Southwestern Electrical & Gas Association held its pre-convention meeting on Feb. 25. The place and date of the 1916 annual convention was confirmed to be held at Galveston, Tex., on May 17, 18, 19 and 20. The convention headquarters will be at the Hotel Galvez. The various sessions will be as follows: Interurban and street railway sessions, morning and afternoon of May 17; gas members' sessions, paralleling interurban and street railway sessions in another meeting-room; lighting and power sessions, morning and afternoon of May 18; claim agents' sessions, paralleling lighting and power session in another meeting-room; general sessions at which papers, addresses and discussions on topics common to all public utilities will be presented, morning and afternoon of May 19.

A special committee has been appointed to present to the convention a full and formal report on the present status and work of the association and to make suggestions for a broadening of its scope and activities. A special committee has also been appointed on "Publicity and Public Relations," with instructions to obtain the presence of and addresses from authorities on these subjects.

Financial and Corporate

LARGE INCREASE IN MATERIAL PRICES

Tabulation Shows Per Cent Increases in Quotations in Iron, Steel and Metal Markets Since War Began

In order that electric railway operators may have a more definite idea of the enormous increase since the outbreak of the European war in the prices of certain materials that enter into the finished products purchased for railway use, the ELECTRIC RAILWAY JOURNAL has compiled from the *American Metal Market and Daily Iron and Steel Report* the following table:

	Before the War, July 31, 1914	Now, March 15, 1916	Per Cent Increase
Metals*			
Lake copper	13.00	27.75	113
Electrolytic copper	12.75	27.75	117
Casting copper	12.62	26.00	106
Tin	33.00	53.50	62
Lead	3.72	7.75	108
Spelter	4.85	17.55	262
Aluminum	17.25	61.00	253
Antimony	5.50	44.50	709
Metal Products*			
Sheet copper	18.50	34.00	84
Copper wire	14.25	29.50	107
High sheet brass	13.87	40.00	188
Sheet zinc	7.00	25.00	257
Iron and Steel Products*			
Bars	1.15	2.35	104
Plates	1.15	2.60	110
Shapes	1.15	2.35	104
Pipe (¾—3)	1.95	2.65	36
Wire (nails)	1.55	2.40	55
Sheets (28 gage)	1.80	2.75	52
Tin plates	3.30	4.00	21
Pig Iron			
Bessemer, valley	$14.00	$20.50	46
Basic, valley	13.00	18.50	42
No. 2 foundry, valley	13.00	18.50	42
No. 2 foundry, Philadelphia	14.25	19.75	38
No. 2 foundry, Cleveland	13.75	18.80	37
No. 2 foundry, Buffalo	13.00	18.25	40
No. 2 foundry, Chicago	14.50	19.00	31
No. 2 foundry S. Cincinnati	13.25	17.90	36

*Quotation given in cents.

The foregoing quotations are based on wholesale quantities and prompt delivery unless otherwise specified. Owing to the withdrawal of all price lists by the leading manufacturers of brass and copper products, the nominal quotations in these cases are based on the outstanding market and are likely to change at any moment. Steel bars and plates in Pittsburgh and Chicago, structural shapes in Pittsburgh and blue annealed sheets in Pittsburgh and Chicago are for delivery only at mill convenience.

NEW CAPITAL FOR ROCK ISLAND

Main Details Completed for Readjustment of Rock Island Southern Railway by Transfer to New Mississippi Valley Railway & Power Company

According to J. W. Walsh, general manager, the final details will soon be completed for the readjustment of the Rock Island (Ill.) Southern Railway and its subsidiaries, concerning which items were published in the ELECTRIC RAILWAY JOURNAL of May 1 and July 24, 1915. The readjustment will be made through the immediate placing of $300,000 of eastern capital into the business and the taking over of all the properties by the Mississippi Valley Railway & Power Company. This is a new company recently organized under the laws of Delaware with $2,000,000 of preferred stock and $2,500,000 of common stock.

It is reported that the transfer has practically been completed, and the only details left unfinished are the election of officers and the placing of new bonds. A board of directors has been elected, and its first action was to authorize an issue of $1,397,200 of 5 per cent bonds dated July 1, 1915, and due on July 1, 1945. Under plans partially disclosed the new company will take up the improvement of the roadbed, the additon of new equipment, etc. The actual work of improving the property will begin this spring, but pending the election of officers and the settlement of details in connection with the outstanding old bonds, no further information is available.

The readjustment of the company and its allied lines followed a recent visit of H. C. Morand, representing H. P. Taylor & Company, New York, to Illinois for a conference with M. A. Walsh, one of the principal stockholders. Unrealized hopes as to the earning power of the property caused many of the old bondholders to desire a reorganization, and they agreed on the present solution. The companies first accepting the plan, thus making possible the readjustment, were H. P. Taylor & Company, Westinghouse Electric & Manufacturing Company, Rock Island Construction Company, Peoples Gas & Improvement Company and J. J. Fleming, trustee. It is said that under the new plan the fixed annual interest charges will be about $69,000, a decrease of about $67,000.

The Rock Island Southern Railway is principally a 72.29-mile electric system between Monmouth and Rock Island. The new Mississippi Valley Railway & Power Company takes over not only this but also the Aledo Terminal Railway, the Rock Island & Alexis Railway and the Edwards River Power Company, all of which have been operated by the Rock Island Southern Railway. The Rock Island Southern Railroad, an 18-mile leased line between Monmouth and Galesburg, is also said to be included in the present deal.

The directors of the new company are as follows: Albert M. Chambers, New York, N. Y.; T. P. Gaylord, Pittsburgh, Pa.; W. W. Gurley, Chicago, Ill.; J. J. Fleming, Burlington, Iowa; J. A. Hanley, Davenport, Iowa; M. A. Walsh, Clinton, Iowa; H. P. Taylor, Pittsburgh, Pa., and H. C. Morand, New York, N. Y.

ARE UTILITY SECURITIES A BUY?

Roger W. Babson Favors Securities of Reorganized Companies—Thinks Utilities Come Between Industrials and Railroads in Popularity

In the March 4 issue of the *Saturday Evening Post* Roger W. Babson has presented his answer to a question much asked to-day, whether or not the present time offers opportunities for investment in public utilities. In his opinion the securities of such companies are not tremendously popular now, for they no longer appear to be the gold mines they seemed a dozen years ago. On the whole they are not so popular as industrial securities, but they are not to be classed with steam railroad securities, because for many public utilities the day of readjustment has not really come as it has for the steam lines.

Mr. Babson's advice to utility investors is that the time to buy is when others are forced to sell, and the time to sell is when others are crazy to buy. In thus looking about for something unpopular he has been led to the securities of different reorganized companies of which the holders were sick and tired—it being his general belief that the best time to buy stocks is during a reorganization and the best time to sell during promotions.

At the present time Mr. Babson does not feel that one should be over-enthusiastic about public utilities, or should become bearish on them, whether reorganized or not. If one wants to buy, however, and desires to be on the safe side, he should buy only such securities as have had their water squeezed out, of which there are enough to absorb all idle money. Mr. Babson believes that it is good business to stick with any properly reorganized public utility, there being to his mind a great similarity between corporate reorganization and personal regeneration.

Presumably the foregoing advice from Mr. Babson is given from the point of view of the speculator, who can reasonably depend upon the well-known rise in the prices of reorganized securities, rather than from that of the true investor, who is more desirous of stability of income and safety of principal than of quick profits through jumps in market prices. For the investor there are many sound utility securities of companies that have not needed reorganization—securities that fully meet the investment requirements of such conservative institutions as trust companies and savings banks. Mr. Babson's advice seems in general to be better suited to a Wall Street paper than to a magazine with a clientele like that of the *Saturday Evening Post*, for popular readers are not very likely to keep in mind the difference between speculative stocks and real investment values in bonds and conservative stocks unless this difference is at least specifically mentioned.

ANNUAL REPORTS

Municipal Railway of San Francisco

The net profit on operation of the Municipal Railway of San Francisco, Cal., for the fiscal year ended June 30, 1915, was $228,157. This amount compares with a net profit of $216,541 for the calendar year 1914, the report for which is superseded by the new report for the fiscal year. After deducting the comparison charges for service rendered by other departments of the municipal government, for insurance and for taxes—thus to show the accounts as if the municipal railway were owned by a private corporation—the net profit for the fiscal year amounted to $83,135. In the comparative charges there were included $138,254 for federal, state and municipal taxes, and $7,768 for the estimated value of service of other municipal departments.

The total net profit from Dec. 28, 1912, to June 30, 1915, amount to $420,402, or after deducting comparative charges, to $187,441. This statement does not take into account the transfer of $48,971 from the surplus account of the municipal railway to the general fund of the city and county of San Francisco. The accounts as maintained at present are said to be those prescribed by the Interstate Commerce Commission as nearly as practicable, and it is recommended that an ordinance be passed formally adopting the procedure.

The statement of income, profit and loss, for the fiscal year ended June 30, 1915, follows:

Operating revenues:	
Passenger revenues	$1,630,778
Miscellaneous revenues	7,886
Total	$1,638,664
Operating expenses:	
Way and structures	$40,716
Equipment	64,787
Power	201,098
Conducting transportation	564,186
Traffic	308
General and miscellaneous	52,293
General and miscellaneous (comparison charges required by charter)	7,768
Depreciation, and injuries and accidents	294,959
Total	$1,226,115
Net operating revenue	$412,548
Miscellaneous income	10,408
Gross income	$422,956
Deductions from income:	
Taxes (comparison charges required by charter):	
State franchise, 5¼ per cent on gross operating revenue	$86,030
Municipal franchise, 3 per cent on passenger revenue	48,923
Municipal car license	2,471
Federal income, 1 per cent on net income	830
Total taxes	$138,254
Interest on funded debt	202,567
Total	$340,821
Net profit for the fiscal year 1914-1915	$82,135

Since the Municipal Railway of San Francisco really pays no taxes, and no payment is made for the services rendered by the other departments of the city, the above statement must be adjusted to show what is called the "true" net profit for the year. This is done simply by taking the profit, $82,135, and adding the comparative charges for legal and clerical service of $7,768 and for taxes of $138,254, producing a net profit of $228,157 for the year on a non-comparative basis.

On account of the change in the accounting period for the last two reports, detailed comparisons of the returns cannot well be made, but it may be noted that the total passenger revenue for the fiscal year ended June 30, 1915, was $1,630,778 as compared to $1,150,236 for the calendar year 1914, an increase of $480,542, thus indicating, in a general way, the effect of the exposition traffic and the opening of 5.8 miles of single track on Feb. 19, 1915. The total operating expenses for the fiscal year ended June 30, 1915, were $923,388 as compared to $613,939 for the calendar year 1914, an increase of $309,449. The company's passenger revenue was $0.32902 per car mile and $2.8478 per car hour in the fiscal year as compared to $0.35046 and $3.1745 respectively in the calendar year. The operating expense (taxes and depreciation not included) in the fiscal year was $0.18630 per car mile and $1.6125 per car hour as compared to

$0.18706 and $1.6944 respectively in the calendar year. The ratio for operating expenses and taxes, not including depreciation, increased from 62.42 per cent for the calendar year to 65.58 per cent for the fiscal year. Other statistics for the fiscal year are shown in the following table:

	Total Amount	Per Car Mile	Per Car Hour
Operating earnings (taxes and depreciation not deducted)	$707,390	$0.14272	$1.2353
Ratio of earnings to passenger revenue	0.4338		
Total taxes and charter charges	146,022	0.02946	0.2550
Ratio to passenger revenue	0.0895		
Operating expenses and taxes	1,069,410	0.21576	1.8675
Ratio to passenger revenue	0.6558		
Depreciation (including injuries and accidents)	294,959	0.05951	0.5151
Ratio to passenger revenue	0.1809		
Operating expenses and depreciation	1,226,115	0.24738	2,1412
Operating expenses, depreciation and taxes	1,364,369	0.27527	2.3826
Ratio to passenger revenue	0.8366		
Net income from operation (after deduction of depreciation, taxes, etc.)	266,409	0.05375	0.4652
Ratio to passenger revenue	0.1634		
Passenger car mileage	4,956,429		
Passenger car hours	572,637		
Total platform expenses (37½ cents per man-hour, 8 hours per day)	$469,328	0.09470	0.8196

The total number of passengers carried in the fiscal year was 40,369,865 as compared to 27,933,049 for 1914. The revenue passengers carried at 5 cents in the fiscal year were 32,676,932, as compared to 22,732,478 in the calendar year. Other divisions of the traffic in the fiscal year were as follows: Government fares, 24,911; school fares, 278,796; revenue transfers, 653,360; free transfers, 6,442,207, and free passengers (police, employees, etc.), 293,659. In July, 1914, when the company had 22.62 miles of single track in operation and owned seventy-two cars, the passenger revenue amounted to $85,534, or $3,781 per mile of single track operated. In June, 1915, with 43.94 miles of single track and 197 cars, the passenger revenue totaled $185,503, or $4,310 per mile of single track operated. The gradual increases in passenger revenue, mileage and equipment are shown by the following table:

	Passenger Revenue	Mileage Operated	Cars Owned
July, 1914	$85,534	22.62	72
August	97,673	*27.88	95
September	109,079	†32.12	113
October	115,227	32.12	143
November	108,704	32.12	154
December	113,645	‡37.24	197
January, 1915	121,941	37.24	197
February	150,557	§43.04	197
March	184,044	43.04	197
April	174,856	43.04	197
May	184,010	43.04	197
June	185,503	43.04	197

*New mileage opened on Aug. 15, 1914.
†New mileage opened on Sept. 7, 1914.
‡New mileage opened on Dec. 28, 1914.
§New mileage opened on Feb. 19, 1915.

York Railways

The gross earnings of the York (Pa.) Railways for the fiscal year ended Nov. 30, 1915, amounted to $828,299, an increase of $31,654 or 3.9 per cent over 1914. The deductions from gross earnings were as follows: Operating expenses, $411,346, an increase of $3,204 or 0.8 per cent; allowances for depreciation, $20,657, an increase of $3,742 or 22.1 per cent, and taxes, $46,110, an increase of $6,355 or 15.9 per cent—making a total of $478,113, an increase of $13,301 or 2.8 per cent. The net earnings amounted to $350,185, an increase of $18,353 or 5.5 per cent, while the interest and bond discount increased $16,135 or 7.2 per cent, so that the net income at $110,712 showed a gain of only $2,218 or 2 per cent.

The disturbance of trade and industrial conditions arising during the latter part of 1914 and extending in 1915, naturally resulted in a checking of the growth of railway receipts. The greatly increased use of private motor cars also contributed to this result. The return of industrial activity during the latter part of the fiscal year, however, brought about a gradual recovery, and it is the opinion of the management that business conditions are on a decidedly better basis than at the end of last year, and receipts are approaching normal.

The total expenditures charged to cost of property during the year were $377,085, of which total $335,657 was for the York Railways proper. This amount was made up of the following items: Acquisition of stock and bonds of the Merchants' Electric Light, Heat & Power Company, $325,760; acquisition of stock of five suburban electric light companies, $2,500; extensions of track and paving, $6,252, and miscellaneous, $1,144.

OCTOBER, 1915, RETURNS NOT ENCOURAGING

Association Figures Show Increase in Net Operating Revenue Over October, 1914, but a Much Greater One in Taxes

A comparison of the electric railway statistics for October, 1915, with figures for the corresponding month of 1914, made by the information bureau of the American Electric Railway Association, indicates that as a whole the electric railway business in the United States has changed but little. Data for 107 companies reporting to the association show an increase in operating revenue of 1.47 per cent, in operating expenses of 0.74 per cent, and in net revenue of 2.42 per cent, while data for eighty-seven of these companies indicate an increase in taxes of 8.30 per cent. The returns are shown in detail in the accompanying table. Similar data for July, August and September were published in the ELECTRIC RAILWAY JOURNAL of Feb. 26.

The Western group represented by forty-one companies shows a decrease in operating revenue of 4.05 per cent and almost no change in its operating expenses. Thirty-five of the companies in this group show an increase in taxes of 22.23 per cent and a decrease in operating income of 12.66 per cent. The Southern group, represented by twenty companies, though showing almost no increase in revenue and a considerable increase in taxes paid, is still able through a reduction in its operating expenses to show an increase in its operating income. The Eastern group, represented by forty-six companies, shows an increase in operating revenue of about 3 per cent, in operating expenses of about 1.4 per cent and in taxes of about 4 per cent. In the operating income of forty-one of the companies there is an increase of 6.15 per cent. All of the districts except the Western show a slight decrease in the operating ratio, the United States as a whole indicating a decrease from 57.25 for 1914 to 56.53 in 1915. The operating ratio in the Western district has increased from 62.12 in 1914 to 63.81 in 1915.

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS, OCTOBER, 1915

	Companies Reporting Taxes		Companies Not Reporting Taxes	
Account	Amount, October, 1915	Increase Over 1914. Per Cent	Amount October, 1915	Increase Over 1914. Per Cent
United States				
Operating revenues	22,283,651	1.47	20,720,967	1.93
Operating expenses	12,588,380	0.74	11,715,465	0.66
Net operating revenue	9,695,271	2.42	9,005,502	3.64
Taxes	....	...	1,304,833	8.30
Operating income	....	...	7,700,669	2.91
Operating ratio, per cent:				
1915	56.49	...	56.53	...
1914	56.89	...	57.25	...
Number of companies represented	107	...	89	...
*Eastern District**				
Operating revenues	16,766,609	3.03	16,259,429	3.39
Operating expenses	9,219,189	1.44	8,912,506	1.42
Net operating revenue	7,547,420	5.05	7,346,923	5.91
Taxes	....	...	966,675	4.31
Operating income	....	...	6,380,248	6.15
Operating ratio, per cent:				
1915	54.98	...	54.81	...
1914	55.84	...	55.88	...
Number of companies represented	46	...	41	...
*Southern District**				
Operating revenues	1,338,956	0.37	567,489	d4.22
Operating expenses	713,015	d3.18	318,073	d11.43
Net operating revenue	625,941	5.38	240,416	7.13
Taxes	....	...	47,807	16.58
Operating income	....	...	201,609	5.11
Operating ratio, per cent:				
1915	53.25	...	56.04	...
1914	55.48	...	60.70	...
Number of companies represented	20	...	13	...
*Western District**				
Operating revenues	4,178,086	d4.05	3,894,049	d2.89
Operating expenses	2,656,176	d0.39	2,484,886	d0.25
Net operating revenue	1,521,910	d9.83	1,409,163	d7.22
Taxes	....	...	290,351	22.23
Operating income	....	...	1,118,812	d12.66
Operating ratio, per cent:				
1915	63.57	...	63.81	...
1914	61.24	...	62.12	...
Number of companies represented	41	...	35	...

Note—Letter "d" denotes decrease.

*Groupings are as follows: *Eastern District*—East of the Mississippi River and north of the Ohio River. *Southern District*—South of the Ohio River and east of the Mississippi River. *Western District*—West of the Mississippi River.

Bay State Street Railway, Boston, Mass.—The Massachusetts Public Service Commission has received a request from the Bay State Street Railway for permission to issue 7357 additional first preferred shares to be offered to stockholders at par; $400,000 first mortgage bonds of the Boston & Northern Street Railway, and $300,000 like bonds of the Old Colony Street Railway, the money so realized to provide for payment of floating indebtedness and purchase of property necessary to the operation of the railway. The company now has $23,265,800 full-paid stock outstanding, composed of $20,517,200 common and $2,748,600 first preferred. The commission announced that it would hold a hearing on the petition of the company on March 17.

Cleburne (Tex.) Traction Company.—The Cleburne Traction Company has been incorporated with a capital stock of $15,000 by F. C. Cotton, Ft. Worth, and Lawrence Hewitt and Daniel Hewitt, both of Cleburne, to succeed the Cleburne Street Railway, the property of which was sold recently to Mr. Cotton and his associates as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 19, page 381.

Columbia Railway, Gas & Electric Securities Corporation, Columbia, S. C.—The Columbia Railway, Gas & Electric Securities Corporation will redeem on April 1 at 101 and interest at the office of the Columbia Trust Company, New York, all outstanding Series "B" convertible 6 per cent secured gold notes. The total authorized issue was $1,000,000. The notes were offered by Redmond & Company, New York, N. Y., at 99½ and interest. They are dated April 1, 1915, and are due on April 1, 1917, but subject to redemption on any interest date.

Empire United Railways, Inc., Syracuse, N. Y.—Holders of the one-year 6 per cent guaranteed gold notes of the Empire United Railways, Inc., issued under the indenture of Feb. 16, 1915, with the Bankers' Trust Company, New York, N. Y., as trustee, are called upon by the trustee to present their notes for indorsement and to receive $633.627 per $1,000 of notes from funds received from certain of the guarantors.

Kansas City Railway & Light Company, Kansas City, Mo.—The reorganization managers of the Kansas City Railway & Light Company announced that the interest to which depositors are entitled pursuant to the plan and also the interest payable on Jan. 1, 1916, upon the new securities issuable under the plan of reorganization would be paid on March 15 at the office of the New York Trust Company, depositary. It is expected that the permanent engraved securities will be ready for distribution in May.

Northwestern Pennsylvania Railway, Meadville, Pa.—The Northwestern Electric Service Company of Pennsylvania, with general offices in the Commerce Building, Erie, Pa., has been incorporated under the laws of Pennsylvania and has elected the following officers: F. F. Curtze, president; Charles M. Hatch, vice-president and general manager; A. O. Chapin, secretary, all of Erie, Pa. Through purchase of the common stock the Northwestern Electric Service Company will control the Northwestern Pennsylvania Railway, the general office of which will hereafter be in Erie, Pa. The officers previously mentioned hold like offices with the railway. The Northwestern Electric Service Company has leased for ninety-nine years the property of the People's Incandescent Light Company, Meadville, Pa., and will extend its light and power service.

Peterboro (Ont.) Radial Railway.—On March 10 just after the Ontario Legislature rose G. Howard Ferguson, minister of lands, forests and mines, announced that the Ontario government had signed an agreement with the Electric Power Company, which controls what are generally known as the Seymour enterprises, purchasing outright on behalf of the people all the interests of that corporation, including the Peterboro Radial Railway. The purchase is the result of negotiations carried on for some time. The purchase price, $8,350,000, payable in Ontario government 4 per cent bonds, is the amount agreed upon by the engineers of the Hydro-Electric Power Commission.

Public Service Corporation of New Jersey, Newark, N. J.—Drexel & Company, Philadelphia, Pa., have sold the entire issue of $7,500,000 of three-year 5 per cent notes of the Public Service Corporation of New Jersey issued to provide funds to retire a similar amount of notes which, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 19, page 382, matured on March 1.

Stark Electric Railroad, Alliance, Ohio.—A quarterly dividend of 1 per cent has been declared on the $1,250,000 of stock of the Stark Electric Railroad, payable on April 1 to holders of record on March 25. This compares with three-quarters of 1 per cent paid since 1909.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa.—William Marriott Canby, Philadelphia, Pa., is offering for sale first mortgage sinking-fund 5 per cent bonds of the Waterloo, Cedar Falls & Northern Railway, dated Jan. 1, 1910, and due on Jan. 1, 1940, denomination $1,000. The bonds are part of a total authorized issue of $6,000,000 and are secured by an absolute first mortgage upon all property. They are now redeemable all or in part on any interest date at 105 and accrued interest.

DIVIDENDS DECLARED

Cleveland (Ohio) Railway, quarterly, 1½ per cent.

Eastern Power & Light Corporation, New York, N. Y., quarterly, 1½ per cent, preferred.

Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1½ per cent.

Northern Ohio Traction & Light Company, quarterly, 1½ per cent, preferred.

Philadelphia (Pa.) Traction Company, $2.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

Springfield Railway & Light Company, Springfield, Mo., quarterly, 1¾ per cent, preferred.

Stark Electric Railroad, Alliance, Ohio, quarterly, 1 per cent.

West End Street Railway, Boston, Mass., $1.75 common.

West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

West Penn Traction Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred; one-half of 1 per cent on preferred on account of accumulated dividends.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO						
1m., Jan.,	'16	$28,865	*$17,245	$11,620	$11,061	$559
1 " "	'15	25,813	*16,027	9,786	10,961	†1,175
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.						
1m., Jan.,	'16	$1,407,552	*$726,500	$681,052	$411,368	$269,684
1 " "	'15	1,241,903	*650,972	590,931	360,376	230,555
12 " "	'16	14,755,303	*7,863,512	6,891,791	4,557,075	2,334,716
12 " "	'15	14,019,809	*7,534,320	6,485,489	4,229,121	2,256,368
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.						
1m., Jan.,	'16	$229,368	*$137,982	$91,386	$61,853	$29,533
1 " "	'15	206,162	*123,679	82,483	63,285	19,198
12 " "	'16	2,490,176	*1,487,895	1,002,281	754,883	247,398
12 " "	'15	2,598,045	*1,589,618	1,008,427	717,133	291,294
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO						
1m., Jan.,	'16	$113,369	*$76,819	$36,550	$36,109	$441
1 " "	'15	98,336	*71,811	26,525	35,926	†9,401
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.						
1m., Jan.,	'16	$52,883	*$40,350	$12,533	$15,963	†$3,430
1 " "	'15	49,527	*38,608	10,919	15,578	†4,659
12 " "	'16	741,207	*477,165	264,042	190,224	73,818
12 " "	'15	681,150	*467,057	214,093	186,658	27,435
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.						
1m., Jan.,	'16	$196,585	*$116,354	$80,231	$43,083	$37,148
1 " "	'15	184,546	*106,976	77,570	42,018	35,552
12 " "	'16	2,155,941	*1,328,210	827,731	511,653	316,078
12 " "	'15	2,237,022	*1,334,853	902,169	497,545	404,624
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO						
1m., Jan.,	'16	$367,142	*$211,606	$155,536	$53,580	$101,956
1 " "	'15	280,838	*181,978	98,860	50,251	43,609
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.						
1m., Jan.,	'16	$454,988	*$257,732	$197,256	$181,762	$15,494
1 " "	'15	489,713	*261,404	228,309	182,361	45,948
12 " "	'16	5,476,620	*3,069,956	2,406,664	2,207,756	198,908
12 " "	'15	6,180,274	*3,248,001	2,932,273	2,181,758	750,515

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*Includes taxes. †Deficit.

Traffic and Transportation

I. C. C. DECISION FAVORS ELECTRIC LINE

Cancellation of Joint Passenger Fares from Milwaukee, Wis., to Muskegon, Mich., Not Justified

The Interstate Commerce Commission has found that the proposed cancellation of joint passenger fares from Milwaukee, Wis., to Coopersville, Nuncia and Muskegon, Mich., on the line of the Grand Rapids, Grand Haven & Muskegon Railway is not justified and the schedules under suspension have been ordered cancelled. By schedules published to take effect on July 16, 1915, the Crosby Transportation Company proposed to cancel the joint passenger fares. Upon protest by the electric railway the schedules were suspended until May 13, 1916. The protestant operates an electric railroad from Muskegon to Grand Rapids, Mich. Grand Haven is the terminus of a branch line which connects with the main line at Grand Haven Junction. Coopersville and Nuncia are located on protestant's main line between Grand Haven Junction and Grand Rapids and are also served by the Grand Trunk system. Grand Haven and Muskegon are on the eastern shore of Lake Michigan. The Crosby Transportation Company operates a line of boats between Milwaukee and Grand Haven and Muskegon.

The Interstate Commerce Commission found in Damon v. Crosby Transportation Company, 33 I. C. C., 448, decided on March 24, 1915, that the refusal of the Crosby Transportation Company to participate in the sale of through tickets between Milwaukee and Grand Rapids in connection with the Grand Rapids, Grand Haven & Muskegon Railway while it authorized the sale of through tickets between Milwaukee and Grand Rapids in connection with the Detroit, Grand Haven & Milwaukee Railway, operated by the Grand Trunk system, unjustly discriminated against the Grand Rapids, Grand Haven & Muskegon. In complying with the commissions order in that proceeding the Crosby Company established joint passenger fares with the protestant carrier, not only between Milwaukee and Grand Rapids, but also between Milwaukee and Coopersville, Nuncia and Muskegon. The fares from Milwaukee to these points were published in the Crosby Transportation Company's tariff, concurred in by protestant, and the fares in the reverse direction were published in protestant's tariff, concurred in by the Crosby Company. Before proposing the cancellations the latter company withdrew its concurrence relative to the point fares maintained from the three points involved to Milwaukee.

In concluding its opinion the commission said:

"The real reason for the cancellation involved is a dispute relative to divisions. As stated in the report in the Damon case, *supra*, the docks used by the Crosby Transportation Company at Milwaukee are owned by the Chicago, Milwaukee & St. Paul Railway, but are leased by the Grand Trunk. The dock at Grand Haven is owned by the Grand Trunk. After the joint fares were established, the Grand Trunk required the Crosby Transportation Company to pay a charge of 60 cents for each one-way ticket sold at the fares involved, as compensation for the use of the docks and for certain accounting done by the Grand Trunk in connection with their use. The boat line endeavored to pass the charge along to protestant, but protestant refused to shrink its divisions to that extent. Disagreements among carriers relative to divisions of joint rates are insufficient to justify the cancellation of such rates. Furthermore, a similar dock charge has been made by the Grand Trunk for a number of years for passengers traveling between Milwaukee and Grand Rapids, under joint fares between the boat line and the Grand Trunk, which was not challenged in the Damon case, *supra*. The Crosby Transportation Company also participates in joint passenger fares with various rail carriers, and while it does not appear that the Grand Trunk exacts a dock charge in connection with each of these fares, or what the amount of such charge is, if any is exacted, it does appear that in no instance has any connection of the Crosby Transportation Company been called upon to pay this dock charge or any portion of it. We find that the proposed cancellation of the joint fares in question has not been justified, and the schedules under suspension will be ordered canceled."

COPPER ZONE SYSTEM OPPOSED

The Public Utilities Commission of Connecticut has concluded the hearings which it has been holding in connection with the appeal of patrons of the Groton & Stonington Street Railway, operated under lease by the Norwich & Westerly Traction Company, from alleged excessive and discriminatory fares under the copper zone system put into effect last November and similar to that of the Shore Line Electric Railway, controlled by the same interests and described in the ELECTRIC RAILWAY JOURNAL for Sept. 11, page 443. The 2-cent zones average about 0.8 of a mile in length. From the Velvet mill to Elm Grove cemetery on the Old Mystic branch the distance is 0.38 mile. This is the shortest zone. The longest zone is 1.58 mile. Warren G. Burrows, representing the town of Groton, favored a straight 6-cent fare. Senator Hewitt maintained that the zone system was discriminatory and that a 6-cent fare with no change in the zone limits as formerly in use would have been more satisfactory to patrons.

Christopher L. Avery for the company expressed the opinion that the present system was equitable and that the 6-cent fare would also have been opposed. He did not think the plan would be practicable of having the first three zones 5 cents and 2 cents thereafter. He expressed the opinion that under such a plan passengers would not declare their destination, but would endeavor to save a few cents by paying 5 cents every 3 miles.

The company introduced as an expert Carol E. Bailey of the J. G. White Engineering Corporation. He did not think that the property could be built at present for the amount of its capitalization. Mr. Bailey placed the cost to reproduce the property at present at $878,610, exclusive of organization expense. A summary of his estimate of the physical valuation of the property was introduced into the evidence.

In his discussion of the capitalization of the company Mr. Avery said that the opponents of the fare system had introduced no evidence to show that the capitalization was excessive. Mr. Bailey's figures were within 10 per cent of the capitalization and they did not take into account organization expenses. In twelve years the $400,000 of common stock had paid only $50,000 in dividends. Even with the increase in fare put into effect last November the company was receiving only enough to pay operating expenses, fixed charges on the $475,000 of first-mortgage 5 per cent bonds and dividends on $200,000 of preferred stock. The new rates which are under protest did not produce the amount which the company considered adequate.

Senator Hewitt in concluding said that whatever increase in revenue was needed should be produced by a system which would not be discriminatory. He advocated the system of three zones for 5 cents.

The fare matter is also before the Interstate Commerce Commission. On March 10 at Mystic, Alton Gerry, examiner for the commission, took the testimony of witnesses. It appears that an arrangement is in effect under which through tickets are sold between Stonington, Conn., and Westerly, R. I.

RAILWAY TO LEND THE PERSONAL TOUCH

Names Not Numbers Will Be Distinctive on the Cumberland & Westernport Railway

A new idea will probably be inaugurated on the Cumberland & Westernport Electric Railway, Cumberland, Md., operated by Henry L. Doherty & Company, that is expected to be popular and beneficial in its results. At the present time both motormen and conductors are designated almost entirely by number, especially so far as the public is concerned. Under the new plan each car will carry a card stating the names of the motorman and conductor, so that passengers, if they find it necessary to complain or praise, will not confine themselves to certain numerals on the badge of each uniform.

For the last year or so it has been quite common in hotels and banks of the better sort to find notices that Messrs.

So and So are on duty. It has been found that this worked out well as each guest or client, as the case may be, has, knowing the name, felt a more or less personal interest in the man behind the counter. A representative of the company is quoted as follows:

"This scheme has not yet been adopted, but it has been approved by the officers of the railway, and will be put up to the men within a short time. Such a plan, it is felt will enable the men to feel that they are direct representatives of the company, with individuality rather than a number. There are many of them who have chafed under this apparent limitation, and we think the plan will please them. It will also benefit the company, because to any possessed of any ambition it will make him feel that he is not only a motorman or conductor, but a direct representative of the company, whose duty it is to sell further service to the public as well as give it at that time."

ACCIDENT FAKER HELD BY COURT

Maurice Abrams of New York City was arrested in Edgewater, N. J., on March 4, on a charge of attempting to obtain money under false pretences from the Riverside & Fort Lee Ferry Company, a subsidiary of the Public Service Railway. Abrams was committed to the Bergen County jail in Hackensack in default of $500 bail. On March 8 his case was called before Judge Seufort. He pleaded guilty and was held until March 22, 1916, for sentence, in order that the judge might have time to look into his history.

When he presented his claim to the ferry company Abrams alleged that on Feb. 24, when one of the boats of the company on which he was a passenger was entering the ferry slip, a broom was jarred from a seat, where it was alleged to have been left by an employee, the handle striking him on the nose, causing it to bleed and breaking his eyeglasses.

Investigation showed that Abrams had filed many similar claims against transportation and other companies in New York City and vicinity and had collected amounts ranging from $5 to $40. In addition to the name of Maurice Abrams he has also used the names Paul Abrams, Martin Abrams, Maxwell Abrams, Maurice A. Brown and Morris A. Brown.

"Passenger Directors" for East St. Louis.—The East St. Louis & Suburban Railway, East St. Louis, Ill., has stationed two "passenger directors" at principal down-town transfer stations in East St. Louis to direct patrons from 4 p. m. to 6.30 p. m. Two other directors will also be named. These men will wear special uniforms.

Bay State Fare Hearings to Be Resumed in April.—The Massachusetts Public Service Commission will resume hearings on the 6-cent fare case of the Bay State Street Railway on April 17 at the offices of the board in Boston, the company's side of the case now being completed. Evidence will then be heard by the commission from remonstrants against the proposed increase, with the cross-examination of various experts who have appeared on behalf of the company.

Newark Jitney Measure Vetoed.—Mayor Raymond of Newark, N. J., has again vetoed the ordinance providing for the regulation of jitneys in the city. This is the second time that the Mayor has disapproved such an ordinance because of the form in which it was passed by the Council. The regulations provided that a bond of $3,000 be furnished in order to afford protection to the public, while the license fees were made to range from $15 for a seven-passenger car to $75 for a bus seating more than twenty-one people.

Kentucky Compensation Measure Before Governor. — A workman's compensation law has been passed by both houses of the Kentucky Legislature. It will go to the Governor, and, since it was an administration measure, is practically assured of his signature. The measure is practically compulsory since it provides that those employers who do not come in under it will be deprived of the usual common-law defenses in case of suits by employees. No State fund is provided, and insurance may be carried in commercial companies or with mutual organizations.

Conference Regarding Service in Toronto.—On March 10 R. J. Fleming, manager of the Toronto (Ont.) Railway, called on Mayor Church in reference to the indictment proceedings for alleged overcrowding instituted by the Mayor the previous day. Mr. Fleming informed the Mayor that the company contemplated making numerous improvements, but that it was greatly handicapped by the fact that more than 600 of its employees had enlisted and there was great difficulty in filling their places. The Mayor decided to call a special meeting of the Board of Control to permit Mr. Fleming to submit his plans for the improvement of the service.

Intemperate and Dishonest Employees Will Not Be Reinstated.—W. M. Weatherwax, superintendent of transportation of the Chicago (Ill.) Surface Lines, has issued a notice that hereafter in all cases where there is proof that trainmen are using intoxicating liquors on duty, or that conductors are failing to register fares, their suspension from service will be made permanent and there can be no reinstatements. The number of discharges during the year 1915 was 381. Of this number 298 were conductors and eighty-three motormen. The records show that 95 per cent of the discharges were due to intemperance while on duty or to dishonesty. The per cent of discharges from a total of approximately 9000 trainmen is considered small. Eighty-one of the discharged trainmen were reinstated.

Kentucky Senate Passes "Jim Crow" Bill.—The Kentucky State Senate has passed the "Jim Crow" bill, which would require the Louisville Traction Company to segregate the whites and blacks in the city cars. The author of the bill, Senator C. H. Knight, stated in his address supporting the measure that there was a general demand for it in Louisville and that his measure would give the relief desired without imposing hardships on anybody. Senator D. H. Peak, Trimble County, offered an amendment requiring that a seat be furnished for every passenger. This amendment was voted down. Senator T. A. Combs, Lexington, wanted to know why, if "90 per cent of the people of Louisville were in favor of separation of the races in the street cars" the City Council did not require it, since it has sufficient power. The measure goes to the House.

Buffalo Suburban Line Petitions for Fare Revision.—The Buffalo & Lake Erie Traction Company has asked the town officials in the several towns on the Dunkirk and Erie division of the company to agree on an amendment to the franchise placing the matter of fixing passenger charges in the hands of the Public Service Commission, as is now the case between Fredonia and Buffalo. A. R. Myers, general manager of the company, points out that under the prevailing passenger tariff it is impossible to operate between Dunkirk and Erie at a profit. The Public Service Commission for the Second District decided previously that it has no power to modify the terms of a franchise granted by a municipality. This ruling was made in connection with the application of the New York & North Shore Traction Company to the commission asking that it determine that the just and reasonable fare between Mineola and Port Washington was 15 cents, instead of 10 cents, to which the road was limited by franchise terms. The decision in this case was referred to in the ELECTRIC RAILWAY JOURNAL of Sept. 18, 1915, page 610.

Memphis Jitneys Enjoined.—Chancellor Heiskell, in an opinion handed down recently, has permanently enjoined three jitney companies from operating in Memphis, Tenn. He held the jitney ordinances recently passed by the City Commissioners to be invalid. The injunction was asked by the Memphis Street Railway. It is directed against the North Memphis Transit Company, the Rapid Transit Company and the Memphis Jitney Association. In its application for a permanent injunction the street railway contended that former Mayor Love's refusal to sign the jitney ordinances passed over his veto made the ordinances invalid. Chancellor Heiskell sustained the contention, holding that the Mayor's signature to the ordinances was absolutely necessary to make them effective, and that the board of city commissioners could not validate the measures by a two-thirds vote over the Mayor's veto. The court also held that in its opinion a blanket indemnity bond of $5,000 for each company was not sufficient. The chancellor held that he interpreted the law to mean that a $5,000 bond is necessary for each car in the jitney business. The city attorney has announced an appeal to the State Supreme Court.

Personal Mention

Mr. J. D. Scott, formerly power salesman of the Portland Railway, Light & Power Company, Portland, Ore., has been appointed assistant engineer in the office of Mr. O. B. Coldwell, general superintendent of that company.

Mr. J. C. Skinner, who has been with the United Railroads, San Francisco, Cal., almost since its inception, and who for many years was division superintendent at Washington and Mason, has been retired by the company on half pay.

Mr. C. G. Stevenson, assistant shop foreman for the railway department of the Southern Public Utilities Company, Charlotte, N. C., has resigned to go into business for himself. Mr. Stevenson has been succeeded by Mr. C. C. Phillips.

Mr. J. P. Jones has been made division superintendent of the United Railroads, San Francisco, Cal., at Washington and Mason, in addition to his position at Turk and Fillmore. At Washington and Mason he succeeds Mr. J. C. Skinner, who has retired.

Mr. J. E. Richards, auditor and treasurer of the London & Port Stanley Railway, London, Ont., has been appointed manager of the road, succeeding Mr. F. T. Leversuch, resigned. Mr. Richards was formerly with the Chatham, Wallaceburg & Lake Erie Electric Railway.

Mr. C. Sims Bailey has been appointed general superintendent in charge of the Petersburg & Appomattox Railway, Petersburg, Va. Mr. Bailey was formerly general manager and chief engineer of the Richmond & Henrico Railway, Richmond, Va., during construction and operation.

Mr. George W. Lang has been appointed claim agent of the Ottawa (Ont.) Electric Railway. Mr. Lang was born in Ottawa on June 13, 1872, and entered the company's service in June, 1892. From that time until July, 1896, he was a conductor. From July, 1896, to October, 1908, he served with the company as inspector, and from 1908 to 1909 as assistant superintendent. Since 1909 Mr. Lang has been engaged in private business in Calgary, Alta.

Mr. E. H. LeTourneau has been appointed efficiency engineer of the Portland Railway, Light & Power Company, Portland, Ore., to succeed Mr. Edward A. West, who, as announced previously in the ELECTRIC RAILWAY JOURNAL has been appointed chief engineer of the Denver (Col.) Tramway. Mr. LeTourneau recently held the position of assistant engineer in the office of Mr. O. B. Coldwell, general superintendent of the company. He has been with the company for the past six years in various capacities.

Mr. J. S. Pevear has recently been re-elected president of the Birmingham Railway, Light & Power Company, Birmingham, Ala. He has also been chosen general manager of the company to succeed Mr. J. P. H. De Windt, who is now connected with the American Cities Company, of which the Birmingham Railway, Light & Power Company is a subsidiary. On Dec. 1 Mr. Pevear moved his headquarters from New York to Birmingham to take active charge of the operation of the Birmingham Railway, Light & Power Company, of which company he has been president for some time.

Mr. L. Edward Herrmann, Jersey City, private secretary to Governor Fielder of New Jersey, has been appointed to succeed Mr. Frank H. Sommer as counsel of the Board of Public Utility Commissioners of New Jersey. As announced previously in the ELECTRIC RAILWAY JOURNAL Mr. Sommer will retire on April 1 as counsel to become dean of the New York University Law School, but will continue with the commission in an advisory capacity until disposition is made of a number of matters now pending before that body. Mr. Herrmann was born in Jersey City on July 6, 1876. He was educated in the Jersey City public schools, New York University and the New York Law School. While he was studying law he taught in the Jersey City night schools, but subsequently engaged in newspaper work on the Jersey City *News* and the Jersey City *Journal*. He was admitted to the bar in 1901, and began practice in partnership with Mr. Andrew J. Steelman, Jr. He has been secretary to the president of the Senate and the Governor and a member of the Board of Education of Jersey City.

E. W. HOLST

Mr. E. W. Holst, superintendent of equipment of the Bay State Street Railway, Boston, Mass., was elected president of the New England Railroad Club at the annual meeting on March 14. This is an unusual honor for an electric railway official, as most of the members of the club are steam railroad men. Mr. Holst is a native of Norway, where he received his technical education. Part of his early training was obtained with the General Electric Company, beginning with that company's student course. He has been with the Bay State Street Railway and its predecessors since 1904. Mr. Holst's election is not altogether surprising as he has always been a willing worker in railway association affairs. In 1912 he was chairman of the subcommittee on self-propelled cars of the American Electric Railway Engineering Association, the report on which subject was remarkable for the thoroughness of its text and the extensive bibliography. As a member of the equipment committee he also gave particular attention to steel wheel specifications. As a car designer Mr. Holst's work is notable not only for progress in equipment standards and weight reduction, but also for the attention given to car planning from the standpoint of the transportation department.

OBITUARY

W. Frank Carr, Pacific Northwest Coast representative of the Chicago Railway Signal & Supply Company, is dead. He succumbed suddenly to heart failure.

William Norris, general superintendent of the Chatham, Wallaceburg & Lake Erie Electric Railway, died in St. Joseph's Hospital in London, Ont., on March 6, after a three weeks' illness, with pneumonia. Mr. Norris was fifty years old, and was formerly connected with the London (Ont.) Street Railway.

Frederick C. Stevens, formerly State Superintendent of Public Works of New York and State Senator, died suddenly in Attica, N. Y., on March 14. He was sixty-four years old. Mr. Stevens was a director with Mr. O. T. Crosby, Mr. C. A. Lieb, Mr. G. W. Bacon and others of the Columbia Railway, Washington, D. C., before that property was merged into the Washington Railway & Electric Company.

Sir Charles Rivers-Wilson, one of the vice-presidents of the Tramways & Light Railways Association of England, is dead. Sir Charles was born in 1831, and was one of the subscribers to the memorandum of association in 1897. He was elected member of the council and first president of the association in 1899, and at the time of the reconstruction of the association in 1906 he was elected a vice-president, the late Duke of Argyll having accepted the position of president.

Robert M. Jones, who since 1906 maintained an office in Denver, Col., and acted as engineer in the examination and design of many hydroelectric projects throughout the West and in Mexico, died suddenly on March 1 at Carlsbad, N. M. Mr. Jones was born in Wayne, Ohio, in 1853. He was a pioneer in both electric light and electric street railway work. In 1889 he went to Salt Lake City and built under contract the three original systems and a steam power plant there and later two electric railway systems in Montana. He then engaged in hydroelectric work. Later he constructed the plant of the Blue Hills Traction Company at Spearfish, S. D., the first installation in this country using the double-discharge type Francis turbines. He is survived by his widow and five sons.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Argenta Terminal Company, Little Rock, Ark.**—Incorporated to construct a belt line 2½ miles long in Argenta. Capital stock, $42,000. The company will complete the line begun by the Little Rock & Argenta Railway. Incorporators: A. C. Butterworth, C. C. Kavanaugh, C. R. Ledbetter, A. C. Read and C. G. Price.

***Northwestern Electric Service Company of Pennsylvania, Erie, Pa.**—Incorporated in Pennsylvania, with general offices in Commerce Building, Erie. The company will control the Northwestern Pennsylvania Railway. Officers: F. F. Curtze, president; Charles M. Hatch, vice-president and general manager, and A. O. Chapin, secretary, all of Erie.

FRANCHISES

East San Diego, Cal.—The San Diego Electric Railway has received a franchise from the Council to construct an extension of its University Avenue line from Fairmount Avenue to Euclid Avenue.

Pocatello, Idaho.—The Pocatello Traction & Interurban Company has asked the Council for a franchise in Pocatello. [Dec. 18, '15.]

Baltimore, Md.—The Maryland Electric Railway has asked the Council for a franchise to construct an extension to Guilford.

Syracuse, N. Y.—The New York State Railways has asked the Council for a franchise to construct a new track through Oak Street from Farmer Street to Roby Street, Syracuse.

Cleveland, Ohio.—Fielder Sanders, city traction commissioner, has asked the Council for a franchise to extend the Cleveland Railway's line on West Twenty-fifth Street 1½ miles on Pearl Road.

Salt Lake City, Utah.—The Utah Light & Traction Company has received an extension of time on its franchise to construct an extension of its Capitol Hill line. The limit for completion of the line to a point opposite the east entrance of the Capitol on West Canyon Street was extended from March 1 to May 1, while Oct. 1 was set as the date limit for completion of the line north on West Canyon Street to Fourth North Street. From Fourth North Street on to De Soto Street the line must be completed within sixty days after establishment of grade by the city.

Spokane, Wash.—The Spokane Traction Company has asked the Council for a new loop franchise on Madelia Street and has asked for the cancellation of its franchise over the Boone Avenue bridge. Members of the Recreation Park Improvement Club have petitioned the Council to repair the Boone Avenue bridge and compel the Spokane Traction Company to restore car service over this route.

TRACK AND ROADWAY

Calgary (Alta.) Street Railway.—The Council of Calgary has approved an item of $20,000 for additional feeder cable for the Calgary Street Railway.

Martinez & Concord Interurban Railway, Martinez, Cal.—This company has applied to the Railroad Commission for a certificate of public convenience and necessity, and for authority to issue securities to defray the cost of constructing the first unit of its proposed line from Martinez to Concord, a distance of approximately 9 miles. The first unit of its line is to be 3.3 miles in length and will start from Martinez and run to a connection with the Atchison, Topeka & Santa Fe Railway. This unit of the company's line is estimated to cost $83,241. The company desires to issue 650 shares of stock at $45 per share, and $60,000 face value of first mortgage bonds at 90 per cent of their face value to cover this construction cost. The company further desires to issue $60,000 face value of cumulative participating bonds to be sold at par, and to be issued only as its first mortgage bonds are retired and cancelled. The company has secured a fifty-year franchise from Martinez and has arranged for practically all the rights-of-way for the first unit of its line. [Feb. 26, '16.]

***Litchfield County Company, Torrington, Conn.**—It is reported that construction will be begun this summer on this company's proposed line between Torrington and Waterbury, via Litchfield, Bantam, Morris and Watertown, 22 miles. At a recent meeting the Torrington Chamber of Commerce passed by unanimous vote a resolution to co-operate in completing the plans. It is stated that a charter was secured by the Litchfield County Company two years ago, but nothing definite has been done by the company. A. J. Patton Company, Waterbury, is interested.

Wilmington & Philadelphia Traction Company, Wilmington, Del.—Announcement has been made by this company that $100,000 or more will be spent on improvements to Shellpot and Brandywine Springs parks owned by the company and located near Wilmington.

Lewiston-Clarkson Transit Company, Lewiston, Idaho.—H. C. Hartung, manager of the Lewiston-Clarkston Transit Company, reports that track construction on the extension of the company's line from its present terminus at Sixth and Sycamore Streets to Thirteenth Street and Highland Avenue, 1¼ miles, has been begun.

***Union City, Ind.**—Business men of Union City, called together by the Union City Community Welfare League, have approved unanimously the proposed $150,000 subsidy for a traction line from Richmond to Portland, to connect with a northern system of electric railways. Union City's share would amount to about $35,000.

Des Moines (Iowa) City Railway.—The North American Construction Company of Chicago has received a contract from the Des Moines City Railway for the reconstruction of practically all the tracks in the West Des Moines business district and the building of a new loop on Second and Ninth and Walnut and Locust Streets. Work will be begun May 1 and the contract calls for its completion by Aug. 1. The cost will be $120,000. This work is being done in accordance with the new franchise agreement.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company has filed with the Public Utility Commission of Kansas revised plans for the proposed strengthening of the present Kaw River bridge at Lawrence in order to obtain the sanction of the commissioners of the company's request to operate cars across the structure. If accepted, the bridge will be repaired by the company.

Cumberland & Manchester Railroad, Barbourville, Ky.—It is reported that T. J. Anderson, Knoxville, Tenn., has received a contract to grade 8 miles of this company's line beginning at Cannon, Ky. M. E. S. Posey, Barbourville, chief engineer. [Feb. 12, '16.]

Newport & Alexandria Interurban Railroad, Newport, Ky.—Preliminary surveys have been begun on this company's proposed road beginning from the corporation line of Newport. The line will follow the Licking pike to Three Mile Creek, thence along the creek valley to the Alexandria pike. It is the intention to parallel the pike to Alexandria. [March 4, '16.]

Fort Fairfield, Me.—The Fort Fairfield Board of Trade advises that surveys have been made for its proposed railway from Fort Fairfield to Limestone, about 12 miles. As soon as weather conditions permit surveys will be made from Limestone to Van Buren, via Caswell and Hamlin, about 22 miles. [July 4, '14.]

Winnipeg, Man.—It is reported that the Board of Control of Winnipeg is considering the question of constructing several new car lines. G. J. Brown, City Clerk.

Grand Rapids, Holland & Chicago Railway, Holland, Mich.—Bids will be received until noon, March 24, by Frank F. Rogers, State highway commissioner, Lansing, for the construction of a 60-ft. span reinforced-concrete arch with 66-ft. width over all on the Grandville Avenue Road, Wyoming Township, which is also the State trunk line crossing Plaster Creek and containing approximately 1008 cu. yd. of concrete. The bridge is to be built jointly by the Board of County Road Commissioners of the County of Kent, the State Highway Department and the Grand Rapids, Holland & Chicago Railway. Bids will be received on the reinforced-concrete structure complete. Travel must be maintained at all times on the highway and street railway during construction. The bridge must be completed and ready for travel by Sept. 1, 1916.

Electric Short Line Railway, Minneapolis, Minn.—Tentative plans for the extension of this company's line from Hutchinson through Thorp and Clara City to Dawson, 75 miles, have been filed with the Secretary of State.

***Schlater, Miss.**—It is reported that John H. Parson, president Southern Finance & Construction Company, Memphis, Tenn., contemplates the construction of an interurban railway to connect Schlater, Itta Bena, Greenwood and Black Hawk.

***Columbia, Mo.**—It is reported that interests connected with the Keokuk & Hamilton Power Company contemplate the construction of an electric railway from St. Louis to Kansas City via St. Charles, Montgomery City, Fulton, Columbia and Fayette, about 250 miles. The Union Trust Company of St. Louis may be able to give further information.

***Scotts Bluff, Neb.**—It is reported that Wilkinson & Vandees of Denver, who have bought the Cross & Roberts' Electric Light Company of Scotts Bluff, will build an electric railway from Scotts Bluff to Gering.

Trenton, Lakewood & Seacoast Railway, Trenton, N. J.—As soon as weather conditions permit, construction will be begun on the proposed extension along Ocean Avenue from Atlantic Avenue to the Manasquan Inlet, and it is expected that the line will be ready for traffic this summer. The road will be built under the charter granted the Point Pleasant Electric Light & Power Company, but the rolling stock and equipment of the company is to be controlled by the Trenton, Lakewood & Seacoast Railway, and the line will be operated in connection with this company's Lakewood-Point Pleasant system. An extension is being planned from Point Pleasant to Manasquan to connect with the Atlantic Coast Electric Railway. In connection with this branch the company is now considering plans for the construction of a drawbridge over the Manasquan River inlet. A survey is being made for an extension from Trenton to Lakewood. George O. Vanderbilt, Trenton, is interested. [Nov. 6, '15.]

International Railway, Buffalo, N. Y.—Plans are being made by this company for extending its line from the upper Grand Island Ferry on the Niagara River to the wharf of the Wickwire Steel Company, 1¼ miles. Application will be made to the Public Service Commission for the Second District of New York as soon as the company obtains the necessary right-of-way across private property along the river bank. The present Grand Island ferry line operates as a stub service from Riverside Park, charging a 5-cent fare for a distance of about a mile.

***Youngsville & Jamestown Trolley Company, Jamestown, N. Y.**—It is reported that this company will begin work in the spring on the construction of a line from Sugar Grove, Pa., to Jamestown, N. Y. Surveys have been made and much preliminary work done. Eventually the road may be extended from Jamestown to Erie. R. L. Davis is interested.

Long Island Railroad, New York, N. Y.—It is reported that this company contemplates bridge construction requiring about 1000 tons of steel.

Niagara River & Eastern Railway, Niagara Falls, N. Y.—A bill of incorporation has been granted by the railroad committee of the Dominion Parliament to the Ontario-Niagara Connecting Bridge Company, which has been incorporated to construct a general traffic bridge across the lower gorge in the vicinity of the Ontario Power Company's transmission cables. The new bridge will afford connections between American and Canadian electric lines, which is the primary object of its construction. It is reported the plant of the Niagara River & Eastern Railway, whose petition for a certificate of necessity to build a double-track trolley line from the Niagara River to Lockport is now before the Public Service Commission for the Second District of New York, proposes to use the structure to connect with Canadian traction lines and connecting at Lockport with the International Railway and the Lockport and Rochester electric lines. The incorporators of the Niagara Connecting Bridge Company are R. W. Wood, Toronto; Alexander Fraser, Niagara Falls, Ont., and George G. Shepard and Alexander J. Porter, Niagara Falls, N. Y. The company has already obtained a charter from Congress and from the New York State Legislature. [Nov. 13, '15.]

New York State Railways, Utica, N. Y.—The Public Service Commission for the Second District of New York has approved the plans of the New York State Railways for the new tracks made necessary in Whitesboro Street, Utica, and the village of Yorkville by the construction of the new canal bridge. The commission on March 1 approved the two franchises for the new single tracks which will be laid. The old tracks will be torn up. Both of the franchises are to be assigned, with the approval of the commission, to the Utica, Clinton & Binghamton Railway with the proviso that the franchises and the new lines will be included in the lease from the Utica, Clinton & Binghamton Railway to the Utica Belt Line Street Railway, one of the predecessors of the New York State Railways.

Cincinnati (Ohio) Traction Company.—It is reported that construction will be begun about April on this company's extension to Bond Hill.

Brantford (Ont.) Municipal Railway.—The bill which gives the city of Brantford the right to operate the Grand Valley Railway under the name of the Brantford Municipal Railway, has passed the railway committee of the Canadian House of Commons. The line extends from Brantford to Galt through Paris and Dumfries. At the instance of John Fisher, M.P., an amendment was made providing that the municipal corporation shall be subject to the same by-laws as applied to the Grand Valley Railway and that it shall be liable to the same rates and taxes as the Grand Valley Railway would if it continued to own and operate the road.

Toronto, Ont.—The engineers of the Provincial Hydro-Electric Commission have submitted plans and estimates to Sir Adam Beck covering seven radial railway lines in Western Ontario. Surveys and estimates of the cost of construction, operation and traffic data have been completed on the following lines, except in the case of the route through Hamilton, which is awaiting a decision as to the various routes through the city, under consideration: Toronto, Port Credit and Oakville to Hamilton, this line to connect at Port Credit with the Toronto-London line already approved by the voters of the municipalities interested; Hamilton, Grimsby and St. Catharines to Niagara Falls; St. Catharines, Welland and Port Colborne; Dunnville, Port Colborne, Fort Erie, Bridgeburg and Niagara Falls; Elmira, Waterloo, Berlin, Preston, Galt and Hamilton; Owen Sound, Chesley, Brussels, Seaforth, Woodham and Kirkton. This line will connect with that covering the St. Mary's, Stratford, Toronto line, and with the Toronto-London line at Granton. According to Sir Adam Beck the commission is prepared to recommend these projects to the municipalities, whether separately or as a system.

***Doylestown, Pa.**—Plans are being considered to construct a line from Doylestown to Boyertown via Perkasie, Trumbauersville and Pennsburg. It is reported the Perkasie Board of Trade has indorsed the project.

Northwestern Electric Service Company, Erie, Pa.—This company, which has taken over the Northwestern Pennsylvania Railway, will construct a 3½-mile extension to connect the present northern and middle divisions of the railway near Cambridge Springs, upon the completion of which, through service will be operated between Erie, Meadville and Linesville. Construction work will commence on April 1 and it is expected that it will be completed by Jan. 1.

***Monongahela, Pa.**—It is reported that negotiations have been completed by a number of Pittsburgh, New York and Washington capitalists, represented by Thomas A. Taylor of Pittsburgh, for the transfer of the property and rights-of-way of the abandoned Monongahela, Ellsworth & Washington Street Railway, which was formed to build a line from Monongahela to Washington. It is stated that construction will be begun at once, and as soon as wires are strung the line already completed will be placed in operation.

Houston, Richmond & Western Traction Company, Houston, Tex.—It is reported that a survey has been begun between Gonzales and San Antonio on this company's proposed line. At a recent meeting of the board of directors of the company, C. C. Godman, Kansas City, was elected president; E. Kennedy, Houston, vice-president, and C. E. Hansen, San Antonio, treasurer. James Bailey Wells and W. L. Gardien, Gonzales, and C. E. Hansen of San Antonio were elected to the board of directors. [Feb. 12, '15.]

***Marlin, Tex.**—The construction of an interurban railway between Marlin and Waco, 35 miles, is being promoted by C. C. Moser, Dallas, and associates.

Seattle, Wash.—The Board of Public Works has awarded the contract for steel rails for the Ballard and Fremont bridges to the Seattle Frog & Switch Company, Seattle, on its bid of $7,075.64. The city of Seattle will lay and maintain double tracks on both bridges and will exact a rental from the Puget Sound Traction, Light & Power Company for the use of these structures.

SHOPS AND BUILDINGS

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company reports that contracts will soon be let for the construction of new repair shops.

New York Municipal Railway Corporation, Brooklyn, N. Y.—Bids were opened by the Public Service Commission for the First District of New York on March 10 for station finish work on seven stations of the new Broadway subway, the lowest bidder being D. C. Serber, New York, at $344,716. The lowest bid for completing station finish on the Hunter's Point Avenue station on the Queensboro subway was submitted by the Degnon Contracting Company, New York, at $32,319.

Tidewater Power Company, Wilmington, N. C.—This company's carhouse and machine shops at Ninth and Orange Streets, Wilmington, containing two city cars, a suburban car and other valuable equipment, were destroyed by fire on March 1. The loss is estimated at $50,000.

Scioto Valley Traction Company, Columbus, Ohio.—It is reported that this company is considering the construction of a new interurban station at Columbus.

POWER HOUSES AND SUBSTATIONS

Algiers Railway & Lighting Company, New Orleans, La.—It is reported that this company is contemplating improvements to its power plant.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—A report from this company states that it will construct two new substations. The company will purchase two substation outfits complete.

Alabama Traction, Light & Power Company, Ltd., New York, N. Y.—Plans have been made by the Alabama Traction, Light & Power Company to make expenditures totaling more than $2,000,000 on the properties of the Alabama Power Company, its principal subsidiary, in order to meet the heavy demand for electric power in the Birmingham district. A fifth unit of 15,000 kw. will be added to the hydro-electric station at Lock 12 on the Coosa River, which now has 60,000-kw. capacity. A new steam generating station of 20,000-kw. capacity will be erected on the Black Warrior River in the center of the Alabama coal fields, giving the company 40,000 kw. of steam capacity, it already having 20,000 kw. at Gadsden. In addition to this the company will largely extend its system of transmission and distributing lines.

Goldsboro (N. C.) Electric Railway.—This company reports that during the next two weeks a contract will be placed for one 150-kw. motor generator set.

Mansfield Railway, Light & Power Company, Mansfield, Ohio.—This company is contemplating the purchase of a new 3000-kw. turbine with condenser and cooling tower and a 500-kw. 60-cycle rotary converter.

Choctaw Railway & Lighting Company, McAlester, Okla.—A court order has been issued authorizing the receiver of this company to issue receiver's certificates in the amount of $130,000 for improvements and extensions. Among other plans, it is proposed to extend the lines of the company to furnish power to mine operators and to purchase the power plant at Wilburton.

Manufactures and Supplies

ROLLING STOCK

New York Central Railroad, New York, N. Y., is asking for prices on equipment for new multiple-unit cars.

Freeport Railway & Light Company, Freeport, Ill., expects to purchase one single-truck closed motor car.

Frankford, Tacony & Holmesburg Street Railway, Tacony, Pa., has remodeled six short double-truck vestibule cars into folding-door, pay-within cars.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., is contemplating the purchase of twenty-five inclosed city cars of the pay-within type. The cars will be substantially of the same design as now operated in Indianapolis, except that they will be of the prepayment type.

City Light & Traction Company, Sedalia, Mo., has ordered seven cars from the American Car Company. This order was published as a report in the March 4 issue, but the cars will be of the American Car Company's light weight type, and not the "Haller" type as previously reported.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., has ordered three freight car bodies from the Niles Car & Manufacturing Company, eight trucks from the Baldwin Locomotive Works, ten No. 201-A railway motors from the General Electric Company and five P.C. control equipments.

Manhattan & Queens Traction Corporation, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, as having ordered seven new prepayment center-entrance cars from the Cincinnati Car Company, has specified the following details for this equipment:

Seating capacity	54
Weight of car body	15,000 lb.
Bolster centers	2.2 ft.
Length of body (no vestibules).	43 ft. 6 in.
Width overall	8 ft. 11 in.
Height, rails to sills	26 in.
Body	All steel
Interior trim	Cherry
Headlining	None, carline finish
Roof	Arch
Underframe	Steel
Air brakes	West.
Control	West. K.
Curtain fixtures	Cur. Sup. Co.
Destination signs	Hunter
Door-operating device,	Nat'l Pneum. Co.'s, manually operated
Fare boxes	Johnson
Fenders	H. P.
Heaters	Consol.
Motors,	2 West. 337-C. (To be transferred from present cars)
Seats	20 slat cross-seats
Step treads	Feralun
Trolley retrievers	Earle
Trucks,	St. Louis 99-D (to be transferred from present cars)
Ventilators,	Ry. Utility, Honeycomb

TRADE NOTES

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip with ventilators the 100 new cars which are now being built by the Cincinnati Car Company for the Pittsburgh (Pa.) Railways.

Edison Storage Battery Company, East Orange, N. J., has appointed George D. Smith, for the past two years supervisor of agencies for the General Vehicle Company, Inc., as special assistant to Harrison G. Thompson, vice-president and general sales manager of the Edison Company.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., held its sixth annual banquet under the auspices of the Westinghouse Club at the Fort Pitt Hotel. The principal speaker, William L. Saunders, vice-chairman of the Naval Consulting Board, and chairman of the board of directors of the Ingersoll-Rand Company, New York, gave an address on "Industrial Preparedness for Peace and War."

Capt. A. M. Wilson, formerly representative of the Galena-Signal Oil Company on the Pacific Coast with headquarters at Portland, Ore., has been appointed resident manager of the company at Indianapolis, Ind., as successor to L. J. Drake, Jr. As announced on page 482 of the March 4 issue of the ELECTRIC RAILWAY JOURNAL, Mr. Drake has been elected vice-president and director of the Galena-Signal Oil Company and will move to New York City.

Canton Culvert & Silo Company, Canton, Ohio, has received from the Court of Appeals of the District of Columbia exclusive right to use the word "No-Co-Ro" as a trade-mark in connection with the use of its sheet metal. This decision was the result of a suit between the Canton company and the Consolidated Car Heating Company, in which the

Canton company stated that it had used the term since February, 1909, as a trademark in connection with the sale of its sheet metal which it claimed was particularly adapted to the use of electrical resistances.

ADVERTISING LITERATURE

Sprague Electric Works of General Electric Company, New York, N. Y., have issued a catalog describing and listing their various types of electric fans.

Ohmer Fare Register Company, Dayton, Ohio, has issued a bulletin entitled "Human Nature Analyzed and Utilized," in regard to its fare register system.

National Tube Company, Pittsburgh, Pa., has issued sheet No. 1 which makes a notation of some corrections to be made in this company's Catalog J-1915.

Drew Electric & Manufacturing Company, Indianapolis, Ind., has issued a sheet on its motorman's safety mirror for reducing boarding and alighting accidents.

Union Switch & Signal Company, Swissvale, Pa., has issued a bulletin which outlines the facilities of its forging and casting department for making railroad and general forgings.

R. D. Nuttall Company, Pittsburgh, Pa., has issued a condensed reprint of the specification for heat-treated gears and pinions, as recommended by the American Electric Railway Engineering Association, 1915.

Westinghouse, Church, Kerr & Company, New York, N. Y., have issued a circular, "Testing the Aggregate," which shows the saving resulting from blending sand and stone screenings in concrete construction.

William Wharton, Jr., & Company, Easton, Pa., have issued bulletin No. 2 describing their specialties, including "W-J" switch stands, Wharton-O'Brien insulated switch rods, adjustable switch cranks and insulated gage rods.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued a bulletin which analyzes the composition and describes the application of its various types of titanium aluminum and other standard bronze castings. Magnified cross-section views of the alloys are reproduced. The bulletin contains additional information regarding its alloys and also other scientific data, besides that which was published in the company's last year's catalog.

Electric Service Supplies Company, Philadelphia, Pa., has issued a general catalog of the Garton-Daniels lighting arresters. The catalog is divided into four sections, so arranged as to make easy the selection of proper apparatus for any set of conditions. Part 1 contains descriptions and price lists of a.c. arresters up to 20,000 volts, d.c. arresters up to 2400 volts, arc circuit lightning arresters for both a.c. and d.c. circuits, panel-board arresters and lightning arrester cross-arm hangers. Part 2 covers choke coils and disconnecting switches. Part 3 explains the construction and operation of a.c. and d.c. arresters. Part 4 includes general rules for the installation of lightning arresters, grounding, distribution, inspection, and contains diagrams showing the proper method of installation.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued a 110-page book of high technical caliber on the subject of ferro carbon-titanium in steel-making. This begins with a brief description of the material, and a discussion regarding its use in general in connection with the manufacture of steel. Following this, more extended discussions are presented on the treatment of various forms of steel, such as steel castings, forging steel, structural steel, rails, sheet steel, wire and tubing. There is given, also, a study of the action of the alumina in steel and a brief treatise on the determination of alumina in steel. The book concludes with two chapters covering castings of bronze and titanium aluminum bronze. Throughout, the book is notable for its illustrations, among which are some remarkable microphotographs and sulphur prints of steel in various forms as well as a number of highly magnified cross-sections of galvanized and tinned material.

NEW PUBLICATIONS

Purchasing. By H. B. Twyford. D. Van Nostrand Company, New York, N. Y. 236 pages. Cloth, $3.

To electric railway purchasing agents who desire a comprehensive and critical discussion of the proper methods to be used in purchasing work, no publication known is as worthy of commendation as Mr. Twyford's book. Covering in nineteen pages the general theory and ethics of buying, the author then devotes all his attention to the practical side of the question—to an analysis of the purchasing organization and its functions, to a description of its work and the devices used therein, and to an illustration of general methods by the actual practices in certain specific and diversified lines. The practical side of the book is well indicated by the fact that it contains 112 charts, diagrams and forms aptly emphasizing the main points of the text. Electric railway purchasing agents will find information of particular interest in the special chapter about purchasing for railway construction and operation, based on the writer's experience with the Underground Electric Railways of London, England, and in a similar chapter describing the purchasing routine of the J. G. White Engineering Corporation. The book as a whole shows the results of the writer's personal experiences in the endeavor to secure economies through regulated and right buying, and as such is worthy of careful perusal.

Cost of Urban Transportation Service. By F. W. Doolittle, Director Bureau of Fare Research, American Electric Railway Association. Published by the Association, 8 West Fortieth Street, New York. 467 pages. Cloth, $3.50.

About a year and a half ago the Bureau of Fare Research began its work of investigating the many factors affecting the cost of passenger transportation service. Special studies of the bureau on particular points have been published from time to time in the technical and association press, but now all the investigations bearing on the cost of service have been assembled under the above-stated title. The book constitutes Volume II of the *Proceedings* of the American Associate, bound in the usual report form. A copy will be sent to each member company, but in view of the contents the book will also be sold separately to anyone interested in the economics of electric railway operation.

An extended reference to the invaluable character of this work is made in the editorial columns of this issue. The book is divided into five sections, Part I dealing with the costs occasioned in creating electric railways and with the costs of developing and operating them as going concerns. Part II is devoted to an analysis of the nature, tendency and measurement of costs, or according to the chapter divisions, the anatomy of the 5-cent fare, the tendency of operating costs, utility capital and its replacement, the actual returns secured in the traction business and units of comparison. Part III contains six chapters on the characteristics and measurements of service, most of which information was published last year in the ELECTRIC RAILWAY JOURNAL in Mr. Doolittle's series of articles on traffic survey work.

With Part IV the author turns from outlining general parts and principles to applying them to the concrete and specific problems of cost involved in the extension of the area served, in the extension of transfer privileges, in the compliance with service standards and in the study of rapid transit. In this section Mr. Doolittle also discusses at length the cost of competing forms of transportation and the effect of the rate of fare upon the riding habit.

Part V describes briefly the cost-of-service and value-of-service theories, and summarizes the considerations which have made cost of service a controlling factor in rate regulation. Mr. Doolittle mentions the relation between the cost-of-service theory and efficiency in management, and then shows the importance of this theory in two types of regulation—that by contract, as exemplified by the Cleveland Railway case, and that by continuous regulation, well illustrated by the case of The Milwaukee Electric Railway & Light Company.

ORGANIZATION OF EXPORT BUYERS

The Export Buyers' League is about to be formed by J. R. Pels of the Warner Sugar Refining Company, and F. M. Moore of Alexander & Baldwin, Ltd., representing Hawaiian Island sugar interests. It will be associated with the Purchasing Agents' Association of New York, which is a branch of the National Association of Purchasing Agents, of which E. G. Hendricks, New York, is secretary. The New York association holds meetings monthly. The next meeting is to be held on March 21, and will be addressed by several prominent speakers.

Electric Railway Journal

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LIABILITY FOR DEFECTIVE MATERIALS

Up to last week our state courts and the United States Circuit Courts have followed the rule that manufacturers were not liable for injuries resulting from defective materials except in cases where the article concerned was "inherently dangerous," such as a firearm, poisons, etc. The New York Court of Appeals has now reversed this rule, and its decision is of considerable interest in the electric railway industry. The case was one in which the owner of an automobile sued the manufacturer for injuries resulting from the collapse of a wheel after the car had been in use for a year. The motor-car manufacturer showed that he did not make but had bought the wheel from a reliable concern. But the court has now decided that as the "manufacturer of a finished product" the motor-car company is responsible for all defective parts and "was not at liberty to put the finished product on the market without subjecting the component parts to proper test." The collapse of the wheel was shown to have been due to defective wood, and this appears to have been conclusive to the court. The layman is likely to wonder how the manufacturer could be expected to discover a defect in a wheel which did not develop until after a year's constant use. Nevertheless the Court of Appeals of New York decides that such a responsibility rests upon the manufacturer—"the duty of vigilance exists whether you call the danger inherent or imminent," and thus a new terror for manufacturers—and a new safeguard for the public—is established.

THE "SAVING" BY TICKETS

Every once in so often the suggestion is put forward that a railway company can save a great deal of money if it issues tickets at reduced rates, because if passengers do not have to stop to receive change, their ingress into prepayment cars will be facilitated and they will not delay others wishing to board the car. We notice that this idea is again being exploited in the pages of one of our engineering contemporaries. The theory is based, however, on a false premise. A few reconverted cars may have inadequate storage space for passengers, but with the modern prepayment car there is rarely serious delay to car movement caused by a blockade of passengers waiting for the conductor to make change. But if there was much more time lost than there is, the remedy would usually be worse than the disease. With six tickets for a quarter, there would be a direct reduction of 16 per cent in gross receipts for all passengers who buy tickets, and there would be the additional expense of the tickets and the danger of their being counterfeited. When prepayment cars were first introduced there was a fear that there would be some trouble from this cause, but experience has shown that it was unfounded. People get used to presenting the exact fare when they have it, or, if not, a small coin that can quickly be changed. Indeed, the tendency is to give up the use of tickets even for elevated and subway service where they can be sold in quantities even at no reduction from the standard price. The case of the Boston Elevated Railway, as was described in the ELECTRIC RAILWAY JOURNAL for Jan. 8, is an example.

STANDARDS SHOULD CHEAPEN COST

Communications by H. H. Adams and W. G. Gove, published on another page of this issue, show plainly that the ultimate price-reducing influence of Association standards has been at least an important reason for their introduction. The mere establishment of standards, however, does not complete the operation. To be effective, standards must be used, and this fact, apparently, is one that many member companies fail to grasp. They are neglecting an opportunity, although their way is not barred by any real physical difficulty. By the time an association standard is established, it has run the gauntlet of literally unrestricted criticism and has been subjected to revision from a dozen different sources. Even "those who can never look beyond the confines of their own properties," as Mr. Gove puts it, can exert an effective restraining influence merely on the peculiar grounds of their own alleged "local conditions," and when a proposed standard finally acquires a place in the Engineering Manual, it is truly susceptible of universal application. In its final form it is a compromise between many conflicting ideas, and if the conflict has been too great for generally satisfactory adjustment the standard never gets beyond the committee. Back of the whole procedure there has obviously been the idea that when the electric railway industry can stand as a single unit on matters of common practice its buying strength is increased enormously and the conception of something on which the various companies could get together solely for commercial purposes appears in more than half the items composing the association's list of standards and recommendations. However, without co-operative action the efforts devoted to establishing such compromises are wasted. The standard brakeshoe, for example, is doubtless no better than one that is a half inch shorter or longer, and a master mechanic may be perfectly justified, on technical grounds, in saying that his own particular design is just as good. Where he is not justified is in overlooking the fact that a universally-used standard would permit the manufacturers to base their production practice upon the normal demands of the whole industry rather than upon the fluctuating activities of their salesmen, and the resultant cheapening of cost would inevitably come back to the railways through the action of competition. That it should be the larger properties with their wealth of engineering talent who are obstructing this well-conceived plan to aid the electric railways, is not alone distressing. It is a reflection upon the common sense of the whole industry.

THE ANNUAL MAINTENANCE NUMBER

While the annual maintenance number issued last week is fresh in the minds of the readers of the ELECTRIC RAILWAY JOURNAL, the editors wish to summarize very briefly a few salient features of some of the leading articles which contain so much data of immediate and permanent value. In view of the alarming increase in the up-keep cost of track, line and rolling stock in recent years the men who are responsible for the physical equipment of a railway property have every incentive to eliminate unnecessary elements of expense. They will, therefore, appreciate the radical character of the articles in last week's issue, using the word radical in its true sense of getting at the root of things. Take, for example, the discussion of a shop planning system by F. P. Maize, which describes a successful attempt to reduce both labor and material costs by merely eliminating losses.

Again, the analysis of Cleveland Railway track costs on a unit basis furnishes interesting data of a different character, but having the same fundamental value in that it permits comparison which cannot but suggest means of cost reduction. The study of maintenance costs of the Detroit River tunnel locomotives add to the meager but growing store of information in the electrification field and furnishes a basis for future estimates.

Mr. Harte's article on overhead construction puts at the disposal of overhead men the results of the extensive and varied experience of the Connecticut Company. The summary of gas-welding practice on several railways brings together a remarkable collection of information in this important field. In the special department on "Equipment and Its Maintenance," nearly eclipsed by the more pretentious articles, there are several of excellent value. Under the simple but striking caption "Why Trolley Wire Wears Out," S. L. Foster inferentially suggests the ways in which it can be prevented from wearing out so fast. G. H. McKelway describes an ingenious device for use in drawing current from a trolley wire without interrupting traffic, and H. H. Buchman tells how he "killed two birds with one stone" by sheathing some old cars with steel. All of these articles, and others which have not been specifically mentioned, taken together form an epitome of current maintenance practice which, it is believed, will be of real and practical service to the electric railway industry.

CO-OPERATION BETWEEN CLAIM AND TRANSPORTATION DEPARTMENTS

In the important task of accident prevention close co-operation between the claim and transportation departments is clearly invaluable. This is generally appreciated. Without any intention of throwing cold water upon enthusiastic team-play between such departments, however, it is well to consider the field in which each can be of the greatest usefulness in work of this kind.

The main service of the claim department naturally concerns itself with the settlement of accident cases, and, so far as practicable, outside the courts. By reason of exceptional facilities for accident analysis, this department is always in a position to supply the transportation branch of the company organization with information of the utmost interest and worth to the operating man, to say nothing of the benefits to the mechanical department resulting from the investigations of the claim agent and his assistants. Then too, the claim department's knowledge of accident causes renders its staff helpful to the public at large in a good many cases. These conditions qualify a well-conducted department of this kind to submit expert advice to the transportation department, and through a very wide range of operating practice.

As the importance of prevention has become appreciated, the broad knowledge of the claim department is being turned to account more and more in campaigns against the occurrence of accidents. Some of the best work in this field has been done by claim agents. Their experience with the public specially fits them to understand the point of view of the individual patron and unquestionably enables them to appeal for "safety first" in terms which the average man and woman find thoroughly familiar. The claim agent's point of view is also more detached than that of the operating man as he travels about the system, and this, combined with the minute study of accidents which falls to the claim department, make its conclusions and recommendations worthy of the most serious consideration by the transportation department.

These recommendations, however, should practically always be put into effect through the proper channel, not only to maintain the highest standards of discipline in the transportation department but also to enable the latter to pass upon the submitted views and suggestions of the claim agent and his subordinates before they are turned over to the operating organization for service trial. Whenever a representative of the claim department, for example, gives an illustrated talk on safety before a body of platform men, inspectors, etc., the announcement of the meeting should be made by the appropriate transportation official, who should be present in person or represented by another transportation executive of standing in the eyes of the men when the lecture is given. Everything of this sort should be handled under the auspices of the transportation department.

The giving of direct advice and suggestions by claim department representatives to men actually engaged in car service at the moment is liable to disturb the smoothness of operation, although of course an important exception should be made in connection with advice offered to prevent an immediate accident. One difficulty about such informal advice is that it often develops the fact that the giver has never operated a car himself or is not familiar with all of the conditions in the transportation department facts which go far to nullify the usefulness of the advice in the eyes of the uniformed employee. Exigencies of which the claim department is not aware sometimes dictate the use of rolling stock or the handling of traffic under unfavorable conditions, and where the transportation department has an opportunity to weigh the ideas of the claim department and is with the rarest exceptions the sole channel for putting operating practices into effect, the efficiency of inter-departmental co-operation is sure to run higher than where the lines of mutual activity are less clearly defined.

COST OF STOPPING A CAR

Recently two of our readers, apparently interested in the matter of the economies that accompany the skip stop, have asked us to state the cost of stopping and starting a surface car. We would feel fortunate if we were able to make a direct answer, but the problem, like that of the proper size for a cart wheel, involves by far too many variables to be definitely solved even for a special case, let alone a general one.

Even at the very beginning of such an investigation there arises the question as to whether the problem is to be limited to the cost of any one particular stop, or whether it is to be expanded to include the results that would be attained if a large number of stops were either introduced or eliminated, thus affecting schedule speed. The latter alternative, of course, would have to be accepted in case the answer to the problem is to be applied in a discussion of the merits of a skip-stop scheme. Yet in this case the actual stops are no more than a contributing cause; the real cost of making them is submerged in the far-reaching effect that their elimination may or may not have upon schedule speed, and one enters into a maze of contradictory and absurd conclusions just as soon as an attempt is made to express the result of higher speed in terms of expenditure per stop.

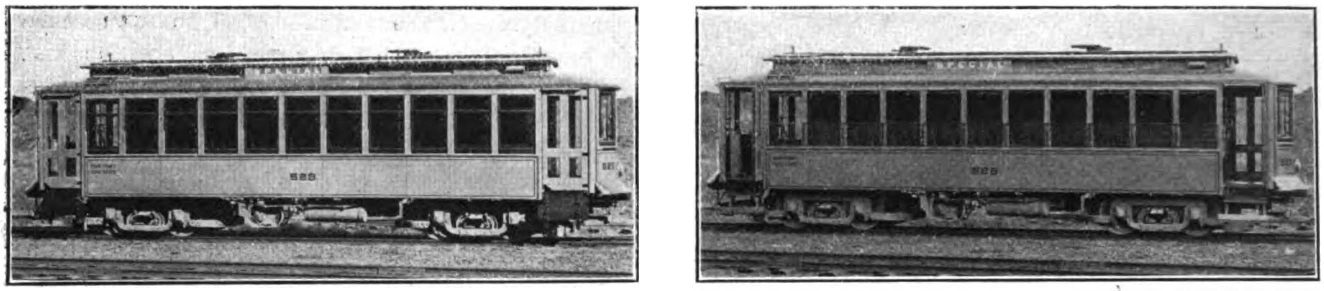
Any single stop, for example, involves a loss of time, but its elimination would not mean that all the consequent expense would be saved. The time loss for one stop, amounting to, say, fifteen seconds, could hardly affect schedule speed even on the shortest of runs. On the other hand, when a large number of stops are eliminated, an increase of 10 per cent and more may occur in the speed, and this in turn effects a corresponding reduction (or its equivalent) in two-thirds of the operating expenses, as pointed out by B. F. Wood in the ELECTRIC RAILWAY JOURNAL for Jan. 1, 1916. The potential expenditure involved in a stop may, therefore, be large, yet the proportion of this expenditure that may be saved by eliminating the stop depends altogether upon the number of favorable factors that may be introduced by the surrounding circumstances.

For this reason the phases of the question dealing with the transportation department cannot be considered unless particular cases are selected and every detail of the operating conditions is known. If a number of stops are to be eliminated the saving must be considered only with regard to the resulting increase in schedule speed, and if this problem is worked out by the method that was followed by Mr. Wood in his article—an analysis of all operating expenses—the direct expenditure due to each stop would be included in the general figures and would not require a separate investigation. There remains, in consequence, only the possibility of determining the expense that is directly involved when a car is stopped and started. This includes consideration of only power and mechanical wear and tear and must of necessity be no more than the roughest of approximations. However, on this basis a generalization may be made.

For the cost of power in d.c. form a unit value of 1 cent per kilowatt-hour may be assumed. This is based upon a liberal estimate of actual cost at the car on a railway of moderate size, overhead charges being not included for arbitary reasons. Assuming a 26-ton car with four 40-hp. motors, the current input during acceleration on resistance would be of the order of 150 amp. for, say, four seconds and 300 amp. for five seconds. After all resistance is cut out there will be a draft of current averaging, say, 160 amp. for about five seconds more, by which time the car would be well under way. At 500 volts this would total approximately 400 watt-hours, having a value of 0.4 cent.

With regard to wear and tear due to stops it may be said that this affects almost every item in maintenance, which should amount to some 2.5 cents per car-mile altogether. Motors, control and air-brake equipment do work, in city service, that is practically in direct proportion to the number of stops. Even trucks and car bodies are affected largely by the racking that comes from rapid acceleration and braking. Some items, wheel wear and axle wear for example, are not influenced greatly, but each is generally small in amount when compared with the whole, being of the order of, say, 0.05 cent or 0.1 cent per car-mile. It is thus possible to say that, generally speaking, wear and tear due to stops should amount to some two-thirds of the whole cost of maintenance, or, say, 1.6 cent per car-mile. If the average car makes ten stops per mile, including those necessitated by vehicular interference, and the cost of wear and tear is distributed over all stops, the cost per stop would be 0.16 cents.

When this figure is added to the previously estimated cost of power, the total direct cost per stop would become 0.56 cent. Since this is the roughest kind of an approximation, however, the figure of 0.5 cent per stop might perhaps be more convenient to use, and this is presumably close enough to the truth for purposes of generalization. However, it should be emphasized, as mentioned previously, that this represents only the direct cost, and that the figure makes no allowance for the losses in time, which may have a very much larger cumulative value.



REBUILT CARS—VIEWS SHOWING CARS AT WORCESTER, REBUILT FROM TWELVE-BENCH OPEN CAR; ONE VIEW SHOWING CAR ARRANGED FOR WINTER SERVICE, THE OTHER AS ARRANGED FOR SUMMER SERVICE

Open Cars Changed to Prepayment

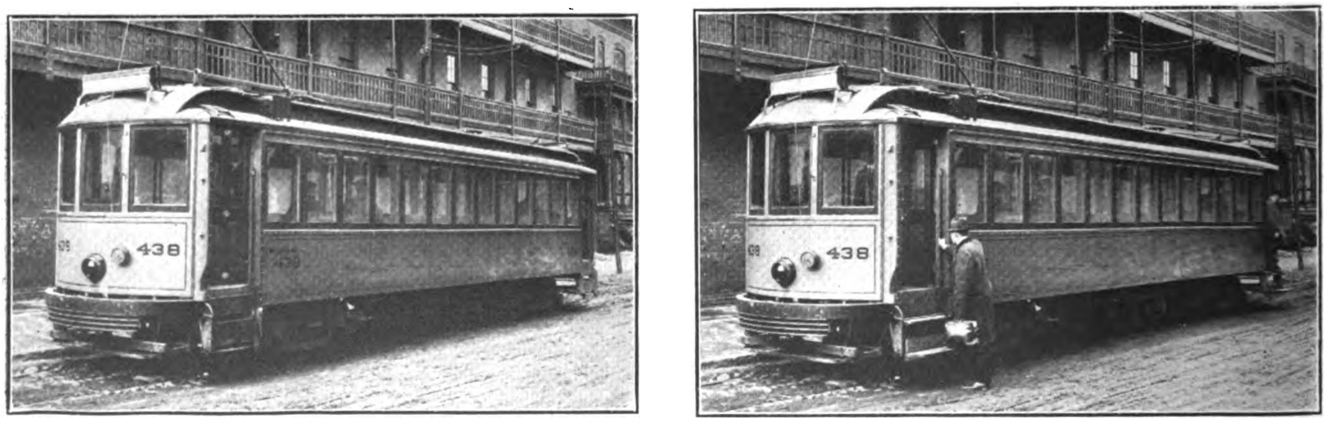
Features of Remodeled Rolling Stock on the Springfield and Worcester Systems Provide for Rapid Handling of Traffic, Entire Freedom from Boarding and Alighting Accidents, Convenience of Access and Satisfactory Service at All Seasons

FIFTY-THREE open cars are being remodelled for all-the-year-around prepayment service by the Springfield (Mass.) Street Railway and Worcester (Mass.) Consolidated Street Railway, and as far as the Equipment has been placed on the local lines, it is giving excellent satisfaction from the standpoints of the public and of the operating organizations. The endeavor has been to secure a commodious car, safety in boarding and alighting through the use of folding doors and steps, adaptability to all weathers, easy access and the advantages of prepayment service. The change is being made at a cost, including all new equipment, not exceeding $1,500 per car, the work for the Springfield lines being done by the Wason Manufacturing Company, Brightwood, Mass., and that for the Worcester lines by the Osgood-Bradley Car Company, Worcester, Mass.

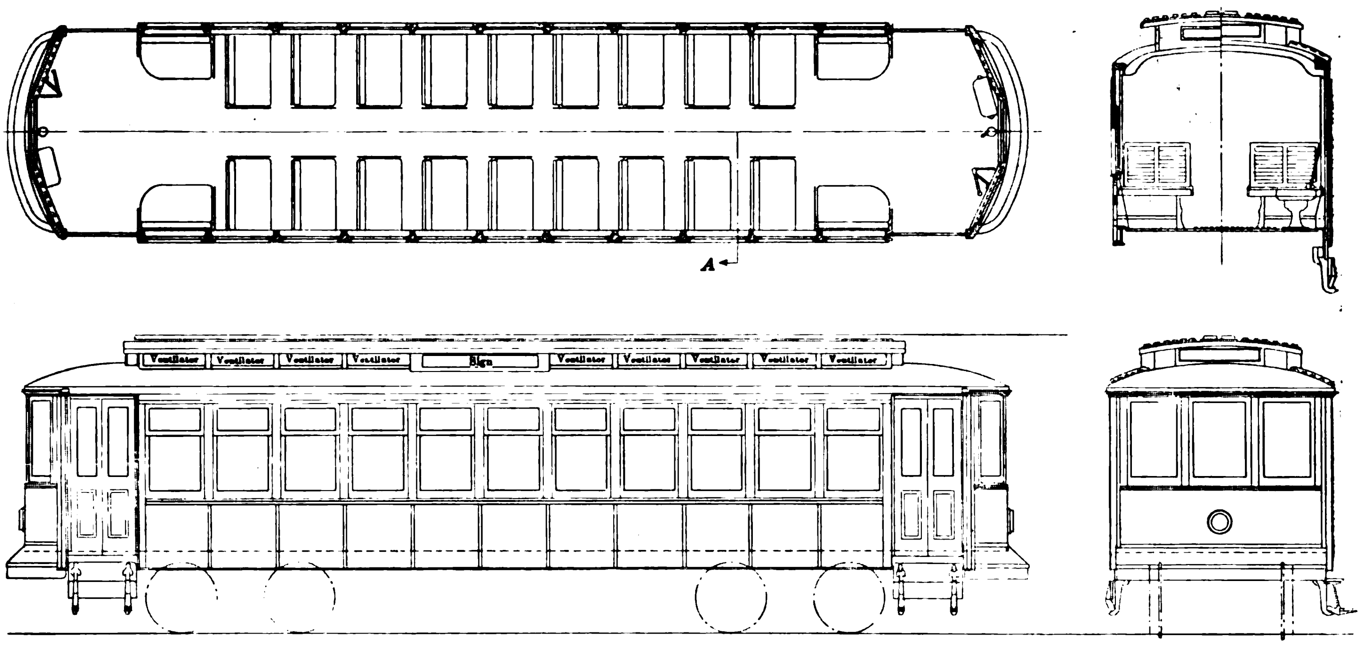
Thirteen of the Springfield cars are being rebuilt from fourteen-bench and fifteen from twelve-bench opens. All the Worcester cars are being converted from twelve-bench units. The general redesign of the cars is the same for both roads, the equipment all being of the double-truck type, with four motors, straight air-brakes, 33-in. wheels and without interior bulkheads. The doorway entrance is 32 in. wide, compared with a frequent allowance of 21 in. to 23 in. in a prepayment platform car with center post or stanchion. The platform is on the same level as the floor of the car, and both cross and longitudinal seats are provided. The converted fourteen-bench cars seat fifty-two passengers each and the smaller units forty-four passengers. The fourteen-bench cars when rebuilt are about 44 ft. long over all, the converted twelve-bench units being about 39 ft. long. All are equipped with GE-80 motors, with 19.67 gear ratio, Standard 050 trucks, Pfingst fenders, Gold electric heaters, Perry ventilators, GE air brakes, Murphy sand boxes, Crouse-Hinds headlights, Wilson trolley catchers and International registers and fare boxes. A 7-in. Hedley anti-climber, 5 ft. long, is installed on each end, extending below the present buffer and braced by 3-in. x ¾-in. irons.

The provision of a common level for vestibule and car flooring, with an unusually wide entrance tends to increase the speed of loading and unloading somewhat, and the step heights are favorable to the free movement of traffic. A maximum of 14 in. is allowed between the top of the rail and the first step, the riser heights on the two steps being 13½ and 12½ in., including a ¼-in. safety tread 3 in. wide at the edge of each. The aisles are 27 in. wide between cross-seats, giving a desirable freedom of movement within. The fare box and door-operating handle, which also controls the movement of the entrance steps, are mounted on a 1-in. pipe frame stanchion inside the vestibule, as shown in the accompanying interior view looking toward the conductor's post.

Passengers leave by the front door, another feature contributing to prompt handling of traffic. Slightly less time is required for loading than on the latest types of prepayment cars used at Springfield, the unloading time being about the same. The vestibule doors are



REBUILT CARS—CAR FOR SPRINGFIELD REBUILD FROM FOURTEEN-BENCH OPEN CAR; ONE VIEW SHOWING DOORS CLOSED AND STEPS FOLDED, THE OTHER SHOWING DOORS OPEN AND STEPS DOWN



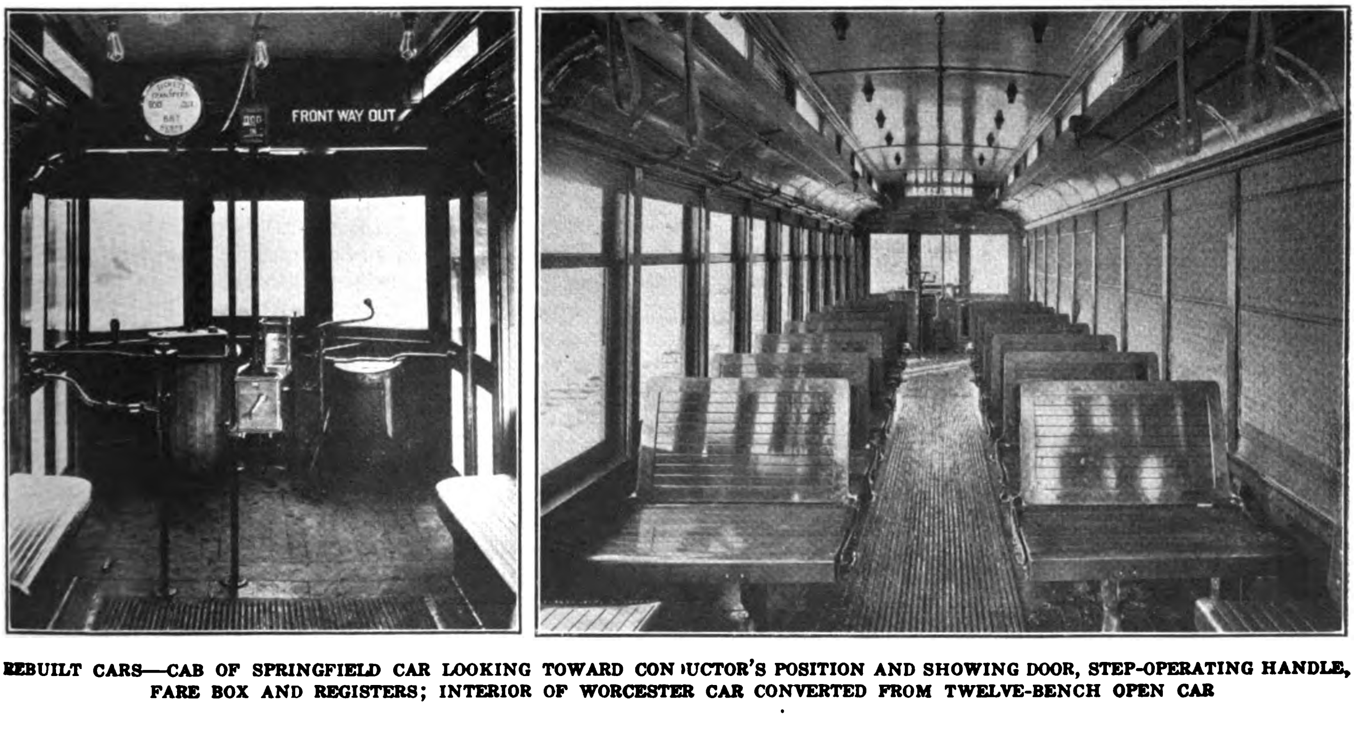
REBUILT CARS—GENERAL ARRANGEMENT OF 39-FT. CONVERTIBLE CAR FOR WORCESTER, REBUILT FROM AN OPEN CAR

provided with wired-glass sashes carried nearly to the floor, and the step risers and vestibule head linings are marked to guide the movement of passengers forward from the time of boarding to the time of alighting. The width of the car inside at the usual bulkhead location is 7 ft. 1 in., and the steps are 32 in. long. The step hanger with steps folded extends only 1½ in. beyond the car.

In rebuilding, the former cross-seats are dismantled, *but the* main framing is left intact. The sills are furred out even with the side posts and the necessary strips applied to straighten the posts so that they will receive the panels, which are of sheet steel and carried to a point 26¾ in. above the floor. The top edge is finished with a pressed steel stool which receives the curtains and sash, these being applied from the outside. In the Wason cars the space between the underside of the letterboard and the stool is filled with mahogany sash, carrying one light of double thick glass. The sash are fastened to the side of the car with iron battens over the joints and bolted through the posts with nuts set in flush on the inside of the post, the bolts being arranged so that, when the sash are removed, they can be screwed in tight against the post to stop the holes and make the finish, the inside of the post being covered with a 2-in. x ⅛-in. strip screwed upon the post and painted to match the interior finish.

All four corners are provided with double folding steps, both steps on each side of each platform being worked as a unit in connection with the double folding doors. The left-hand steps are arranged to work from the conductor's control staff, which is placed at a point approximately under the end plate, the steps on the opposite side being worked from the motorman's control staff. The steps are provided with a spring balance to facilitate easy working.

New flooring is laid as required in rebuilding, and the previous underframing is utilized, together with the



REBUILT CARS—CAB OF SPRINGFIELD CAR LOOKING TOWARD CONDUCTOR'S POSITION AND SHOWING DOOR, STEP-OPERATING HANDLE, FARE BOX AND REGISTERS; INTERIOR OF WORCESTER CAR CONVERTED FROM TWELVE-BENCH OPEN CAR posts and roof structure. Corrugated floor matting is provided in the aisles between the cross-seats, and the latter are of the Walkover type, eighteen being provided in the case of the fourteen-bench cars and fourteen in the case of the twelve-bench cars. All seats are of birch slats without other covering, and the cross-seats are 36 in. long and 18 in. wide, spaced 14 in. apart in the clear, with curved backs 15 in. high. The seats are provided with concave surfaces, but have no foot rests. There are four longitudinal seats in each car at the ends, 5 ft. 1 in. long by 2 ft. 4 in. wide, the backs being 12 in. high. The "Faraday" push button signal system is provided, and the cars are equipped with a row of 23-watt tungsten lamps along each side and supplemented by three similar lamps in a central row, there being nine lamps per side in the larger cars.

The side curtains of the former open cars are removed, cut off and rebound with a flap 2½ in. wide at the bottom so as to prevent water from beating in over the stools. The motorman is provided with a curtain 33 in. wide which is made of old curtain material taken from the end panels of the open cars and which drops to within 28 in. of the floor. Straps are attached to the monitor sill by a 2-in. x 2½-in. iron plate screwed to the sill. A heater is located under each seat and "Utility" automatic temperature control is provided.

All the wiring except that between motors and controllers, and other circuits beneath the car is done by the builders. All cars will shortly be equipped with a line switch governed by the door opening, so that it will be impossible to start a car in case the doors are open. In general, the builders are made responsible for the superstructural wiring.

The Worcester cars are provided with a smaller top sash which can be opened by releasing appropriate locks, the Springfield cars being equipped with single sashes which are fixed in position and removable only for summer service. Two grab handles are provided at each entrance door and one at each exit door. The weights of the fourteen-bench car before and after rebuilding are approximately 45,900 and 50,000 lb. respectively.

Montreal Recruiting Car

That the Montreal (Que.) Tramways are taking an active part in the Canadian recruiting campaign is evidenced by the accompanying illustration of a single-truck car which is being used at the present time by the 148th Battalion for recruiting purposes. This car is placed in the park space on Victoria Square at St. James Street directly in front of the Queen Victoria monument.

148th OVERSEAS BATT 148th

MONTREAL RECRUITING CAR

The Siemens-Schuckert Works in Germany have introduced a controller handle and reverser handle made of iron and wood with which to replace the copper and brass handle now used on tram cars, so that the latter may be "mobilized" for army use.

Purchasing Agents Organize

General Objects and Subjects of Discussion for Columbus Association Are Outlined—Office Hours for Salesmen Are Utilized by One Member

The membership of the Columbus Purchasing Agents' Association, the organization of which was briefly described in the Electric Railway Journal of Jan. 15, page 140, consists of the purchasing agents, buyers and other persons having authority to specify and buy, but not primarily engaged in sales, in the city of Columbus. The association is now a branch of the National Purchasing Agents' Association. The main objects of the body are the promoting of friendly relations among the members, the interchange of ideas, the familiarizing of the members with the products they buy, the securing of more uniform purchasing methods, the standardization of specifications, classifications, etc., the gathering and the dissemination of data on buying, and the improving of existing methods for the diffusion of market information. From time to time specialists will be secured to address the members on topics and problems of importance.

One of the points that should be emphasized, in view of the erroneous views of some persons in this regard, is that no prices are divulged in the meetings of the association. The discussion will cover such topics as the "order blank," with the idea of producing a more uniform blank with all necessary information, but with unnecessary printing eliminated; the standardization of all forms, with necessary data such as f.o.b. point, time of delivery, etc., included; methods of making requisitions; follow-up methods; filing systems, etc.

In cases where any members have unfavorable experiences with manufacturers which would reflect upon the standing of the latter, the incidents will be related at meetings that are for members only. On the other hand, when manufacturers show themselves to be above the average in handling their business transactions, this fact will also be brought to the attention of the association. Thus there will be a decided tendency to eliminate unscrupulous dealers and make the way easier for firms maintaining high standards of service and material.

One of the charter members of the association, W. V. C. Bulkeley, purchasing agent Columbus Railway, Power & Light Company, has in his department a practice that will undoubtedly come up for discussion and probably for emulation. This is the practice of having office hours for visiting salesmen between 9 a. m. and 11.30 a. m., and of showing this fact on all forms that pass outside of the company, such as bid, order and tracer forms and all letterheads. With a large number of salesmen passing through Columbus, and with a convenient location in the downtown section, Mr. Bulkeley has found it decidedly to his advantage to maintain these office hours so that he can have the afternoon to take care of his office work and also that of the storerooms, which are under his control. Moreover, it is of decided advantage to the salesmen to know that there is a definite time when they can see the official with whom they desire to transact business. The plan causes all of the salesmen for the day to visit the office in the period of two and one-half hours, which naturally shortens the time consumed by the purchasing agent in seeing them, and furthermore makes it possible for him to set special appointments for afternoon meetings, which are not interrupted. If salesmen from out of town passing through Columbus happen to arrive in the afternoon, and it would not seriously inconvenience the work of the department, they would, of course, be seen, but inasmuch as the office hours are well advertised they are generally understood.

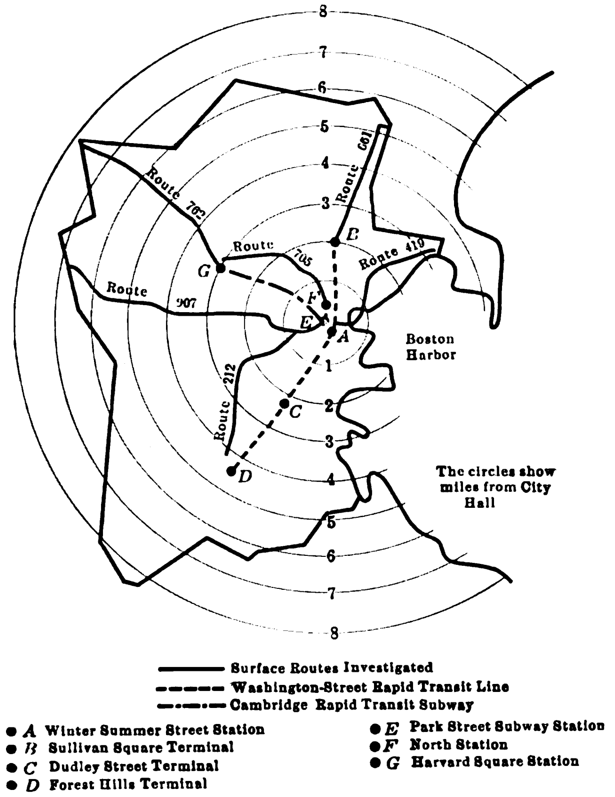
Determining the Actual Length of Ride

Description of a Traffic-Count Method to Show the Average Length of Ride in Urban Electric Railway Service, and Relative Proportions of Passengers Taking Long, Short and Average Rides

By D. J. McGRATH
Research Assistant Massachusetts Institute of Technology

IN spite of the occasional traffic counts and investigations that have been made in various American cities, there is almost no information available as to the average length of ride taken by passengers on the urban electric railways, and with one trifling exception, nothing as to the relative proportions of the passengers taking long, short and average rides. Many claims have been advanced by railway operators that they are carrying passengers too far for the 5-cent fare, and, on the other hand, some people claim that a large proportion of the patrons have to pay 5 cents to ride a very short distance.

For the purpose of obtaining some positive data upon this subject and to develop and test a method for obtaining such data, the research division of the electrical engineering department of the Massachusetts Institute of Technology secured permission from the Boston (Mass.) Elevated Railway to conduct an investigation upon its lines in the spring of 1915. A party of eight senior students in the electrical engineering course at the institute volunteered to perform the work of securing and tabulating the data as their thesis.


8
7
6
5
4
3
2
1
Route 762
Route 661
Route 705
Route 419
Route 907
Route 212
A
B
C
D
E
F
G
Boston Harbor
The circles show miles from City Hall
Surface Routes Investigated
Washington-Street Rapid Transit Line
Cambridge Rapid Transit Subway
● A Winter Summer Street Station
● B Sullivan Square Terminal
● C Dudley Street Terminal
● D Forest Hills Terminal
● E Park Street Subway Station
● F North Station
● G Harvard Square Station

TRAFFIC COUNT—FIG. 1—SHOWING SINGLE-FARE UNIVERSAL-TRANSFER AREA OF BOSTON ELEVATED RAILWAY AND REPRESENTATIVE LINES

That their efforts were successful and the results so satisfactory was due in no small measure to the assistance and friendly interest of Matthew C. Brush, vice-president, Edward Dana, superintendent of traffic, and the transportation employees generally of the Boston Elevated Railway. James A. Emery of the Department of City Transit, Philadelphia, furnished some valuable suggestions from his experience with traffic investigations in that city. The agreeable attitude of the general public of Boston was, of course, the one most essential factor in the success of this work. That out of about 10,000 persons questioned only an occasional refusal to give information was met with, speaks well for the attitude of the public and the spirit of the students who were conducting the work.

The inbound traffic on six representative lines of the surface system was studied, as well as the outbound traffic from the center of Boston on the north and southbound rapid transit line. The amount of data thus obtained came from only a comparatively small portion of the total passenger traffic in and about Boston, and to make a thorough investigation of this system would require a somewhat more extensive campaign. The main object of this particular investigation was to prove that it is both possible and practicable to determine with some accuracy the proportions of passengers taking rides of various lengths on a complicated city electric railway system.

The results as presented in the following discussion are valuable in that they demonstrate these important points:

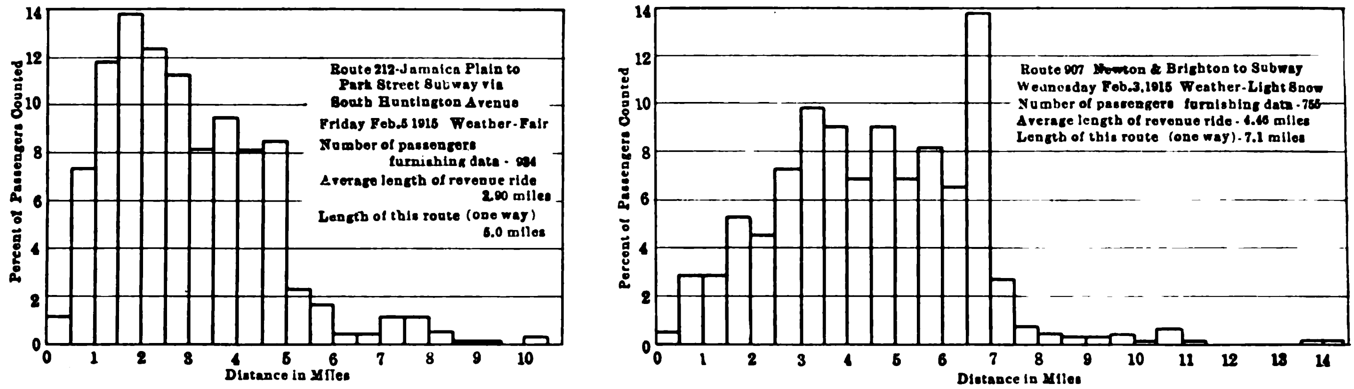
1. That there is a very considerable amount of passenger traffic throughout the city riding 5 miles or more for 5 cents.
2. That the amount of extremely long riding, such as from one suburb through the center of the city out to another suburb, is appreciable but not abnormally large.
3. That there is a considerable amount of short riding of 2 miles or less for the same fare, 5 cents.
4. That it is evident on all the lines studied that the average transfer-passenger rides further than the average non-transfer passenger, and, moreover, the average length of ride is still further increased for those passengers using double and triple free transfers, as is possible on the Boston system.
5. That the average length of ride, from start to ultimate destination, of passengers originating on the lines studied, is as follows:

Route 212, Jamaica Plain to Park Street, Subway......	2.9 miles
Route 419, Orient Heights to Scollay Square............	3.0 miles
Route 661, Linden to Sullivan Square*.................	5.4 miles
Route 705, Harvard Square to Subway via North Station	2.7 miles
Route 762, Arlington Heights to Harvard Square*......	5.8 miles
Route 907, Newton and Brighton, Park Street to Subway	4.3 miles
Route 907, Newton and Brighton, Park Street to Subway	4.5 miles

*At these points, passengers transfer (free) to the rapid-transit trains, which take them in to the center of Boston.

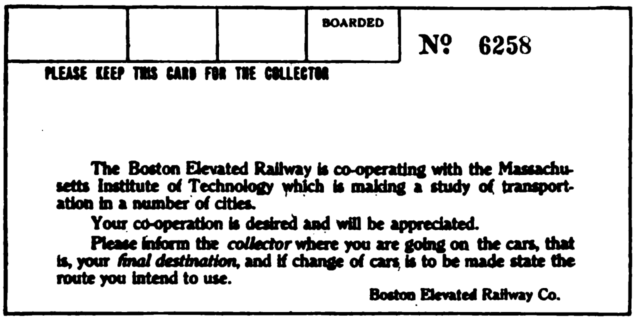
The two counts on the last-named line were made on different days of the week and on a different running schedule for the observers, the results checking remarkably well.

The map, Fig. 1, shows the whole single-fare area of the Boston Elevated Railway system in which universal free transfers are offered between surface, subway and elevated lines. The map also shows the various locations of the six different surface lines which are named above.



TRAFFIC COUNT—FIGS. 3 AND 4—SHOWING THE PROPORTION OF PASSENGERS TAKING VARIOUS LENGTHS OF RIDE ON BOSTON SURFACE ROUTES 212 AND 907

In order to obtain data in the matter under inquiry, it was necessary to determine in some way the origins and destinations of a representative number of passengers on representative lines of the whole railway system. After formulating and discussing a number of possible plans, it was finally decided to place two observers on inbound surface cars of the lines chosen, these men to note the street where each passenger boarded the car and to learn by directly questioning the passenger his intended ultimate destination route.



			BOARDED

Nº 6258

PLEASE KEEP THIS CARD FOR THE COLLECTOR

The Boston Elevated Railway is co-operating with the Massachusetts Institute of Technology which is making a study of transportation in a number of cities.

Your co-operation is desired and will be appreciated.

Please inform the *collector* where you are going on the cars, that is, your *final destination*, and if change of cars is to be made state the route you intend to use.

Boston Elevated Railway Co.

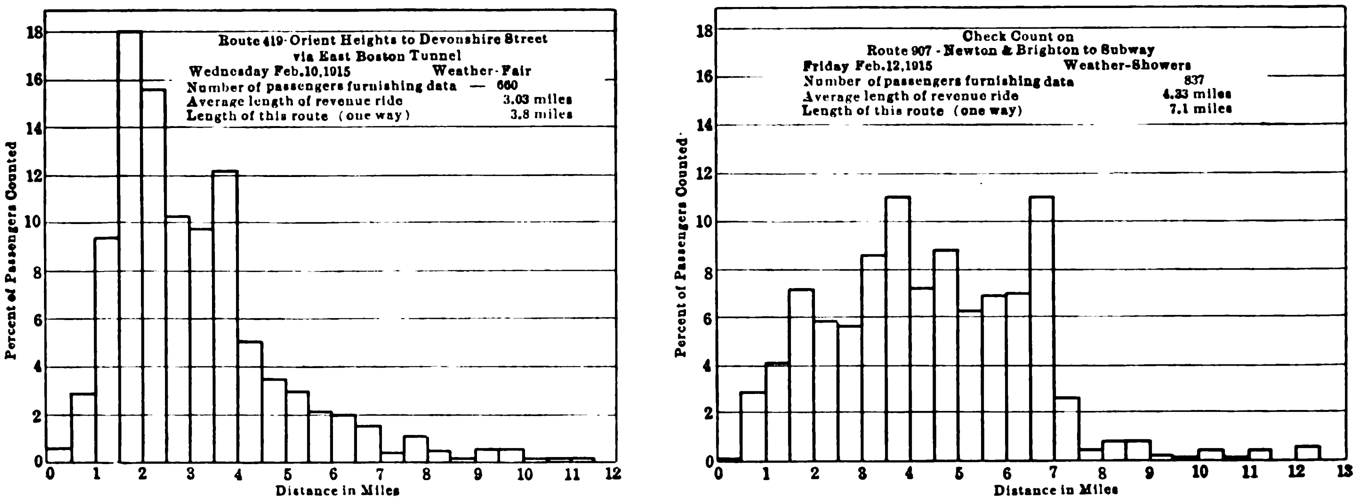
TRAFFIC COUNT—FIG. 2—SHOWING FORM OF SLIP USED IN SURFACE-LINE INVESTIGATION

As the traffic on these lines is quite heavy and the number of men available for the work was limited, only a part of all the trips run on a given line on the day of the count could be covered. Only inbound traffic was studied, as the fare and transfer system in the intown stations is so complicated that it would require a second question to learn the point of origin of outbound passengers. The reasonable assumption was made that outbound traffic on the lines studied would probably be substantially the reverse of the inbound.

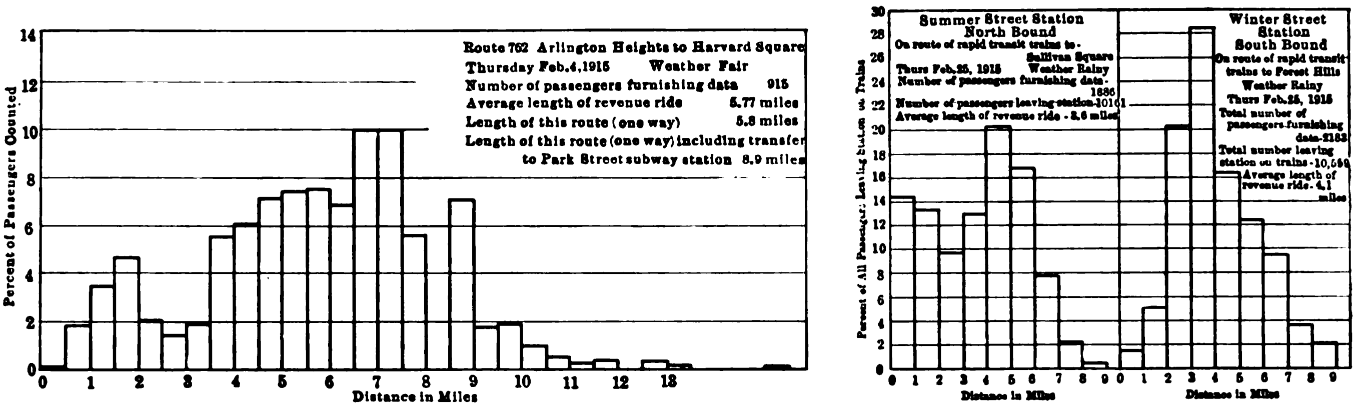
A sample of the form of traffic-count slip used in the surface-line work is shown in Fig. 2. An individual slip was presented to each cash-fare-paying passenger as he boarded the car, one of the observers being stationed at the prepayment entrance of the car for this purpose. In the upper space on the slip, marked "boarded," this observer wrote a number designating the street at which the passenger boarded and then handed the slip to the passenger, who carried it to his seat. The second observer went back and forth through the car, collecting the slips, asking the necessary questions, and recording the answers on the slips.

Two pairs of observers were assigned to each line, and they worked practically continuously from 7 a. m. to 7 p. m. on a schedule prepared in advance. Although only a portion of all the trips were covered on any one line, it is confidently believed that sufficient data were obtained to be representative of average conditions, and this belief is supported by the close correspondence of the results obtained on the two different days chosen on the Newton-Brighton line to check the accuracy of the method.

In the investigation of the traffic outbound from the center of the city on the line of the Washington Street tunnel a different procedure was followed. The Winter Street station (at point *A*, Fig. 1) was chosen for questioning southbound traffic and the Summer Street station (also at point *A*, Fig 1) for northbound. These two stations are located at practically the same point in the very center of the downtown shopping and business



TRAFFIC COUNT—FIGS. 5 AND 6—SHOWING THE PROPORTION OF PASSENGERS TAKING VARIOUS LENGTHS OF RIDE ON BOSTON SURFACE ROUTE 419, WITH CHECK ON SURFACE ROUTE 907



TRAFFIC COUNT—FIGS. 7 AND 8—SHOWING THE PROPORTION OF PASSENGERS TAKING VARIOUS LENGTHS OF RIDE ON BOSTON SURFACE ROUTE 762 AND ON RAPID TRANSIT LINES

district. Observers worked at these two stations continuously from 7 a. m. to 11 p. m. on Thursday, Feb. 25, 1915.

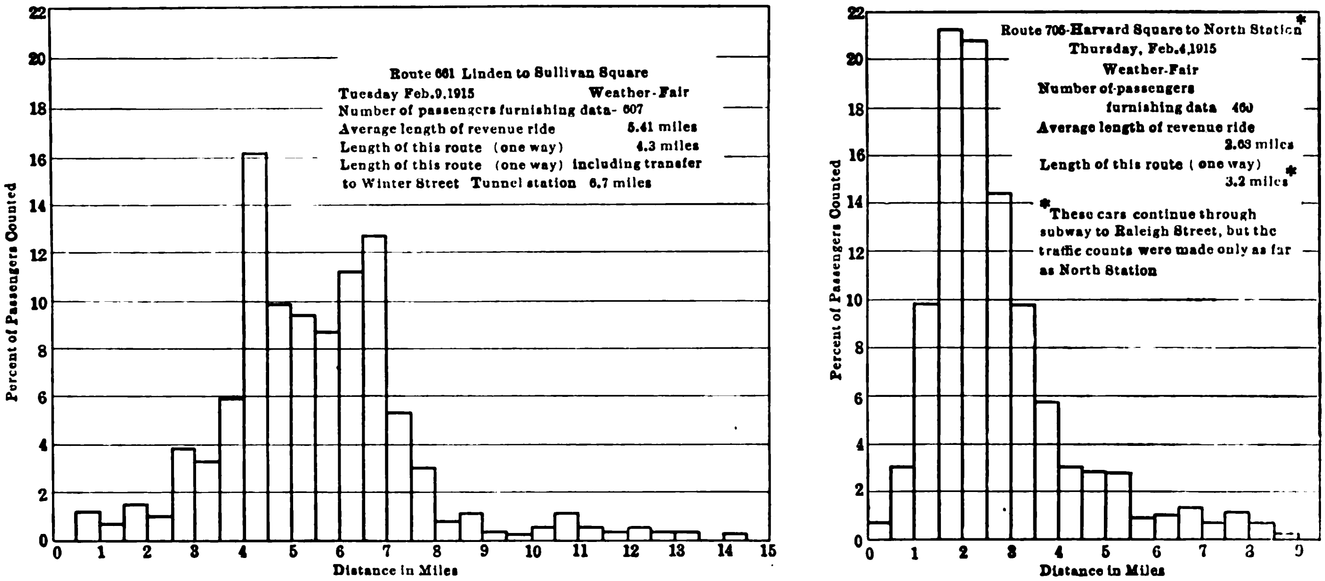
On this work, no riding was done on the trains, but the passengers were questioned as to their ultimate destinations while they waited on the platforms for their trains. Practically all the passengers entering these stations were cash-fare ones—that is, they began their ride at this point. This was, of course, before the present Cambridge Subway extension was opened at Washington Street. The interval between trains was generally sufficient to permit the observers to approach and question a considerable number of waiting passengers. No attempt was made to question all the passengers, only a representative number being desired. The results showed that the observers succeeded in obtaining information from a total of about 20 per cent of all the people entering these particular stations throughout the day.

As the trains operated in this subway run to the Sullivan Square and the Dudley Street and Forest Hills terminals of the rapid transit lines and as free transfers are given to all surface lines radiating from these terminals, the data obtained in this way covered the passenger traffic from the business district to a large part of the suburban territory served by the Boston Elevated Railway north and south of Boston.

HANDLING THE PUBLIC

It did not seem feasible to give any advance publicity to the proposed traffic counts, and consequently the observers were obliged to rely on the printed slips and their own initiative for approaching passengers. In the tunnel stations slips were not used. Here in conspicuous places a large number of printed signs were hung announcing that a traffic count was being made and explaining in a few words what was wanted. The signs were not placed until the day of the count. The observers in the stations recorded the data furnished by passengers on large blank sheets instead of on slips as used in the surface counts. Each observer wore a nickel-plated badge, bearing the title "Traffic Checker" and an identification number.

The majority of riders questioned gave the desired information without undue discussion or explanation, but some, of course, desired to know all the history, reasons for, and purposes of the investigation. The observers soon became accustomed to this and had some brief stereotyped answer ready. A few refused outright to give any information, and an occasional foreigner was encountered who could not understand the proposition or who could not be understood when he attempted to give the answers. Some of the data taken down by the observers were later found to be illegible or obviously incorrect, and these of course had to be thrown out in working up the results. The sum total of these exceptions was trifling in comparison with the total amount of satisfactory data, and it is believed that no error of appreciable magnitude was introduced because of them. On the surface lines, 5720 cards were given out to passengers entering the cars, 5429 were collected, and 5168 were later found to contain satisfactory



TRAFFIC COUNT—FIGS. 9 AND 10—SHOWING THE PROPORTION OF PASSENGERS TAKING VARIOUS LENGTHS OF RIDE ON BOSTON SURFACE ROUTES 661 AND 705

TABLE SHOWING INCREASE IN LENGTH OF RIDE WITH NUMBER OF FREE TRANSFERS USED

Route Number	No Transfers		1 Transfer		2 Transfers		3 Transfers		Total Number of Passengers Counted
	Number of Passengers	Average Ride, Miles	Number of Passengers	Average Ride, Miles	Number of Passengers	Average Ride, Miles	Number of Passengers	Average Ride, Miles	
212	630	2.45	198	3.04	86	4.98	20	6.77	934
419	386	2.19	196	3.35	76	6.36	2	7.60	660
661	481	4.95	68	5.55	55	7.32	8	9.37	607
705	336	2.11	97	3.79	27	5.80	0	....	460
762	614	5.20	275	6.67	22	9.03	4	10.30	915
907	482	4.21	195	4.34	69	5.87	9	10.03	755
Check Count 907	528	3.92	227	4.46	63	5.57	19	10.15	837

data. The latter figure represents 90.4 per cent of all the cards given out.

WORKING UP THE DATA

The office work of computing the length of ride of each individual and tabulating and analyzing the data is of course the expensive part of this type of traffic count. The distance traveled by each individual had to be measured separately, but this work was greatly simplified and speeded up by the construction of straight-line charts representing the various surface-line routes. Each stop along the route was plotted to scale on the straight-line plot and was numbered according to a number system adopted for the field work. By the use of a scale marked off in miles, it was only a matter of reading the length of ride directly from the chart by placing the zero point of the scale at the passenger's origin and reading the distance to the destination. Connecting lines to which passengers transferred from the routes under observation were similarly laid out. Unusual transfer rides for which no charts were made were measured directly from a map of the railway system. For rides from the downtown tunnel stations tables were made showing the distances to all important localities, transfer points and terminals, and the ride of each individual had only to be measured on the map from the nearest of these tabulated points.

At the same time that the length of each individual ride was being computed, the number of times the passenger had to transfer to complete this ride was also determined (from a knowledge of the system) and all data entered in the upper part of the slip. In this work transfers to or from the rapid transit line terminals at Harvard Square, Sullivan Square, Dudley Street or Forest Hills were not counted, as the Boston system is so laid out that in general riders are practically obliged to make this transfer to reach the center of the city from the outlying districts.

Finally all data were assorted and tabulated so as to give, by lines, the numbers of passengers riding less than 0.5 mile, between 0.5 and 1 mile, between 1 mile and 1.5 miles and so on by half-mile groups up to the maximum ride. These results were calculated as percentages of the total number of passengers questioned, and then plotted. The results for each of the surface lines, including the check count made on the Newton-Brighton line, and the results of the tunnel station investigations are shown in the accompanying figures numbered 3 to 10. The plots do not represent any particular distances or points along the given routes. For instance, the percentage shown in the 1 to 1.5 mile group on a given route does not mean passengers boarding the car or riding at any specific place on the route but is made up of all passengers who took a ride at any point, the length of their riding being within the designated limits.

The data were also sorted out according to the number of transfers made by the passengers. Then the total passenger-mileage for those making no transfers (ride completed on the original car), those making one transfer, two transfers and three transfers was added up and tabulated. The average ride was computed for these different classes, with the result that on every line the length of ride showed an increase directly corresponding to the number of transfers. The accompanying table shows these results in some detail.

DISCUSSION OF RESULTS

The main features and significance of the results of this investigation were pointed out in the summary at the beginning of this abstract. It is not within the scope of this particular paper to recommend or suggest rates of fare for the Boston Elevated Railway system or any other street railway. That is a general problem, toward the solution of which the research division at the Massachusetts Institute of Technology is devoting some effort. The question of the actual length of haul of passengers, discussed above, is merely one of the many factors which are being studied.

It is believed, however, that such a study of the traffic on a complicated urban electric railway system will furnish valuable information that will amply justify its expense. Not only does it show the actual and indisputable facts as to the length of haul and the effect of transfer traffic but also possible economies or conveniences in the routing of cars may be brought out. Subsequent to the work of the technology men, the Boston Elevated Railway transportation officials used this method to investigate the feasibility of a proposed revision of routes. The same form of slips and badges for observers were utilized. Practically this same method of traffic study was adopted in 1912 by the experts of the Philadelphia Department of City Transit to determine the best routes for the new rapid transit subways.

Norwegian Electrification Plans

Plans for the electrification of the Christiana-Drammen Railway in Norway will be submitted to a committee of experts, including two Swiss, one German, one Swedish and one Norwegian engineer. The representative committee is necessitated because of the fact that the system to be adopted for the whole country's railway electrification has to be decided upon now. A general plan has already been drawn up for the electrification of all the Norwegian railways. The necessary amount of power has been calculated, and the localities fixed upon where this power is wanted. The various transformer stations have also been located, and the areas for the different power stations have been specified. The plan involves the purchase of small waterfalls, and it is proposed to build the hydroelectric power stations by degrees and in such a manner that they can supplement each other. As regards the Christiana-Drammen Railway, the source of power supply has not as yet been determined.

The *Electric Railway & Tramway Journal* recently published statistics from the various electric railways in Great Britain to show the effect of the war upon the industry. In practically all cases a reduction in service has taken place, but the effect of the war upon receipts has been exceedingly variable, some roads having lost thousands of dollars during the course of the year while others actually show increased receipts for the same period. There is a general difficulty in obtaining supplies of material, and prices in general have been found to have increased.

Wisconsin Association Ends Meetings

Summary of Taxation Discussion on March 16—Full Details of Remarks on One-Man Car Operation at Final Session on March 17

THE Wisconsin Electrical Association, the opening session of which on March 16 was reported in the ELECTRIC RAILWAY JOURNAL of March 18, page 563, concluded its work in Milwaukee with a final meeting on March 17, when one-man car operation was the subject of chief interest to electric railways. Before the report of this session, however, there will be presented a summary of the discussion on taxation, which as the last topic at the opening meeting was referred to only briefly in the preceding report. Elsewhere there are also published abstracts of papers presented on March 16 as follows: "Attitude of Wisconsin Railroad Commission on Security Issues," by Harold L. Geiss, secretary of the commission, and "President's Address," by M. C. Ewing, secretary and manager Wisconsin Valley Electric Company, Wausau, Wis. Other railway papers not appearing below will be published later.

TAXATION OF UTILITIES

The main remarks on taxation at the March 16 session were made by T. E. Lyons, member Wisconsin Tax Commission, who described the tax methods used in Wisconsin and told why there have been annual increases in taxation. He stated that in Wisconsin the steam railroads pay 9 per cent and the electric railways 2 per cent of all the taxes. He explained that the method of making the tax levies is based on the *ad valorem* system as nearly as it can be applied to all property in the State. The electric and steam railways pay taxes on the value of all the railway properties, whereas lighting and power companies and other local industries pay upon actual assessments. The tax commission has nothing to do with the amount of taxes assessed but merely distributes the assessment. The rate of taxes is obtained by dividing the total amount of taxes required by the value of all the taxable property in the State. In 1915 the Wisconsin Tax Commission had to distribute assessments which would produce a total of $43,500,000 in taxes.

Mr. Lyons explained the marked increase in the amount of taxes as being entirely due to the expenditures authorized by local regulatory bodies and the public. Taxes, not only for Wisconsin but for the whole United States, have increased uniformly over a period of years and will continue to increase as long as the public continues to authorize improvements. Taxes are no higher in Wisconsin than in other states, some showing a greater increase per capita and others less than Wisconsin. The general average increase in taxes from 1903 to 1913 in Wisconsin was approximately 100 per cent.

Mr. Lyons then described how the commission fixes value in distributing the tax levy. It is not very difficult to determine the value of personal property, real estate or buildings, because they are sold frequently. There are few instances, however, to guide anyone in fixing the value of a utility, and it is very difficult to determine its value To fix a value the commission asks for reports of everything that could be taken into account as elements of value, and therewith the commission attempts to arrive at the cost to reproduce the property new. Then it takes into account the securities issued and the average net earnings. The commission also investigates the history of the company, its present condition and its prospects, and the general movement of property in the vicinity.

Mr. Lyons stated that the physical value could not be used in all cases, because the commission desired to know the selling value of the property as the basis for levying taxes, and with equal physical values the earning power of two properties might vary greatly. In some instances, he said, the value was based entirely upon the yield of the property, the total amount being obtained by capitalizing the average net earnings over a period of five years. In Mr. Lyons' opinion gross earnings are not an indication of value, because they only show the volume of business and not the profit. The value of a property for rate-making purposes is another matter and should be considered wholly from the standpoint of how much money was put into the property to build it up. Its taxation value, however, should be based upon how much money can be obtained from it in the way of profits.

In answer to an inquiry Mr. Lyons explained that when earnings are capitalized to arrive at a basis of value, 6 per cent is applied to the properties in prosperous communities and 10 per cent to the utilities in the smaller cities and villages. The average rate for capitalizing earnings, as applied to street railway properties within the State, is about 6.5 per cent. Even this basis of fixing value, however, will not do for new properties, for the results of the first two or three years of utility operation cannot be made use of as a measure of value.

F. W. Walker, general manager Milwaukee Northern Railway, Cedarburg, Wis., suggested that a new factor had entered into electric railway operation which should be given consideration in distributing taxes. In the past electric railways were considered monopolies in the communities they served, but this had been disproved by the recent jitney competition. In connection with the value of water powers, Mr. Walker said that the rapid progress made in developing the internal combustion engine indicated that it might soon compete with central-station energy for consumers requiring 50 kw. or more. Mr. Lyons replied that these factors were taken care of in part by the reduced earnings, but of course from the standpoint of prospects they might affect the value of a property.

OPERATION OF ONE-MAN CARS

The morning session on March 17 was devoted to a paper by H. W. Young, president Delta-Star Electric Company, Chicago, and to other subjects of interest to light and power companies. At the afternoon session R. M. Howard, general manager Wisconsin Railway, Light & Power Company, Winona, Minn., read a paper describing his two years' experience with one-man cars. This appears in abstract form elsewhere. While reading the paper Mr. Howard explained that of the amount paid out for claims approximately one-half was chargeable to a test case which the company won in the higher courts. In response to an inquiry he stated that the motormen collect and pocket the fares and ring them up on the register, but do not attempt to issue transfers until the passengers leave the car. Since there is only one transfer point on the system, the schedules are made sufficiently flexible to permit the motorman to take whatever time he requires to issue transfers. The company has not considered using fare boxes, because it operates double-end cars in the one-man service, and the lines are not equipped with loop tracks.

In answer to other inquiries Mr. Howard explained that the one-man cars operate over 8 miles of single track with two railroad crossings. Prior to one-man operation and during the first two years, a schedule speed amounting to 9 m.p.h. was adopted, but changes are now being made in switch locations so that the service can be speeded up to the extent of 10 m.p.h. and a twelve-minute headway maintained. The rear doors are equipped with manually-operated emergency spring locks which the passengers can open by pulling a chain. The passengers have not opened these doors except under abnormal conditions, as when the car is crowded and the entire load is discharged at one point. There is no objection to opening the rear door at this time because there is no danger and it shortens the time of unloading.

Mr. Walker was of the opinion that if the motorman controlled the emergency door lock, he would have just one more thing to do when he should be completely engaged in handling an emergency. If the rear door was under the control of the motorman and operated with pneumatic door engine, it should act upon the release of the air. Attention was called to the fact that the one-man cars on the Menominee & Marinette Light & Traction Company's line in Marinette, Wis., are equipped with an alarm to indicate to the motorman that a passenger has opened the rear door. It was also brought out that the Wisconsin Railroad Commission has ruled that the rear doors of one-man cars shall be left so that they can be opened by passengers in an emergency.

S. B. Way, vice-president and general manager Milwaukee Electric Railway & Light Company, Milwaukee, Wis., stated that his company operates one-man cars in Kenosha, Wis., with pneumatic emergency lock mechanisms on the rear doors. These door mechanisms are tested daily and have worked very satisfactorily. He was of the opinion that the character of the passengers handled on one-man cars should largely govern the selection of the rear door operating mechanism. So far as he could learn, there has been no objection to either the manual or pneumatic control of the rear door lock.

H. O. Seymour, general manager Wisconsin Telephone Company, Milwaukee, Wis., then read his paper on "The Telephone Company and the Electric Utility." In this he told of the attitude of the telephone company toward other electric utilities, and outlined the practice to follow in order to secure uniformity of negotiations and agreements between different public service companies. Mr. Way then explained the work of the National Bureau of Standards in preparing the national electrical safety code, and Mr. Howard closed the program with a description of an automatic current-limiting circuit breaker which he had adopted in his substations to protect the railway feeders and rotary converters. This description appears on another page.

At the close of the program President Ewing suggested that as there appeared to be discrimination against public utilities in Wisconsin taxation, it would be well to appoint a committee to investigate the subject and report before or at the next annual meeting of the association. He recommended that this committee investigate whether the public utilities, including central stations and electric railway companies, are bearing more than their just proportion of Wisconsin taxes and whether they are paying more taxes than similar utilities in other states. Upon motion the association authorized the president to appoint such a committee.

It was recommended by committee that the salary of the secretary be increased from $350 to $400 a year and that copies of the president's address be mailed to each member of the association. The following new officers were unanimously elected: President, W. E. Haseltine, secretary and general manager Ripon Light & Water Company, Ripon, Wis.; first vice-president, B. F. Lyons, vice-president and general manager Beloit Water, Gas & Electric Company, Beloit, Wis.; second vice-president, A. E. Peirce, vice-president Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis.; third vice-president, John St. John, secretary and treasurer Madison Gas & Electric Company, Madison, Wis., and secretary-treasurer, George Allison, comptroller Clement C. Smith properties.

President's Address

BY M. C. EWING

Secretary and Manager Wisconsin Valley Electric Company, Wausau, Wis.

The Wisconsin Electrical Association kept closely in touch with all legislative matters at the last session, and by open and frank discussion at all committee hearings presented to the legislators a large amount of reliable information which had the immediate result of assisting in the defeat of a great number of proposed measures pernicious in their conception and unwise in their scope. If all the bills affecting public utilities that were introduced at the last session had been enacted into laws and had stood the test of the courts, it is conservative to say that the value of privately owned utilities in the State would have been materially less than it is to-day. When a proposed measure is unjust, discriminatory and confiscatory, intelligent effort ought to demonstrate that fact, and when it is once demonstrated and properly presented to the legislature, there is, as a rule, little danger of bad law-making. The danger lies in utility interests failing properly to present their cases and letting them go by default.

The problems of regulated monopoly are being decided on their merits, and yet only a few of the really important principles of regulated monopoly have been thoroughly tried out or determined. There is little use in shutting one's eyes to the facts as they are, and the municipal acquisition during the last two years of a number of comparatively large electric utilities in Wisconsin is at least one indication that regulation is not always satisfactory. Wisconsin law permits plants and parts of plants to be acquired in haste and without due consideration, a mere majority of votes at any election settling the question beyond recall. One of the dangers of regulation in Wisconsin, therefore, lies right here. A considerable percentage of the people has favored regulation with the one view of continually enforcing greater service and at the same time a reduction in the cost of service. These two processes must have their limit. Yet when a ruling commission after careful investigation is unable to comply further with popular demand for reductions in rates or unprofitable extensions, the judgment of the commission is impeached and repudiated. This has happened in a number of instances in Wisconsin. Local politicians who have instigated unfair demands, in their disappointment immediately condemn the commission and direct their efforts toward municipal ownership. Thus condemnation elections are being carried upon prejudice rather than upon sound business principles. Public welfare will be best served under present conditions of municipal government by privately owned utilities, and the responsibility for the correct understanding of these matters must rest entirely with the officials of the utilities. Lack of intelligent publicity on the part of some utilities themselves is still evident.

A few of the members of this association are the unhappy custodians of small electric railways. These lines have had anything but a bright and rosy history, and their owners are facing a still darker future. The rapid development of automobiles is the latest affliction of these properties, and since self-propelled mobile conveyances are just out of the experimental stage their future growth in usefulness seems assured. As these new styles of conveyances increase in use, the street railways, in the smaller cities at least, are undoubtedly destined to a still more difficult existence. There are unquestionably many small roads which should never have been built—at least there seems no likelihood that their builders will ever recover their investment. We can neither determine the course nor can we let go, and there seems nothing to do but to hang on and do the best we can.

Two years ago the electric railways of Massachusetts began campaigns for increased rates, which in many cases have been granted. Increased fares are in many instances equally necessary in Wisconsin, and where this is true they should be asked for, after first frankly notifying the public of the intention and the necessity thereof. There is no sound reason why the power and light business of most of the companies should be permanently called upon to supply the deficits for the transportation departments, as is being done by many small jointly operated properties.

For the smaller cities with lines of light traffic, the one-man cars and the lighter equipment appear to be the last trench in economy, and there are those who believe that many of the small electric passenger lines will yet find a resting place with stage coaches, horse cars, etc. Less taxes, direct and indirect, less paving and fewer street improvements would, of course, defer the funeral, but the public recalls that the companies have contracts to pave the streets and shows no disposition to cancel such contracts. There is not seen any organized effort on the part of many companies to present intelligently to the public the financial straits in which they are now found. Whatever the results may be, managers and operators should frankly and persistently inform the public of the true financial condition of their companies. This information may not solve all their difficult problems, but it will do no harm and it may do some good. There has been no electric railway building in Wisconsin of any consequence for a number of years, and there is not likely to be any in the future under present conditions. Street improvement burdens should be placed on the property holders, where they belong, but they will never be so placed unless the companies educate the public to this necessity.

Two Years' Experience with One-Man Cars

BY R. M. HOWARD

General Manager Wisconsin Railway, Light & Power Company, Winona, Minn.

The operation of the one-man system in Winona, which was introduced twenty-two months ago, has been entirely satisfactory. We have had no objections from the public or municipal authorities. The trainmen perform their duties in a manner satisfactory to the company and to the public and appear to have ample time for all the various duties imposed by this system.

Our experience has demonstrated that it is necessary to have the platforms of sufficient length to furnish room for separate entrance and exit. The new cars that we had built for one-man operation have separate entrances and exits from the platforms, and we find that these cars handle our traffic safely and expeditiously and that we are able to maintain our schedules with the cars except under unusually heavy traffic conditions which occur at infrequent intervals. Our gross earnings have been improving.

We find, however, that the remodelled cars with short platforms are rather slow in loading and unloading because there is not sufficient room on the platform to provide for separate entrance and exit, thus making it necessary for incoming passengers to wait on the street until outgoing passengers have left the car. As we are planning to increase our schedule speed to give the same headway with a smaller number of cars, and as we wish also to provide for future growth of our business, we have duplicated our order for larger cars. This order, when received, will enable us to equip our entire line with the cars having the long platforms and separate entrances and exits.

Our experience has indicated that it is very desirable to have an air-brake equipment on this type of car and we have, therefore, ordered such equipments for all our 34-ft. single-truck cars. The additional cars and air-brake equipment will place us in a position to handle our business and maintain a schedule of 10 m.p.h. The car equipment purchased about two years ago, which was especially designed for one-man operation, has worked out to our entire satisfaction, and the new cars will be exact duplicates in so far as platform and seating arrangement is concerned.

We have adhered strictly to one-man operation and have not employed a conductor since the one-man system was placed in operation. We handle fair-days, circuses, baseball and theater crowds, etc., with one man on each car, and our experience has not indicated the necessity of using conductors even during periods of heaviest traffic.

When the one-man system was first placed in operation the question of flagging railroad crossings was carefully studied, and we decided to stop the car 15 ft. or 20 ft. from the crossing and have the motorman flag in the usual manner by advancing to the center of track, returning to the car and then proceeding. The plan has worked out very nicely, and we are still operating under this rule.

The adoption of the one-man system has practically eliminated all complaints of discourtesy to passengers on the part of the employees. It has also eliminated all arguments regarding the payment of fares. The trainmen have no time to get into heated discussions with passengers.

We have carried 2,354,638 passengers during the past twenty-two months, 10 per cent of whom were transfer passengers, and we have operated 762,511 miles. Our total expenditures charged to accident account during the period amounts to 0.7 per cent of our gross earnings, and to the best of our knowledge no claims are pending at present.

The possibilities of an increase in accidents on account of one-man operation appears to be an interesting topic of discussion, and I am going to discuss the accident situation in detail. Our experience so far bears out our previously-formed opinion that there will be fewer accidents with the new methods of operation. Our total accidents during the period number sixty-eight, divided as follows:

Platform	0
Inside car	5
Rigs (horse)	16
Persons struck	4
Collisions with cars	2
Automobiles	33
Bicycles	3
Motorcycles	1
Fell just after leaving car	2
Riding horses frightened	2
Total	68

We have not experienced a single platform accident, but in two cases accidents happened to passengers after they had stepped from the car. These passengers were not injured until after they had left the car, and the injuries were reported as a matter of safety to complete our records. We had five accidents inside the car. Two of these were due to passengers having balls of ice under their heels, and when they stepped in on the smooth floor they slipped and fell. One was a plain drunk that fell on the floor of the car. Two were caused by passengers losing their balance when the car was started. Only two of all of these passengers were injured, and these but very slightly.

We experienced sixteen collisions with horse-drawn vehicles. Eleven of the collisions were with covered wagons such as laundry wagons, milk wagons and ice wagons. Most of the drivers are irresponsible boys who seem to take a fiendish delight in violating the traffic ordinances and turning suddenly across the track in front of a car without giving the motorman an opportunity to avert a collision. We had thirty-three automobile collisions. I will not comment particularly on these. In ten or twelve cases the collisions occcurred when the street cars were standing still or were run into from the side or rear.

In the entire list of accidents there is not one which could be attributed to the absence of a conductor. Our experience appears to demonstrate the fact that one-man operation does not have a tendency to increase the number of accidents. More than 85 per cent of our accidents are collision accidents, and we expect that the installation of air-brake equipment, in addition to making it easier for us to maintain our schedule, will also reduce the number of those that occur.

In conclusion, our experience has confirmed our original opinions regarding the merits of the one-man system and we now plan to speed up our schedules, reduce the number of cars and increase the earnings per car and per car-hour. We are demonstrating our faith in the future of the one-man system by ordering sufficient additional car equipment to equip our lines completely with cars that are especially designed for this method of operation.

Attitude of Wisconsin Commission on Security Issues

BY HAROLD L. GEISSE
Secretary Wisconsin Railroad Commission, Madison, Wis.

To those whose attention is frequently directed to questions of rates and service it would appear sometimes that if the regulation of security issues really retards development there ought to be more of it. Yet the body regulating the security issues may not, other things being equal, erect its judgment that a proposed project will not, in all human probability, yield a fair return as a barrier to its fulfillment. The sustained effort of the Wisconsin Railroad Commission has been to aid the development of well chosen enterprises, keeping their activities within the law. If "the cream is off the public utility business" it is because the days of exploitation are past and the day of honest development is here. How far the commission is able to go in discouraging the embarkation upon an enterprise which in the light of the commission's knowledge of the business and of surrounding conditions is bound to prove disastrous, is frequently misunderstood. Frequently, by virtue of the confidence it enjoys, the commission is able to have some influence in preventing the recurrence of those gross economic wastes that occurred so often before the days of security regulation. But it has no power to refuse an authorization because in its judgment the project is not well considered. To do so would be to assume managerial functions. The commission has power to require only that the corporate management show a legal right to accompiish the proposed act. If the management can show that the project is within the law the duty of the commission is fulfilled.

The law does not contemplate that its administration should result in absolute safety. If, therefore, the law be properly understood, the flank attack upon it frequently made to the effect that the State binds itself in some sort of guarantee that the securities are sound or will earn interest or dividends, is repelled. No one would seriously contend that because the State has created a system of banking inspection and supervision, it thereby assumed to guarantee the safety of the funds entrusted to the banks by depositors. Yet the regulation of security issues and the inspection of banks are founded in the same concept, namely, that the State owes to its people the duty to protect them so far as reasonably possible against malfeasance on the part of the creatures to which it gives special privileges.

An accomplishment of the statute not frequently considered, but one of prime importance, is the effectual determination of the priority of issues. The law in Wisconsin provides that before issuing any securities the company shall file an application with the commission sworn to by the president and the secretary of the company, stating the purposes for which the securities or the proceeds from the sale thereof are to be used. Upon due proof a certificate of the commission is granted. If the securities are to be exchanged for property, the value of the property must be stated in the certificate. This certificate is required to be recorded on the books of the company, and both as a public record in the office of the commission and as a corporate record it is notice to all the world of the effectiveness of the lien of the securities authorized to be issued, because the lien does not attach unless and until the certificate is issued. This feature of the law is of exceeding importance to investors and to the utilities. It makes definite and certain that which might be confusing and obscure, thereby increasing public confidence in the securities. It may logically be presumed to be an element favorable to their marketability.

A further consideration is the ability of the utility to market the securities at a warrantable price. This is particularly important in the instance of new enterprise, where it may assume almost vital significance. In this connection it is well to speak of the frequently voiced criticism that the authorization of the commission helps to sell the securities. There is a vivid inconsistency between the argument that regulation retards development and this argument that it aids in the sale of securities. One or the other must go by the board.

Of influence with the commission in considering an application for authority to issue securities is the efficiency and personnel of the management. A great deal may be said as to the advisability of giving this feature of an application considerable attention. The question of the public relations of the management and of its general policy is important. If a management has shown a breadth of vision in conceiving means of developing the property to better serve its public, this fact should go a good ways in concluding the determination of the commission to authorize an issuance.

It is not to be concluded that the stock and bond law of Wisconsin is in a perfected condition. There are certain defects that are apparent to those who have given it thought. The statute, with others affecting the issuance of corporate securities, is a growth, and it is only to be expected that it has rough spots that should be smoothed out. The present law provides that stock must be issued at par, but that bonds or other evidences of indebtedness may be issued at a price not less than 75 per cent of their par value. It is frequently found that it becomes necessary for a corporation to issue stock at less than the actual value, and this necessity, in the instance of corporations in general, has led to a frequent evasion of the statute.

In the case of the public service corporations it is the duty of the commission to see that the statute is not evaded. This the commission does, though frequently recognizing that it might be advantageous, if it were possible, for the corporation to issue its stock at a discount. There would seem to be no logical reason why, if bonds are authorized to be issued at less than their par value, stock should not be issued at less than par. Many public utility enterprises are handicapped, especially construction enterprises, by the fact that the commission is not permitted to authorize stock discounts. No one would contend that either stock or bonds should be permitted to be issued at an excessive discount. To permit this would result in that inflation of capital issues that the stock and bond law was designed to prevent. The commission, however, has in its possession at all times a great deal of information respecting the price at which money may be obtained, and it is not an improper suggestion that the law be modified to enable it definitely to fix the price down to which securities may be sold, whether they be stock or bonds.

Feeder Protection by Automatic Current Limitation

BY R. M. HOWARD
General Manager Wisconsin Railway Light & Power Company, Winona, Minn.

Two 300-kw., 600-volt, d.c. rotaries are operated at the La Cross substation of the Wisconsin Railway, Light & Power Company to furnish current for the local street railway, and they flashed over frequently when the trolley wire came down or when bad-order cars were on the line. The flash-overs and also the sudden dropping of the d.c. load when the circuit breakers operated interfered with the regulation on our transmission line as our waterwheel governors did not operate fast enough to compensate for the instantaneous reduction or increase in load under the conditions cited.

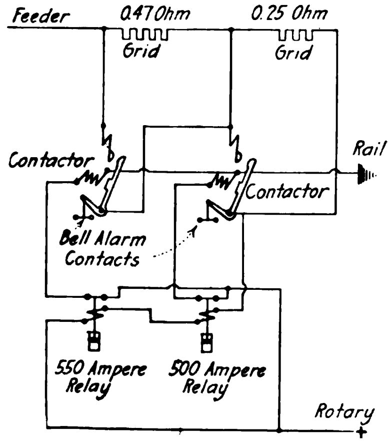


DIAGRAM OF CONNECTIONS OF CIRCUIT BREAKERS AND PROTECTION RESISTANCE

After some investigation we installed on each railway feeder automatic current-limiting circuit breakers of the type developed by the General Electric Company for use in automatic substations. The equipment for one feed consists of two relays and two 500-amp., 600-volt contactors mounted on a suitable panel together with two sets of resistance grids and the necessary wiring. The contactors are normally held in closed position by 600-volt electro-magnets, and they short-circuit the resistance grids. In our case the relays are set to operate at 500 amp. and 550 amp. respectively. The rotary circuit breaker is set at 850 amp. In event of current exceeding 500 amp. on a feeder the first relay operates, breaking the circuit on the contactor coil and allowing the contactor to fall open and cut in the first set of grids with 0.25 ohm resistance. If the current value continues to rise and goes over 550 amp., the second relay operates, the second contactor cutting in 0.47 ohm additional resistance from the second set of grids. The relays are equipped with dash pots, which allow the relay to reset eight or ten seconds after the current drops below the relay setting, and the resetting of the closed contactor-coil circuit closes the contactor and short-circuits the resistance. The equipment is entirely automatic and requires practically no attention.

To illustrate the protective value of this equipment, assume a resistance of 0.28 ohm in feeder and return with the trolley wire short-circuited on the rail. Under this condition at La Crosse both sets of grids would be instantly inserted in series with the feeder, giving a total resistance of 1 ohm. and limiting the current to 600 amp. with 600 volts at the switchboard. Without the resistance, more than 2100 amp. would flow through the feeder. A bad-order car with its motor flashing over will generally cause the first contactor to operate, and the reduction in voltage caused by the insertion of resistance in series with the feeder reduces the current value to a point where it is not so destructive. A reduction in voltage is much better than the opening of the rotary breaker, as the cars keep moving until the automatic circuit breaker resets.

This installation has reduced flash-overs, practically eliminated the regular circuit-breaker operation, improved the regulation on transmission line and reduced railway motor and controller burn-outs.

Compulsory Health Insurance

Proposed Legislation in Eleven States Providing for Compulsory Health Insurance Opposed by Labor Organizations

THE National Civic Federation, in a statement just issued relative to the proposed legislation in eleven states having sessions this winter, purports to show that compulsory state sickness (health) insurance, such as is being urged by social reformers, is not favored by the trade unions, by railroad brotherhoods in the United States or by employers. The statement points out that the objection of the former group is partly based upon the failure of national health insurance in England, asserts that the plan being promoted here is actuarially unsound and calls attention to the fact that there are no statistics at present upon which legislation of this character may safely be based.

The National Civic Federation is part of the movement which has brought into common touch various bodies representing employers, wage earners, fraternal organizations and insurance companies, with a view of establishing first of all data upon which a system of social insurance might have scientific foundation. The information desired will be available in the near future and will, it is hoped, afford an American solution of this problem. No states can afford to enact any compulsory self-insurance legislation until after a comprehensive investigation has been made as to what extent and through what means the application of social insurance beyond the voluntary methods now employed may be possible in this country. It is suggested that a commission composed of those representing the various interests, and not one made up simply of the advocates of compulsory insurance, be created in each state. The National Civic Federation calls attention to the report of one of its earlier commissions on insurance in the United Kingdom, and the conclusion that there should be resistance to any spirit of ambition in America to copy doubtful European experiments.

Chicago Electrification Report Discussed

At the New York Railroad Club, George Gibbs Presented a Paper on the Chicago Terminal Report—Advantages of Electric Switching Service Pointed Out—Discussion by Prominent Steam and Electrical Engineers

THE annual electrical night of the New York Railroad Club was held on the evening of March 17. For some eleven years this meeting has been an event in electrical and steam railroad circles in New York, and has called out a large gathering. The program was prepared by the electrical committee of the club, whose chairman this year was E. B. Katte, chief engineer of electric traction, New York Central Railroad, and the first announced speaker was George Gibbs, consulting engineer, Gibbs & Hill, New York. The subject of Mr. Gibbs' address was the recent report on smoke abatement and railway terminal electrification made for the Chicago Chamber of Commerce. Gibbs & Hill were the consulting electrical engineers in the preparation of this report, which was published in abstract in the issues of the ELECTRIC RAILWAY JOURNAL for Dec. 4 and Dec. 11, 1915. Mr. Gibbs had prepared before the meeting for distribution among the members a brief printed abstract of the report, with illustrations, covering some of the principal points that were raised.

In opening the meeting Mr. Katte complimented the authors of the report on its completion, and said that it was the most important event in electric railway matters during the year, as well as the most comprehensive report on electric railway subjects ever issued in print.

Mr. Gibbs did not read the printed abstract of the report which had been distributed before the meeting but described the reason for the appointment of the committee and its organization, and gave some deductions from the report. He explained that the problem set was that of the entire suppression of the steam locomotive in Chicago and not the partial substitution of electricity for steam. The railways were to be taken as they exist and the substitution of electric for steam traction made with as little change in physical property and operating methods as was consistent with minimum costs for the changes. He then showed a number of slides made from diagrams in the report, and discussed their import. He also analyzed the operating expenses given in the report under steam, as in 1912, and if electricity was used. He said that the total saving in operating expenses inside the electrical zone for 1912 with electricity would have been $3,793,569, and this was apportioned between the different services as follows:

Saving in through passenger service	$ 66,079
Saving in road freight service	278,631
Saving in suburban passenger service	996,018
Saving in yard and transfer service	2,452,841

He then pointed out that the yard and transfer service furnished two-thirds of the saving and that this yard service could be conducted electrically without materially affecting operating costs and methods outside the electrified district. On the other hand, electrification of through service, passenger and freight, would interfere with the length of outside engine runs and require additional constructive mileage and other outside expense which would have to be deducted from the saving inside the zone.

Mr. Gibbs also presented a rearrangement of the table of annual operating costs as given in the report, to show the account in which the savings in electric traction occur. This rearrangement, based on the 1912 figures, is given in the table opposite.

He also called attention to the fact that by far the greatest saving, as shown in this table, is in the item of power, and that the next largest is in "Engine House Repairs." He also pointed out that the power saving occurs very largely in the switching service, a service in which the steam locomotive is worked very uneconomically. Thus, according to the report, tests showed that the switching engines were standing 40 per cent of the time, that the average length of run was only 628 ft., and that the speed while in motion was only a little more than 5 m.p.h. These are conditions which are greatly against economical steam locomotive performance.

Mr. Katte was the first speaker to discuss the report, and explained that the report was based on the plan that all railroads would pool their interests and get their power from one station or one power system, but he doubted whether New York City would permit the erection of overhead wires carrying 33,000 volts within the city limits. He also doubted whether it was advisable to use an overhead wire carrying 11,000 volts as the trolley wire in a city as large as Chicago. If it was necessary to modify the plan of electrification system to direct current, the cost would be materially increased. From the data in the report it was certain that the railway companies could not afford to electrify their terminals without financial assistance. He believed that if the people felt that the railroads should be electrified, they should be willing to contribute to the expense, either by legislation permitting increased railroad rates in the form of an additional terminal charge, or, since the municipality would be the gainer by the receipt of increased taxes collected from owners of property adjacent to the electrified tracks, a portion of this increased revenue might be paid to the railway company to help bear the cost of the improvement. Experience in other cities has demonstrated that the electric operation of steam railroads is reliable and attractive, but the first cost of the installation is prohibitive except where special conditions warrant extraordinary expenditures.

Following Mr. Katte, A. B. Symons, who had been a partner of Horace G. Burt, the first chief engineer of the committee of investigation, outlined the steps leading to the formation of the committee. He said that the demand for the electrification of the railroad terminals arose because it was popularly supposed that steam locomotives caused a large part of the smoke in Chicago, from 43 to 50 per cent of the total. The

OPERATING EXPENSES—ITEMS AFFECTED (1912)

	Steam	Electric	Saving
Power	$5,536,708	$2,936,654	$2,600,054
Repairs	1,953,708	1,377,847	575,861
Communication	157,237	258,173	d 100,936
Engine house expense	1,293,394	258,678	1,034,716
Roadway	1,395,706	1,420,254	d 24,548
Buildings, fixtures and grounds	139,116	642,623	d 503,507
Conductors, brakemen and enginemen	458,195	246,266	211,929
Totals	$10,934,064	$7,140,495	$3,793,569
Added costs due to change in operating methods in and beyond the city	....	....	$1,996,113
Final net saving, 1912	....	....	$1,797,456
Total on basis of 1922	$14,214,283	$9,282,644	$4,931,639
Added costs	....	....	2,594,947
Final net saving, 1922	....	....	$2,336,692

d = loss instead of saving.

press also was in favor of electrification. The Illinois Central Railroad was the object of much of the agitation, and in an engineering paper the statement was made that this railroad could be electrified within the city limits for $8,000,000. The idea was also promulgated that electrification would cure all evils. To controvert this feeling some persons pointed out the part which the Illinois Central Railroad had had in the appreciation of land values, but these arguments had little effect. A change in the presidency of the Illinois Central Railroad involving the retirement of a very popular man was utilized in connection with the electrification agitation. As a result of all this, the railroads of Chicago saw that something would have to be done to please the public, and this committee was the result. Mr. Symons expressed a high opinion of the value of the report.

W. S. Murray, who was recovering from a severe attack of typhoid fever, was able to take but a brief part in the discussion. He expressed gratification that the single-phase system had been recommended by the committee, and stated his belief that as a whole the conclusions reached by the committee were correct. He thought that part of the railroad system of Chicago could be profitably electrified. In conclusion, he quoted from a letter recently received from Mr. Huber-Stockar, consulting electrical expert for the Swiss Railway Department, stating that the single-phase system had been selected for the St. Gothard Tunnel electrification.

The next speaker was William McClellan, consulting engineer, New York, who referred to the extraordinary difficulties connected with criticism of such a monumental work, the committee's report. However, it was evident, that on subject matter of capital cost, the committee had to be conservative, as there were many contingencies which could not be provided for. The actual cost of electrification would probably be much greater than that estimated. The report was made to answer definitely the question as to what the railroads would have to pay for electrification. Its function was not to evaluate the attendant advantages, but rather to determine whether this was a feasible thing to ask of the railroads. If the broader questions were asked, a different treatment would be required. The speaker believed that if electrification were demanded, the city of Chicago should in some way assist in financing it.

E. B. Temple, assistant chief engineer, Pennsylvania Railroad, referred to the recent electrification by that company in Philadelphia. In this terminal sixteen locomotives out of 300 have been eliminated by electrification. The Chestnut Hill extension will eliminate some more. Complete electrification of the terminal would eliminate fifty locomotives, or 17 per cent of the total using the Broad Street station. The total cost would be $10,000,000, not including a power house. The Pennsylvania electrification in Philadelphia is being carried out not to eliminate smoke but to enable the company to conduct traffic more expeditiously. The Philadelphia Electric Company furnishes the power, and it is a question how much actual smoke reduction results from burning the coal in the power house as compared with burning it in the steam locomotives, when much of it would be emitted in the open country. Mr. Temple also felt that the municipality should co-operate in such undertakings, at least by assisting in the elimination of grade crossings, etc. Nearly all of the costs of eliminating such crossings in Philadelphia have been carried out on the basis of equal division of the expense between the city and the railroad. This is the kind of co-operation that counts. A total of $30,000,000 is now being invested in Philadelphia in track elevation.

C. H. Quinn, electrical engineer Norfolk & Western Railway, expressed his belief that electrification comes down in the end to a question of dollars and cents. In the case of the Chicago electrification, the public had in mind that it was a suburban undertaking. As a matter of fact, most of the savings were found in the substitution of electric locomotives for yard engines.

E. S. Doughty, consulting engineer, New York, gave some of the results of his experience as a smoke inspector in Chicago. He said that in an experiment a consolidation locomotive pulled a heavy train of loaded freight cars without producing any smoke, showing the possibilities of correct firing. With yard engines, it is more economical to fire low and keep the locomotive smoking. The Illinois Central Railroad received a great deal of criticism partly because it is largely used for commutation service with the South Side. In hot weather the smoke is very disagreeable, particularly in view of the fact that the road runs through a residential district. To show that smoke from industrial plants can be kept down if desired, he cited the circumstances that, in Chicago, when the smoke inspectors are on duty, the smoke is kept down, but at other times furnaces in industrial plants are allowed to smoke.

E. R. Hill, Gibbs & Hill, New York, in commenting on the estimated savings due to electrification, pointed out the general fact that it does not pay to establish short terminal divisions on a steam railroad. Sixty per cent of the savings in the present case are due to the switching locomotives, the natural field of which is in a restricted local zone. The electric switching locomotive is very efficient, and it takes the place of a most inefficient steam engine. The feasibility of electrification progress must be determined on common sense lines, and no arbitrary ordinances can solve the problem.

Mr. Gibbs then answered a number of questions which had been asked during the discussion regarding details of the report. He said that in general the densest consumption of coal is in the business district where the population is densest in Chicago. He called attention to the fact that the report contained a study of schemes by which municipalities can co-operate with the railroads. He said that the traffic in the city which could not be electrified by means of continuous conductors were principally in the stock yards, on the water fronts, etc. Storage batteries or internal combustion engines could be used as motive power in these sections. In regard to the economies of electrification, Mr. Gibbs said that the Pennsylvania Railroad Terminal in New York could undoubtedly be operated more cheaply by steam locomotives than electric, and that the same was probably true with the New York Central Railroad. One difficulty is in eliminating steam locomotives without adding to outside costs. On the Norfolk & Western Railway electrification the engine runs were not affected on either side of the electrified zone.

In closing the discussion, Mr. Katte, referring to one of Mr. Gibbs' remarks, agreed with him that the New York Central electrification was not expected to pay directly, but referred to the value of the air rights over the tracks with electric operation.

The mechanical department of the Public Utilities Company, Evansville, Ind., has found it economical to place rattan patches on seat ends when they become worn through. These patches are made with new material which is woven into the old rattan to a point about 3 in. back from the hole. Water is liberally applied to the old rattan and to the new patch to soften them, so that the weaving can be readily done. The completed job is neat in appearance, and the economy resulting from patching the large piece of old rattan that is in good condition makes the work worth while.

A. R. E. A. Committee Reports

American Railway Engineering Association Reports of Interest to Electric Railways Presented at the Annual Convention in Chicago on March 21, 22 and 23 Included Those on Ties, Conservation, Signals, Track, Lumber and Wood Preservation

AT the annual convention of A. R. E. A. in Chicago on March 21-23 the economics of labor in signal maintenance was one of the subjects assigned to the committee on signals and interlocking. Its report discussed the various phases of this subject, and the committee concluded that because signal apparatus was largely electrical and because special training on the part of maintainers to obtain economy and efficiency was required, it would not recommend any combination of signal and track maintenance forces. It did conclude, however, that occasionally it might be found practical and economical to combine the forces engaged in maintaining the various other electrical features of the road with those maintaining signals. As a general proposition, however, the committee decided that a higher degree of economy and efficiency would be obtained by co-operation rather than by combination. This committee also reported progress in its study of the problem of signaling single-track roads, with special reference to the effect of signaling and proper location of passing sidings on the capacity of a line. The report contained a method of finding the proper locations of passing sidings for trains of one kind, and for determining the capacity of a given piece of single-track road in trains of one kind. Work along this line will be continued and various other formulas will be developed, applied and tested in actual service.

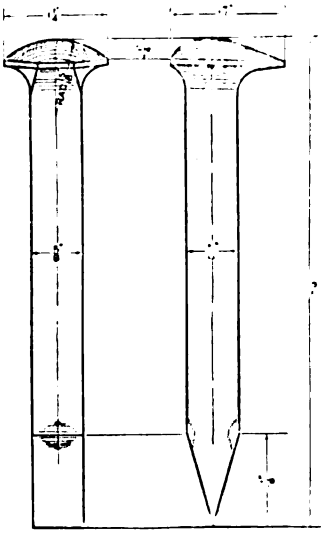
Track in Paved Streets

That portion of the Manual devoted to track construction and flangeways at paved street crossings and in paved streets was reviewed and revised by the committee on signs, fences and crossings. Through some misunderstanding strong opposition had developed against the conclusions adopted after an investigation of this subject in 1913. The objection was concerned principally with the recommendation that 141-lb., 9-in. girder rail should be used. This year's committee studied the original report and concluded that the 9-in. rail was intended for use in the construction of track in paved streets and not at paved street crossings. After a thorough consideration of the subject, the committee decided that three distinct forms of track construction were desirable. For paved street crossings where the general direction of traffic was at right angles to the track, the regular standard track construction should be used and the space occupied by the track should be planked over. The flangeway should be formed by using rail laid upon its side and properly secured to the ties, or rail set upright and bolted to the running rail. If the latter construction was employed the side of the rail head adjacent to the flangeway should be beveled to an angle of about 45 deg. to prevent horses' feet from being trapped.

For tracks located in paved streets, subject to heavy traffic and requiring a granite block paving, the committee recommended that the track construction should consist of stone or gravel ballast at least 12 in. deep, treated ties and 141-lb., 9-in. girder rail, and that the paving within the track limits should comply with municipal requirements as to the depth of the base, the thickness of the sand cushion and the filling of the joints. Tracks located in streets subjected to light traffic only, the committee recommended, should be built of the standard track construction using treated ties and stone or gravel ballast, and the space occupied by the tracks should be paved to conform with municipal requirements.

Ties, Track Stresses and Fastenings

The work of the committee on ties included an investigation of the effect of tie plates and track spikes on the life of cross-ties; specifications for cross-ties and switch-ties, and a summary of the progress on substitutes for wooden ties. The committee did not reach any definite conclusions concerning the effect of tie plates and track spikes on the life of cross-ties, because it felt that the practice had not progressed far enough. Revised specifications for cross-ties and switch-ties were submitted, however, for the approval of the association.



RECOMMENDED DESIGN FOR CUT SPIKES AS A. R. E. A. STANDARD

One of the subjects considered by the committee on rail was that of preparing specifications for track bolts and nut locks. Accordingly specifications for medium carbon steel track bolts and nuts, and for quenched carbon and quenched alloy steel track bolts and nuts were submitted, and it was recommended that they supersede those now in the Manual. This committee also revised the specifications for joint bars in order to provide more satisfactorily for bars made of alloy steel.

Specifications and designs for cut and screw spikes were two of the subjects assigned to the committee on track. Responses to a circular letter showed that only two or three of the roads reporting used A. R. E. A. specifications for cut spikes but that the specifications more generally used were not materially different from them. This year's committee did not deem it advisable to change the standard specifications materially, but did submit a design for cut spikes which it recommended for adoption as standard. The dimensions of the new standard cut spike are shown in the accompanying illustrations.

The head of the new cut spike is designed to take the hammer blow directly over the axis of the spike and thus minimize the damage to spike-heads and danger of breaking the heads off during extremely low temperatures. The tilting downward of the nose gives a stronger and more rugged construction, and provides an easier clearance in the spike machine. It also permits the spike to be pulled more readily with a claw-bar. The reinforcement of the spike head was made symmetrical with that on the back of the neck which was provided for driving the spike forward against the rail. A reinforcement was added on the front of the neck to provide additional metal to withstand rail wear and necking of spikes which has been prevalent with the old flat tieplate. Changes were also recommended in the physical tests including the requirement that they be made on the finished spike instead of on the bars from which the spikes are manufactured. The proposed specification required an elongation of not less than 20 per cent in 2 in., and if the test was made on the bar, 25 per cent in 8 in. When cold, the head of the spike was required to bend backward without a sign of fracture until the underside was in line with the body. Under the heading of workmanship and finish, no tolerance less than the dimensions shown is allowed.

DENSE AND SOUND PINE

"Dense pine" and "sound pine" were the terms substituted for longleaf pine and shortleaf pine, in the report of the special committee on grading of lumber, thus replacing the designations that are generally used. This change was recommended after the committee had followed the investigations made by the United States government and the American Society for Testing Materials, which led to the adoption of these changes in terms. The terms "dense pine" and "sound pine" referred particularly to the quality of density and weight in their relation to strength values of Southern yellow pine. Southern yellow pine was defined as the species growing in the Southern states from Virginia to Texas, and included pines hitherto known as longleaf, shortleaf, loblolly, Cuban and pond pines. The specification for dense Southern yellow pine states that it shall show on either end an average of at least six annular rings per inch and at least one-third summer wood, or else that the greater number of the rings shall show at least one-third summer wood, all as measured over the third, fourth and fifth inches of a radial line from the pith. Wide-ringed material excluded by this rule will be acceptable, provided the amount of summer wood, as above measured, shall be at least one-half. It was also provided that the contrast in color between the summer wood and the spring wood should be sharp and that the summer wood should be dark in color, except in pieces having considerably above the minimum requirement for summer wood. In cases where timbers do not contain the pith, and it is impossible to locate it with any degree of accuracy, the same inspection is required over 3 in. on the approximate radial line beginning at the edge nearest the pith in the timbers over 3 in. in thickness, and on the second inch nearest to the pith in timbers 3 in. or less in thickness. In dimension material containing the pith, but not a 5-in. radial line, which is less than 2 in. by 8 in. in section or less than 8 in. in width and does not show more than 16 sq. in. on the cross-section, the inspection shall apply to the second inch from the pith. In larger material that does not show a 5-in. radial line, the inspection shall apply to the third inch farthest from the pith. The radial line chosen shall be representative, and in case of disagreement between the purchaser and the seller the average summer wood and number of rings shall be the average of the two radial lines chosen. Sound Southern yellow pine includes pieces of Southern pine without any ring or summer wood requirement.

WOOD PRESERVATION

Specifications for bridge timbers to be creosoted were also formulated and presented by the committee on grading of lumber. It took the standard specifications for structural timber as printed in the Manual, and omitted all reference to the heartwood and heartface requirements and substituted a clause permitting sapwood. In explanation the report stated that recent investigations plainly showed that heartwood and sapwood had exactly the same strength with equal moisture content.

Water sampling in creosote, the relation of the amount of preservative and the depth of penetration to the resistance of materials against decay, and the compilation of service test records made up the report of the committee on wood preservation. The first subject was discussed at length, and a tank car sampling device was submitted for approval accompanied by the results obtained from various methods of sampling. The committee was unable to reach any definite conclusion concerning the relation of the amount of preservative and the depth of penetration to the resistance of materials against decay. It recommended that the subject be continued, and it expected that the analysis and study of the service test records would furnish a basis for a definite conclusion.

TRACK STRESSES, BRIDGES AND CONSERVATION

Experimental work undertaken by the special committee on stresses in railroad track has made satisfactory progress. The committee reported that a considerable amount of time was being expended on the development of instruments and methods for conducting the tests. The results so far obtained, the report stated, indicate that the committee will be able to determine the general action of the track under moving loads, and it plans to continue the tests during the coming season.

An investigation of the relative merits of ballast-deck wooden trestles as compared with reinforced-concrete trestles was conducted by the committee on wooden bridges and trestles. While this work was well in hand it was the sense of the committee that there were so many factors both of an engineering and economic nature that they should be thoroughly considered before intelligent conclusions could be reached. Circular letters of inquiry on this subject were sent to seventy-five of the largest and most important railroads in the United States and Canada, and a tabulation of their replies accompanied the report.

In connection with the report of the committee on conservation of natural resources attention was called to the advantage of greater development of hydroelectric power as a means of conserving coal resources. The report described in some detail the results of electrical operation on the Butte, Anaconda & Pacific Railway and the Chicago, Milwaukee & St. Paul Railway. The report of this committee was offered simply to show progress, and the committee requested that the report be received as information.

OTHER REPORTS

The committee on ballast submitted a statement regarding the efficiency of ballast, placing the various materials in the following order: Stone, broken slag (not granulated), gravel, chats, burnt clay or gumbo, and cinders. The efficiency of gravel was considered to be much improved by washing because this removes undesirable materials and because the desired percentage of each size of gravel can be secured during the process. The committee was unwilling to make definite recommendations regarding the use of the pneumatic tamping machine. Ballast "formers" were considered to produce considerable economy, but specific data were not available to permit making a complete report. A sub-committee which had investigated the economical depth of ballast presented data from steam railroad reports indicating that there is a much greater depth of ballast actually existing in tracks than has previously been supposed, and that while many standard plans show 12 in. the actual depth in main-line construction is much greater.

The committee on electricity presented data regarding third-rail and overhead clearances which have been outlined in previous issues of the ELECTRIC RAILWAY JOURNAL. It was also reported that the national joint committee on overhead and underground line construction has not yet completed its work on the revision of crossing specifications, owing to the fact that the National Bureau of Standards had included such specifications in its safety code. The committee's representatives on the national joint committee on electrolysis stated that they had no report to make until the joint committee prepares its report. No meeting of this committee was held during 1915, but sub-committees had been at work preparing various sections of the report.

"Preparedness" Discussed

Subject Prominent at New England Banquet—A. B. Leach Talks on Railway Economics—New Officers Elected

SIX hundred members and guests of the New England Street Railway Club celebrated the sixteenth annual banquet of the organization on Thursday evening, March 23, at the Copley-Plaza Hotel, Boston. The occasion was one of the most largely attended in the history of the club, under the favorable weather conditions which enabled the active operating men present to forget the snow burdens of a long and rigorous winter and relax amid the joys of good fellowship. Among those at the speakers' table were the Governor of Massachusetts, the Mayor of Boston, the chairman, and other representatives of the Massachusetts Public Service Commission, two members of the Connecticut Public Utilities Commission, and prominent electric railway executives.

The menu cards were cleverly designed in the form of 4.5-in. shells, the program being illustrated with timely "preparedness" sketches, including a fearfully and wonderfully conceived "6-cent-imeter" gun loaded with a 6-cent fare for 1916-1917.

GOVERNOR MCCALL URGES FAIR PLAY FOR STREET RAILWAYS

A square deal for the street railway was vigorously advocated by Governor McCall of Massachusetts, who was the first speaker of the evening. He said in part:

"I am glad to meet so many men in the practical work of doing something which your industry represents. The disposition of us all is to try to get upon the same spot at the same time. If it were not for the street railway we should be scattered over the surface of the earth. All transportation companies are entitled to fair treatment on the part of the public. If burdens are placed on the street railway they are sure to come back on the public in the form of decreased accommodations. The street car is the people's auto. It carries a man 10 miles for the price of say 1 mile in a gasoline driven car.

"The expenses of the electric railway are an open book to-day. 'Slush funds' and 'yellow dog funds,' I am glad to say, have disappeared. It is possible to read in the records of every company the cost of manufacturing transportation. Exactions by the public will lead to poor service. The companies should receive a fair return for their service. The street railway is a democratic institution, and it therefore deserves fair treatment at the hands of our legislators." Closing, the speaker emphasized the tendency toward multiplying laws needlessly on the statute books and expressed his sense of the value of the veto as a timely check on the volume of legislation, which in Massachusetts alone totals 1000 pages of new laws a year. Laws are increasing with vicious fecundity and need to be checked from indiscriminate multiplication.

In introducing the next speaker, toastmaster Ham spoke eloquently of the situation of the United States in the present world crisis and urged the importance of both industrial and military preparedness. Capt. Halstead Dorey, U. S. A., Aide-de-Camp to Maj. Gen. Leonard Wood, Headquarters Eastern Department, Governors Island, N. Y., and Camp Commander, First Training Regiment, Plattsburg, N. Y., described the work of the Plattsburg Camp and outlined the functions of universal military training in the scheme of national defense. Mayor Curley of Boston spoke on the relation of the American spirit to preparedness.

LARGER FINANCIAL ASPECTS OF THE ELECTRIC RAILWAY INDUSTRY

A. B. Leach, New York, emphasized the limitations of the 5-cent fare and said that to his mind the zone system appears to offer the best solution of the problem of securing adequate revenue. Capital is subject to no whims or fiat of legislation when investment is under consideration, but it goes where the best security is possible. It is unfair for municipalities to demand that electric railways share to so large an extent in the upkeep of roadway on each side of tracks. In the last two years one of the speaker's companies has paid $350,000 in such upkeep, and not a dollar of income has resulted from the outlay.

Speaking of the wage-problem, Mr. Leach said that the higher cost of living and higher wages must be used by the railways as an argument for a higher fare. The jitney as a "guerilla of the streets" must be brought into line and compelled to render its fair share of the public needs, paying for the use of the streets and being subject to damage claims. A possible solution of the problem for the street railway is the taking out by the company of a jitney franchise, offering a quicker and more mobile service at certain hours for an increased fare. Communities benefited should be willing to pay a part of the cost of temporarily unprofitable extensions. The public is more interested in quality of service than in security issues. Public ownership means inefficiency and political administration, and it should be avoided through publicity of accounts. Taxing authorities and regulating bodies should co-operate in dealing with public utilities. The securities of such utilities should be made non-taxable, as are municipal issues, to anticipate the competition for capital expected at the close of the war.

The dinner concluded with a clever speech by a well known impersonator in Boston.

At the business session in the afternoon the following officers were elected for the ensuing year: President, Clark V. Wood, Springfield, Mass.; vice-presidents, Maine, A. H. Ford, Portland; New Hampshire, J. Brodie Smith, Manchester; Vermont, W. F. Corry, Montpelier; Massachusetts, J. E. Dozier, Lynn; Rhode Island, A. E. Potter, Providence; Connecticut, R. W. Perkins, Norwich; secretary, H. A. Faulkner, Boston; treasurer, Fred F. Stockwell, Cambridge, Mass.

Work is now proceeding on the electrification of the London, Brighton & South Coast Railway. The number of passengers carried on the electric lines in 1915 was nearly 70 per cent more than in the last years of steam operation. The increase in passengers carried last year was 15 per cent more than in 1914.

American Association News

The Block Signal Committee, at Its Meeting in Chicago, Discussed Many Subjects of Considerable Interest —Manufacturers' Dues Under Revised Constitution—General Activity in the Company Sections Is Indicated by the Many Meetings Reported in This Issue

General Association Activities

BLOCK SIGNAL COMMITTEE MEETS AT CHICAGO

Many features of considerable interest in electric railway block signaling were handled by the joint committee on block signals during its meeting in Chicago, March 21, at which J. M. Waldron presided. The members of the committee and the guests in attendance included J. B. Stewart, Jr., Youngstown, Ohio; John Leisenring, Springfield, Ill.; G. K. Jeffries, Indianapolis; G. N. Brown, Syracuse; C. D. Emmons, South Bend; W. C. Smith, Boston; H. W. Griffin, New York; S. M. Day, Rochester; R. V. Collins, West Newton; C. P. Nachod, Louisville, and L. E. Gould, Chicago. The subjects assigned to the committee by the executive committee were reported on in detail by the chairman of the subcommittee and final action was taken on many of them so that material is well in hand for the preparation of the report which will be presented at the fall convention.

Mr. Leisenring spoke of the work that had been done in connection with reviewing the association standards and recommendations for aspects. He said that the standard aspects of the American Railway Association showed position-light signaling, but no color-light signaling. There was general discussion on the need for clearly-defined aspects for both steam and electric roads, which aspects would conform so far as conditions permitted.

The chairman read letters on the subject of operating by signals without the aid of dispatchers. Such letters had been received from C. F. Handshy, assistant general manager Illinois Traction System; C. D. Emmons, general manager Chicago, South Bend & Northern Indiana Railway, and R. L. Koehler, superintendent Scranton & Binghamton Railway. Mr. Koehler's letter set forth answers to sixteen questions that had been propounded by J. W. Brown, a member of the committee.

Messrs. Collins and Nachod discussed the revision of circuits of contactor signal systems which would permit the use of the standard color-light aspects and thus would avoid necessity for the motormen observing the movement of the disk or the change in the aspect to make certain that the signal had operated properly when the car passed under the contactor.

The committee members discussed the desirability of recommending the omission from the Manual of the standard, regarding the use of continuous track circuits for the control of automatic signals for high-speed interurban service and considered the insertion of certain paragraphs on the "Requisites of Installation for Automatic Block Systems." J. J. Doyle, Baltimore, is preparing abstracts of the rules and regulations of commissions as affecting block-signal installations on electric railways, which material will be included in the report, and H. H. Norris, ELECTRIC RAILWAY JOURNAL, is preparing a bibliography on signaling which will be included in the report.

General discussion was held on what symbols it might be desirable to insert in the Engineering Manual. The use of some comparatively large sign to indicate the location of signals and sidings along interurban rights-of-way was also discussed by several of the members who were using such signs. G. N. Brown displayed a blueprint of a sign about 3 ft. x 4 ft. in dimensions, reading "Block Signal 1000 Feet." The sign had large black letters on a white background and was mounted at a height about level with the motorman's eyes, its function being to enable motormen to locate themselves more easily. Mr. Jeffries then described the sign which is used throughout the interurban lines of the Terre Haute, Indianapolis & Eastern Traction Company. This is oval in shape, 3 ft. long and 2 ft. high, and is made of cast iron with raised letters reading "2000 Feet—Name of Siding." The letters are black on a white background and the signs are mounted on substantial posts. These signs have been found of considerable value, not only in helping the motormen to locate the signals, but also in checking the memory of the train crews regarding orders. Mr. Jeffries pointed out that the use of the name of the siding was an important feature in that respect.

Revised clearance diagrams were then considered for inclusion in the report, and it was stated that the chairman of the block signal committee will shortly ask the secretary of the association to send out data sheets requesting the essential facts regarding the cost of operating block signals.

The subject of highway crossing protection also received very thorough discussion. In this it was pointed out that a committee of railway men in the State of New York has prepared a data sheet which will be sent broadcast throughout the country with a view to co-ordinating the ideas of not only railways, but also automobile associations and state and municipal authorities preparatory to the choice of some standard aspect which can be recommended for general use by steam and electric railroads.

Drawbridge protection was then discussed by Mr. Smith, who described the practice of the elevated railways, and Mr. Gould, who described the safety features installed by the Chicago Elevated Railways to provide against trains approaching an open draw. The series of tests proposed by R. V. Collins for contactor-signal equipment was then discussed, as were such other subjects as the code of safety rules of the National Bureau of Standards, the form of contract for signal installations and the operation of trains by signals without the aid of dispatchers. It is probable that the next meeting of the committee will be held somewhere in New York State in June.

REVISIONS FOR ENGINEERING MANUAL

The American Electric Railway Engineeering Association has issued its revised sheets for the Engineering Manual, the revision being to the month of December, 1915. The new sheets comprise forty-six folders of various lengths, the data contained therein bringing up to date the record of the preferred practices of the Association, as well as the standards and recommendations. The new index that is supplied with the revision sheets contains a complete list of reports and discussions on the various engineering subjects that have been presented before the Engineering Association since the year 1907, so that reference to information contained in the Association's proceedings may be quickly made. In addition, there is a general index of the material contained in the *Manual* as revised, this including the list of standards and recommendations of the Association that was published in last week's issue of the ELECTRIC RAILWAY JOURNAL.

MANUFACTURERS' DUES UNDER REVISED CONSTITUTION

Letters received by the secretary of the American Electric Railway Association recently show that there is some misunderstanding among manufacturers in regard to the dues payable by them as member companies of the association under the revised constitution. Perhaps the chief point which is not clearly understood is in connection with the $5 registration fee formerly charged each manufacturer's representative for attendance at the convention. Under the new plan no such fee will be charged, the manufacturers being on the same basis in this respect as the railway companies and will be privileged to send as many representatives to a convention as they desire without the payment of any additional fee. This will not prevent, of course, any manufacturing representative from joining the association as a member as before for $5 and getting the publications for which these dues entitle him, but such action is not necessary to secure admission to any convention.

Another point upon which there has been some question has been as to whether manufacturing companies which join the association have to disclose their receipts from electric railway business in their application blank. This is not necessary. The manufacturer needs only state the class, based on gross receipts, in which his company belongs, and the limits in this classification are so wide that very little definite information is thereby given. No manufacturer need hesitate to join the association through the fear, therefore, that his competitor will know just what his gross receipts were during the previous year.

COMMITTEE ON PASSENGER TRAFFIC

In accordance with the plan outlined at the meeting of this committee held on March 2 a data sheet covering the following particulars has been prepared and is being sent to the members of the association.

I. Interline passenger traffic, arrangements between interurban and steam roads.

II. Financial aspects of the operation of open cars.

III. Special cars, methods and results. (*a*) City lines, chartered car service. (*b*) Interurban lines, chartered car service.

ACCOUNTANTS' ASSOCIATION COMMITTEE APPOINTMENTS

The following appointments have been announced:

Representing association at convention of railway commissioners—W. F. Ham, chairman; C. S. Mitchell and Irwin Fullerton.

Accounting definitions—George A. Harris, S. C. Stivers and J. Gerry Dobbins. (Chairman and one other member to be appointed.)

Passenger, express and freight accounting—Walter Shroyer, chairman; E. L. Kasemeier, H. H. Read, R. J. Clark and T. B. MacRae.

Engineering-Accounting—F. H. Sillick, co-chairman; Charles H. Lahr, J. C. Collins and H. A. Gedney. (One member of the committee to be appointed.)

Life of railway physical property—R. N. Wallis, co-chairman; A. R. Patterson and J. M. Smith.

Transportation-accounting—A. E. Dedrick, chairman; George W. Kalweit and W. O. Ingle.

Activities of the Company Sections

PUBLIC SERVICE SECTION

The eighth discussion in the course on "Public Service Economics" was held by company section No. 2 in Newark, N. J., on March 16.

R. E. Danforth, general manager, discussed the operating statistics of the company for 1915. He called attention to the fact that in the past year the scheduled speed had been increased 3 8/10 per cent by cutting out layovers, etc., the company now operates practically 1,000,000 car-miles per week, and carries an average of 1,132,812 passengers per day. During the year past the cost of settlements for damages has decreased by 25 per cent. Automobile accidents have gradually increased until they now form about 14 per cent of the total. Mr. Danforth quoted freely from the statistics of operating and maintenance costs to indicate where improvements were being made and where others could be made.

H. A. Benedict, mechanical engineer, then gave an illustrated historical talk on the development of the electric car and the power plant. He showed a remarkable collection of slides of cars of various types, including typical cars used on the local property.

William H. Davis, librarian, a recent addition to the staff of the company, explained the purpose and method of operation of the library, and gave some statistics as to contents and circulation. It contains 4350 books and 9000 pamphlets besides numerous periodicals. It is used by 1200 or more persons, who either call at the room or have material sent to them. During the past year about 15,500 books and pamphlets were sent to users, and the total use was 36,000 pieces, not including magazines used casually.

H. C. Donecker, assistant general manager, announced the results of the suggestion contest arranged some months ago by the company. One hundred and twenty-five suggestions were received in January and, on account of the large number, only operating details were considered at this time. There were seventy-two suggestions along these lines, forty-eight of them for motormen and conductors. Mr. Donecker read a number of typical suggestions and also the names of a number of contributors, closing with that of William Snell, conductor reporting at the Montgomery Street carhouse, Jersey City, who received the award for the month.

In closing, some moving pictures of a general nature were given under the auspices of the claims department.

MANILA SECTION

At the fourteenth meeting of joint company section No. 5, held on Feb. 1 in Manila, P. I., the principal speaker was C. M. E. Pereira, bookkeeper, the title of his paper being "What Street Railways Have Done for the City and Its Inhabitants." At the meeting twenty-nine applications for membership in the railway association were presented, all but four being from members of the transportation department.

Mr. Pereira said that the first street railway in the Islands was built in Manila thirty years ago by the Compañia de Tranvias de Filipinas, a European-Filipino corporation. Horse and steam tram cars were operated. When the Americans arrived an agitation for better transportation was begun, the pioneer being A. Burlingame Johnson. The result was the present company, financed in the United States, which inaugurated the new system in April, 1905. In 1907 the suburban line to Pasig through Fort McKinley was built and steam was replaced by electricity on the line to Malabon. Conditions since the American occupation have not been conducive to the investment of outside capital so that the optimism and courage of the pioneers, which have resulted in 52 miles of street car lines in Manila, deserve a greater financial reward than they have so far received. The poorer classes have benefited greatly from the improvement in the railway system as they have been able to get out of the congested districts. A large class of small-home owners has been built up. The outlying towns have benefited also through the American and European colonies which have been formed in the Singalong, Malata, Pasig, Santa Mesa and Santa Ana districts.

SECTION NO. 10 DUE ON MARCH 31

A company section of the association will be formed on March 31 by Newport News & Hampton Railway, Gas & Electric Company, at Hampton, Va. This Allen & Peck property is under the management of E. F. Peck, and promises a fertile field for local association activities. Representatives of the association will be present to assist in launching the new section.

MILWAUKEE SECTION

A meeting of company section No. 1 was held on March 2. J. G. Hordgrove, of the company's counsel, gave an extemporaneous talk on paving, tracing the paving situation from the early days of the street railway in Milwaukee, and outlining the franchise requirements. Committee reports on special work and design of cars were presented and discussed. A "quiz" period of fifteen minutes followed the general order of business, and mimeographed copies of the "Review of the Technical Press" were distributed.

CAPITAL TRACTION SECTION

Section No. 8 met for the first time in its new quarters in the general office building of the company on March 9 with a record attendance. Addresses were delivered by P. T. Moran, president of the Washington Chamber of Commerce, and Vice-President D. S. Carll and President George E. Hamilton of the company. A program of musical numbers and recitations was rendered by talent gathered from within the membership of the section, and at the close of the evening's entertainment a buffet luncheon was served.

Mr. Carll spoke on "Some Problems the Company Has Met," and gave a brief history of the early operations of the predecessors of the present company. He called upon a number of the older employees present, who recounted personal reminiscences which supplied interesting details of the company history. The occasion developed into a regular experience meeting. In closing, Mr. Carll said that his purpose had been to bring out the importance of co-operation between the company and its employees in the solving of past problems, and predicted that this same spirit would enable the company successfully to meet every difficulty which might arise in the future. Mr. Hamilton said that Mr. Moran had been invited to speak not because he was president of the Chamber of Commerce, but because he was a man who from small beginnings had accomplished great things. He said that labor and ambition rooted in integrity were the implements with which Mr. Moran had forced his way in life, and that by using the same implements, which were in their possession, the employees of the local company can accomplish much for themselves and for the community.

DENVER TRAMWAY SECTION

The thirty-fourth monthly meeting of the section was held in the company's assembly hall on March 18, with W. G. Matthews in the chair. Four reels of moving pictures showing the several processes in the manufacture of "National" pipe were first shown. There were 150 persons in attendance.

The address of the evening was by Hon. Sheridan S. Kendall, a member of the Colorado State Public Utilities Commission, and it was entitled "The Triangle." The suggestion for this subject was obtained by Mr. Kendall from the monogram recently adopted by the company, and which was described and illustrated in the issue of the ELECTRIC RAILWAY JOURNAL for March 4, 1916, page 450. His remarks covered the relations of a public utility corporation to its patrons, to the investor and to the employee, and they brought forth a lively discussion.

CHICAGO ELEVATED SECTION

President Charles L. Henry addressed an enthusiastic meeting of the Chicago Elevated Section on Jan. 18, taking the opportunity to describe to this recently formed section the plan and scope of association work, and the place of the company sections in this work.

The following meeting was held on Feb. 29, in the rooms of the Western Society of Engineers, with an attendance of eighty. The secretary reported that since the last meeting thirteen new applications had been received, making the present membership 177. The constitution was amended to provide for meetings on the third Tuesday of each month except during July and August. Among the topics discussed in connection with the question box were, "Which is more economical, the use of flanged brakeshoes or plain ones?" and "How much power measured at the substation bus is required to start up rotary converters of various sizes from the a.c. side and the d.c. side?" The matter of a binder for the preservation of safety bulletins was discussed, and a committee reported that it would have a suitable binder ready for distribution at the next meeting. It was also decided to print and circulate copies of the constitution and by-laws.

The speaker of the evening was M. J. Feron, general superintendent of transportation, who has been in the service of the Elevated Railroads for twenty-one years, having risen from the position of switchman. He spoke on "Training of Transportation Employees." He said that an employee is essentially an investment, a great deal of time and effort having been spent in his initial training, so that in further dealing with him a consistent effort must be made to conserve this investment and to derive from it an adequate return to the company which made it. An infraction of the rules by an employee, unless extremely serious and repeated, should not call for dismissal, by which the entire investment in the training of this employee is lost, but rather for "repairs" or admonition. If the employee can thus be made to realize his mistake, he becomes a more valuable man, and yields a higher return on the investment.

Mr. Feron quoted a number of statistics to show the permanency of the personnel of transportation employees on the local property. On account of the unreliability of their employment, the extra guard class changed very rapidly, but in the last few years the rate of change has decreased considerably. All transportation employees work as extra guards, and progress from

that class to the others, that is, to be regular guards, switchmen, towermen, conductors, motormen, service inspectors, etc. At present, the companies have in their employ 314 transportation men who have been with them continuously for fifteen years or more. A method of discipline of employees by further education rather than by the application of summary methods is not only a paying proposition, from the business standpoint, but it is a duty which is owed to the employee.

PORTLAND (ME.) SECTION

Company Section No. 9, that of the Cumberland County Power & Light Company, met on March 10, with 150 men in attendance. The principal speaker was Judge Benjamin F. Cleaves of Biddeford, Me., chairman of the Public Utilities Commission for the State of Maine. He explained the relations of the commission to the public, traced the development of the railway and lighting utilities and prophesied good results for the future from co-operation between the public and the utilities.

Following the address there were musical numbers and a banquet, prepared and served under the direction of Clarence Houghton, chairman of the hall and supper committee. G. C. Estill was appointed chairman of the program committee vice G. S. Brush, resigned.

WASHINGTON R. & E. COMPANY SECTION

The regular monthly meeting of the Washington Railway & Electric Company section was held in the new assembly hall of the company on March 13. An address was given by Maj. Robert Hugh Patterson, an American army surgeon recently returned from the European war zone where he had been stationed with the American Red Cross forces. The address was preceded by a song recital, and at the conclusion of the meeting a buffet luncheon was served. The attendance at the meeting was about 100 members. President Kimball announced that the present membership is nearly 150, and he anticipates that this will be increased in the near future.

Major Patterson stated that in view of the unselfish manner in which America had sent money, food, clothing and medical supplies to the war sufferers abroad, it was now time for us to begin conserving the medical resources of the country for home consumption as part of the government preparedness program. He described first-aid methods with the aid of motion pictures, and gave practical demonstrations of applied methods with Dr. L. W. Glazebrook, chief surgeon of the company, as his subject.

Tramway Accident Increase in Germany

Since the outbreak of war the number of tramway accidents in Germany has shown an alarming increase, owing chiefly to the substitution of unskilled men for train motormen and conductors who are fighting in the war. Statistics show that in the period between the beginning of the war and Dec. 8, 1915, there were 425 collisions between tramcars, 120 of these between Aug. 1 and Dec. 31, 1914, and 305 between Jan. 1 and Dec. 8, 1915. In the same five months from August to December, 1915, there were only six collisions. The collisions between tramcars and wagons and other vehicles also show an increase in the last sixteen months. The municipal authorities have decided to appeal to the military commandant to release both motormen and conductors, who are merely performing garrison duty, and permit them to return to work.

COMMUNICATIONS

Standards Should Cheapen Cost

CHICAGO SURFACE LINES
CHICAGO, ILL., March 20, 1916.

To the Editors:

I was very much interested in reading the editorial in your issue of March 11 entitled "Standards Should Cheapen Cost," and as chairman of the committee on the use of standards of the American Electric Railway Engineering Association I desire to thank you for bringing out the very important point which you have mentioned in connection with this subject. I also note that in your issue of March 18 you have published the up-to-date list of standards and recommendations that have been approved by the Engineering Association, and I wish to say that our committee appreciates the assistance which you have rendered to date in connection with this subject. We welcome any further aid that you may give in drawing this matter to the attention of the electric railway industry at large.

H. H. ADAMS,
Chairman Committee on Use of Standards.

BROOKLYN RAPID TRANSIT SYSTEM
BROOKLYN, N. Y., March 14, 1916.

To the Editors:

I note your editorial reference of March 11 to the insular attitude of the larger companies in regard to the use of association standards, and believe that, in general, this is correct. The larger companies who, as stated by you, control the situation to the extent of purchasing large quantities of material, could do much to increase the value of the association's specifications, by decreasing the cost of the product, if all of them got together on the single set of standards that are thus presented. If those in direct charge of the various technical departments of the larger properties were more interested in this feature, the incentive toward the establishment of future standards and the revision of those already established would be much greater than it is to-day, when a more or less discouraging situation confronts the committees.

It is my belief that lack of sincerity or of interest on the part of all concerned (and every official of the various railroad properties bears his share) is primarily the reason for the present situation. Only a conservative number of standards have been established, and then only after a full discussion and thorough consideration for the interests of the manufacturers and the electric railway companies as a whole. Yet the standards are used but little and they do not have the standing with the manufacturers that is enjoyed by the standards of the Master Car Builders' and Master Mechanics' Associations.

Nevertheless, the standards of the American Electric Railway Engineering Association are determined upon broad lines. They must be if they are to be of value. They can never be established without the representation, or at least consultation, on the part of reputable manufacturers. The full views of the latter, through their engineering departments or factory managements, must be obtained, and this point, as a matter of fact, I consider as a first essential. However, it need not necessarily be followed to an extent that would bias the action finally taken, which primarily must be for the benefit of the electric railway properties and their various managements.

But, before these various standards are used in a general way, and to such an extent that they will be of real value to the electric railway industry, it will be necessary to awaken real interest. By this I do not mean the kindly expressions that oftentimes emanate from those who are associated in our work, but who refuse to accord practical support the moment they return to their properties from conventions or meetings. Frequently such officials, who have given ostensible support to the standards, sit tight in exactly the opposite position and, when they are requested to advise why they do not use association standards, reply that they believe their own to be better, or that their peculiar situation makes it desirable or necessary to act differently—in other words, pinning the blame to that poor old over-worked phrase, or excuse, "local conditions."

It is true also that many of those having to do with the establishment of standards are not in a position to carry out their recommendations. Often it is difficult to overcome the somewhat narrow views expressed by those represented in our association work, these views being set forth purely from motives akin to self-preservation. For instance, some officials see fit to oppose certain details in connection with the establishment of standards because these do not happen to exist upon their own systems or because such practices are not a part of their own routine. This has been true to a large extent, and my object in pointing it out is to indicate that the final establishment of a standard is possible only after the most thorough discussion, investigation and full expression of views by all those who are interested, including even those who can never look beyond the confines of their own properties. W. G. GOVE,

Superintendent of Equipment.

Why Trolley Wire Wears Out

UNITED RAILROADS OF SAN FRANCISCO

SAN FRANCISCO, CAL., March 13, 1916.

To the Editors:

Supplementing the article which I recently sent you on the subject "Why Trolley Wears Out" the following additional notes on the relation of retrievers and trolley wear may be of interest.

In the preretriever days when the trolley rope hung loosely from the pole the whole upward pressure from the trolley base springs was applied vertically to the under side of the wire, and the wear on wheel and wire was nearly symmetrical.

With the retriever pulling diagonally downward from the end of the trolley pole, beside this vertical pressure which still remains, there is brought about an additional side pressure between the trolley wire and one flange of the trolley wheel that causes the wear in the wheel and on the wire to be unmistakably one-sided, as an inspection and study of condemned wheels and wire from straight line track readily reveals. The excess wear on both is always found on the side likely to be abraded as the result of the rope pull from the off-center retriever, and is thought to explain large increases in trolley wire and trolley wheels used per car-mile for renewals in years immediately following the adoption of retrievers.

With a 6-in. diameter retriever located in the center of the car front, the rope leaves it at the periphery of the coil and is 3 in. off center or 3 in. away from a point directly below the trolley wire. With the retriever located beside a 12 in. diameter headlight the rope is 6 in. off center at the retriever. This location brings an appreciable and constant, though perhaps slight, horizontal pressure between one flange of the wheel and the wire. Retrievers have even been found located so that the rope emerges as much as 16 in. off center.

On curves the trolley wire is located off center for minimum rolling friction between wheel and wire and the farther this curve location of the wire from the track center, the greater is the side pressure between wheel and wire due to the existence of the retriever even if located centrally.

Retriever pull on devices a short time in service has been found to vary from 1 lb. to as high as 9 lb. For some long cars on 45-ft. radius curves the wire is located 57 in. off center. With an 18-ft. high wire, retriever 5 ft. 6 in. above the ground, 16 in. off center and 9 lb. pull there would be a theoretical side pressure of nearly 4 lb. between wheel flange and wire in such an extreme case with retriever and wire on opposite sides of the car center.

If the retriever was off center on the same side of the car as the trolley wire was off center, theoretically this side pressure would be less. Practically it might be more with some types of retrievers because the rope would pull harder over the iron edge of the mouth of the retriever than it normally drags, and would increase the retriever reluctance to yield up the necessary rope. This reluctance under such conditions is often enough to cause the wheel to leave the wire and, to forestall this, conductors are seen to pull out slack rope and hold it out until past curves located on the same side of the car as the retriever to prevent interruption to service.

The high polish and deep scores to be found on the edge of the mouth of certain types of retrievers where the trolley rope drags proves the existence of this additional friction.

The retriever has undoubtedly come to stay, but in a company covering millions of car-miles per year this continuous one-sided grinding against the soft trolley wire and brass ears caused by the presence of the retriever may be a serious item in copper consumption, whether the device is located centrally or off center, besides increasing the frequency of re-earing the line.

A study of the annual consumption of trolley wire and trolley wheels for purely maintenance purposes per car-mile for a series of years before and after the adoption of retrievers might surprise some companies. The theory of trolley renewals occuring in periodic cycles must be allowed for in considering wire figures though it has no place in considering wheels.

S. L. FOSTER, Chief Electrician.

Service Improvements on the London & Southwestern

The advantages of electric operation on the Kingston and Shepperton lines of the London & Southwestern Railway, the electrification of which was placed in operation on Jan. 30, is already very noticeable, according to the engineer. The company has made a marked revision of its local service. The quicker acceleration of the electric trains enables them materially to reduce the number of trips hitherto in force, while the steam trains on other routes, such as those running to Hampton Court, are arranged in many instances only to stop at principal stations, thus enabling quicker service. Moreover, as a result of the policy of standardizing the service, important developments affecting almost the whole of the suburban and outer suburban operations have been made. After 5.30 a. m. every train is electric, except on routes which are not wholly on the section at present equipped, and a ten-minute service is provided. Originally, a steam local train running between Waterloo and Kingston took thirty-five minutes to cover the journey, while the time taken by the electric trains is only twenty-eight minutes. Six-coach electric trains will be used as required to meet traffic variations.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

A One-Man Pole-Hoisting Machine

BY W. E. NEES
Superintendent of Railway, Selma Street & Suburban Railway, Selma, Ala.

The Selma Street & Suburban Railway has recently built in its shop in Selma, Ala., a pole-hoisting machine which has several good features, and which will probably be of interest to the readers of the ELECTRIC RAILWAY JOURNAL as a continuation of the subject discussed by C. R. Harte in the issue for March 18. The machine is strictly a one-man affair, one man with it being able to handle any pole that is liable to be used on an electric railway. The accompanying photographs show the construction and method of operation of this machine.

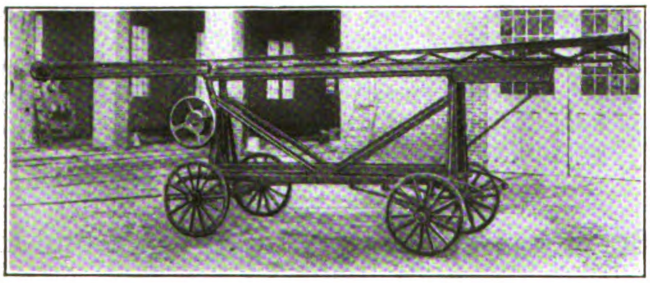
With most pole-raising machines, more time is required to get them ready than is used in the actual raising of the poles. With this machine, however, the mast is raised by the same hoisting tackle that is used to raise the pole, so that all that is necessary in operating the machine in pole-setting is to run it up to the hole, fasten the hook on the end of the chain to the lower end of the mast, and begin to turn the winch in the hoisting direction. It operates so easily that one man has been able to raise a 1500-lb. pole without pausing for breath.

The machine consists of a steel frame carried on wagon axles, the frame serving to transport a steel mast or gin pole and to mount a winch used for raising the mast and also the pole when the mast is placed in position. The frame is made of angle irons, and well-braced, its construction being clear from the illustrations. The whole machine is made up of standard material, a 22-ft. Bates expanded metal pole being used for the mast, and a Yale & Towne winch for hoisting purposes. The mast is strong enough to carry very heavy loads and it is provided with a substantial base 14 in. wide and 42 in. long.

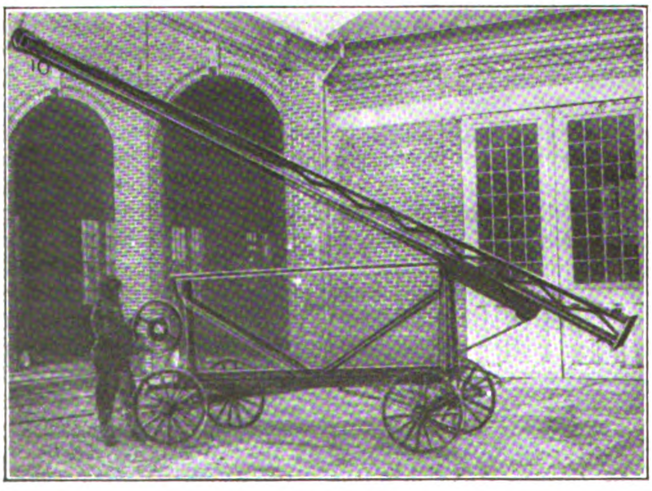
Two head lines, fastened permanently to the top of the mast, are provided to take the lateral strain. When the mast is in place and the head lines are made fast to trees, poles, or other suitable anchorages the machine is ready for business. Two iron pins or stakes are used as anchorages if no others are available. The head lines are adjusted to permit the mast to lean so that its top extends toward the pole hole about 6 in. from the vertical.

The hoist has a self-contained arrangement that prevents it from lowering the load unless the winch is turned backward, against the hoisting direction.

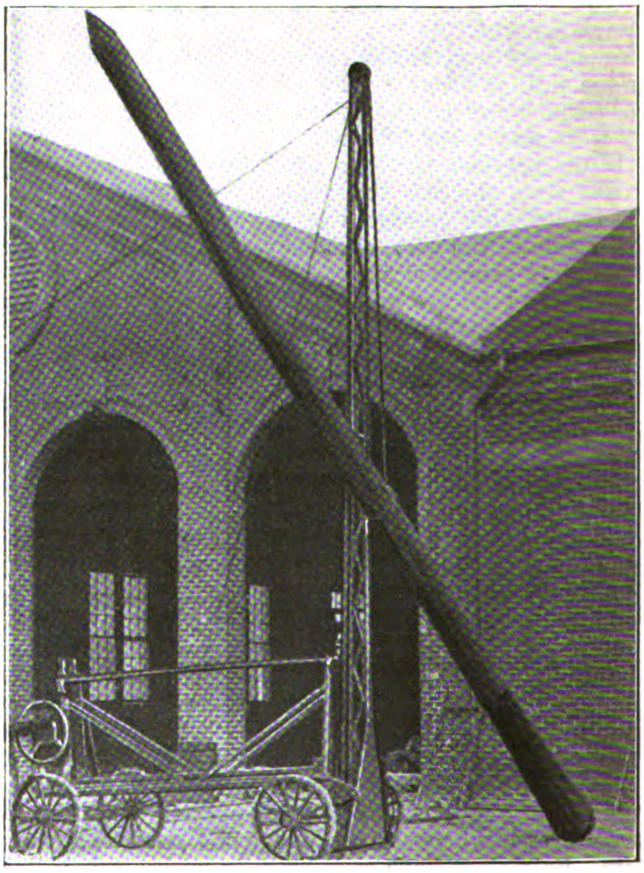
The weight of the mast is nearly balanced on one end of the supporting frame, so that a very slight effort serves to raise it to a vertical position. It is placed slightly out of balance to render easy its return to normal, or horizontal position. When the mast is raised its weight is automatically transferred to the



ONE-MAN POLE HOIST IN LOWERED POSITION



ONE-MAN POLE HOIST IN PROCESS OF BEING RAISED



ONE-MAN POLE HOIST WITH MAST IN HOISTING POSITION ground, and the machine is relieved from all strain while a pole is being raised.

When a pole has been set and tamped a slight turn of the winch in the lowering direction releases the chain hitch and the hook returns to the ground. It is made fast to the bottom of the mast and by a slight pull on the head lines the mast is started down. As soon as it leaves the vertical the effect of the slight counterbalance is felt and the mast is returned to the horizontal by the unwinding motion of the winch.

Reclaiming Broken Track Tools

BY "WAY ENGINEER"

Ordinary track hand tools, as a rule, are not reclaimed when they become badly worn or broken, and only such repairs are made as can be readily handled by an ordinary laborer. This is particularly true of large construction jobs where a considerable item of their cost is expended in track hand tools, yet when a job is completed comparatively few of the tools are to be found that are good enough to turn over to the maintenance forces. Many of these worn and broken hand tools which are discarded as useless can be repaired profitably. Experience on some roads has demonstrated this fact, and the ease of making repairs has been considerably facilitated by the introduction of portable welding outfits. While it has been found economical to repair tools, it is also very important that the repairs be properly made to accomplish the best results. It is as essential to good workmanship and efficiency that tools should be kept in proper condition as it is to buy first quality tools. In other words, tool repairs should be concentrated at a single point where one or more men may be regularly employed in putting them in serviceable condition.

Specific cases of repairs to hand tools that pay include reclaiming good shovel blades in which the handles have been broken, by supplying new handles. Handles in good condition may often be had by taking them from blades that are completely worn out. Claw bars badly worn, or with one of the claws broken may be reclaimed by dressing the bar down to form a new claw, or if there is not sufficient stock remaining, a new claw may be welded on. It is also important, and has now become general practice, to keep track picks sharp and properly tempered. The cost of the pick, however, is so small that reclaiming an old one by welding on a new point is hardly worth while. Lining bars and tamping bars may be readily restored to good condition by straightening, redressing and retempering.

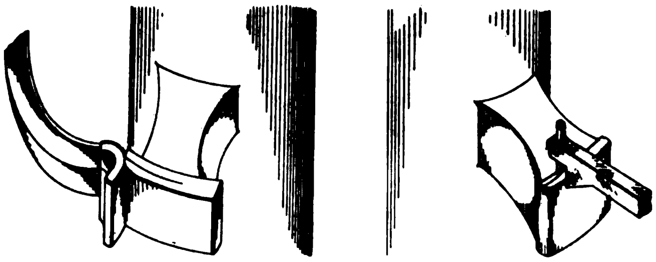
Accurate workmanship when repairing spike mauls is very important. An untrue surface makes it impossible to strike a true blow, and an improperly struck blow may bend a spike or cause an accident. An improperly tempered maul soon becomes untrue when the metal is too soft, or if it is too hard pieces may chip off and cause an accident. The same requisites apply to track chisels which primarily must be purchased with steel of proper quality. A poor chisel delays the work, and increases the cost of any operation. It is also very important to keep track jacks in perfect operating condition. Where several extra ones are not on hand a bad-order jack may tie up a gang. The track jack like the track drill, is more expensive than the average hand tool, and it is not general practice to have an unlimited supply of extra ones. It is therefore important that jacks and drills not only be in good order but that they be inspected for defects occasionally, and when repairs are necessary they should be made by an expert mechanic in order to insure results.

With no other track hand tools are accuracy and good repair so important as with the ordinary track gage and level. When these become damaged for any reason the utmost care should be exercised to see that the repairs are made properly, and after the work is completed their accuracy should be checked before they are actually used in track work. Repairs to either of these tools are difficult to make because accuracy is so essential, hence, it is especially advisable to have this work done by an experienced repairman. In other words, the repairing of most track hand tools is a job for a specialist if the best results and maximum economy are to be obtained. A first-class blacksmith is best qualified to do this kind of work, but it must be borne in mind that not every blacksmith can repair these tools. Experience in making repairs to hand tools is a necessary requisite, hence it is better to employ one man on work of this kind and hold him responsible for the quality of the repairs made.

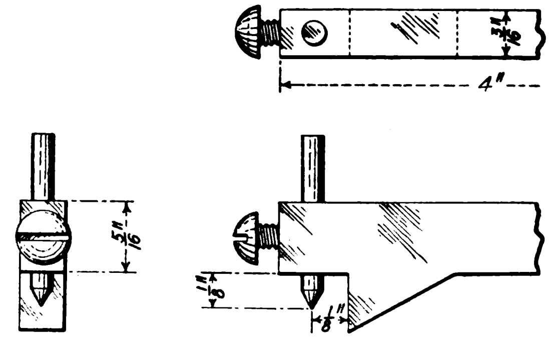
Gage for the Adjustment of Controller Fingers

BY R. H. PARSONS, ELECTRICAL FOREMAN

The life and service of controller fingers depend so much on their proper adjustment that too much care cannot be given to this point. The General Electric Company recommends a lift of 3/32 in. or ⅛ in. for each finger. This gives sufficient contact, and at the same time does not subject the springs to excessive motion, which would have a tendency to break them in a short time. It is believed that the lift should approximate ⅛ in. rather than 3/32 in., because in old cylinders there are invariably irregularities which make the segments a little higher on one side than on the other, and a 3/32-in. lift at the beginning might mean only 1/16 in. at the full parallel position, which would be getting near the point of insufficient contact.



DIAGRAMS SHOWING METHOD OF USING CONTROLLER-FINGER MARKING GAGE



A MARKING GAGE FOR USE IN ADJUSTING CONTROLLER FINGERS

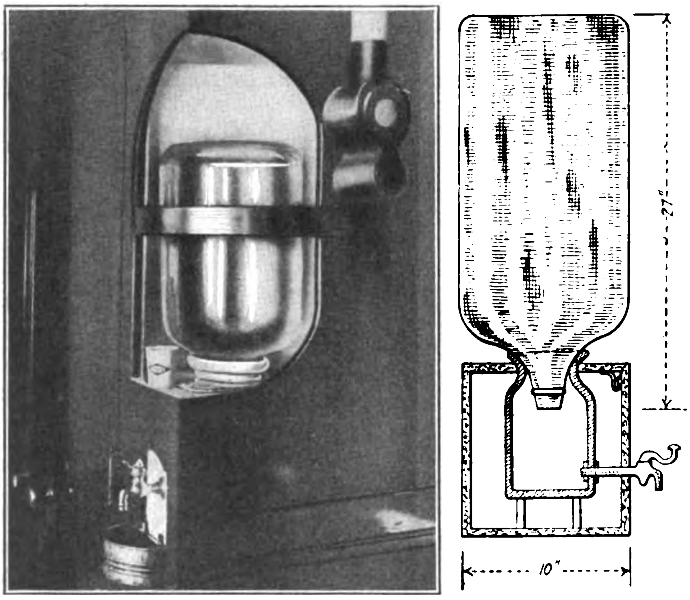
As it is a difficult matter to get the proper lift by eye, and still more difficult to instruct men to do so, a gage similar to the one herewith illustrated will be found an excellent aid. This gage is a scratcher with a permanent setting of ⅛ in. or 3/32 in. It is constructed so that when used as shown in one of the illustrations it will leave a mark on the segment at the proper distance from the outside surface.

After the segment has been marked, which takes but an instant, the cylinder should be moved until the segment just touches the finger. The finger is then set so that its line of contact shall be in line with the mark on the segment, after which its set-screw is tightened. This completes the setting of the finger as far as lift is concerned.

Sanitary Water Cooler with Isolated Ice Chamber

BY C. W. DUNCAN
Master Mechanic Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

Much controversy has been heard concerning the sanitation of drinking cups for interurban and steam passenger cars, while little attention, if any, has been paid to the container of the drinking water. Unsanitary conditions are caused by the contact of drinking water with the ice, which may contain impurities from having been handled by men whose hands are often dirty and possibly contain disease germs. On many roads the water tanks are seldom if ever tested and cleaned. The water tanks used on most interurban roads are made of zinc or copper, and lined with sawdust or asbestos. They are constantly in need of repair, thus necessitating the use of acids inside the tanks, which thus become very unsanitary. In many cases the water leaks through the first wall into the asbestos for some time before the flavor of impurities is noticeable in the water.



SANITARY WATER COOLER

In order to eliminate this unsanitary condition and to reduce the cost of maintenance of the water cans, the writer has designed and installed a sanitary water cooler, shown in the accompanying illustrations, which on the cars where it has been installed in connection with penny-in-the-slot machines for dispensing drinking cups has produced a sale of double the number of cups sold with the old-style drinking water container.

The cooler consists of a 10-in. x 24-in. glass bottle, a porcelain or enameled cooling chamber (the latter being preferable on account of breakage), and an ice tank. The tank is 10 in. x 10 in. x 12 in., and is made of No. 23 gage sheet iron with a 5/8-in. wall. It is filled with charcoal. The tank is designed with a false bottom so that the ice can be packed all around the cooling chamber.

On the side of the tank near the bottom edge is located a cock for draining the water of the ice tank. The cooling chamber is permanently fastened inside the ice tank by the pipe which leads from the inside of the cooling chamber to the faucet on the outside of the ice tank, and it is supported by the false bottom, which is 3 in. from the true bottom of the tank. Rubber washers and nuts are placed on both the outside and inside of the cooling chamber and tank to keep the drinking water from mixing with the ice water and to keep the ice water from leaking out around the pipe where it passes through the side of the tank. The ice tank is covered with a tight-fitting cover made in two pieces so that the front half can be easily removed for filling with ice. The neck of the porcelain jar projects through the cover of the ice tank for about 3/4 in. There is a heavy rubber washer around the inside of the neck of the porcelain cooler upon which the neck of the water bottle rests, making a tight joint.

The water cooler and bottle are placed in the corner of the lavatory, with the faucet on the aisle side. The ice tank and the inside of the recess are painted white, which gives the outside an attractive and sanitary appearance. The bottle is held in place by a brass strap, hinged at one end and flat at the other.

The cost of the outfit was as follows:

Tank and drain cock	$7.60
Glass bottle	.75
Faucet and porcelain cooling chamber	3.00
Total	$11.35
Labor of installing	2.50
Total	$13.85

The cost of both the cooling chamber and tank would be greatly reduced by buying in quantities. The cost of the old tank previously used was $12 without the faucet, or with the faucet about $13.85, plus the expense of installing.

Power Plant Inventory

BY J. C. HENRIQUES
Electrical Engineer

In making a valuation of the electrical equipment of power plants and substations it is often assumed that the taking of a correct inventory requires little knowledge of the apparatus used or of its functions. Such is not the case, however, for the work of listing items which go to make up the physical property on which the whole valuation lies must be done by competent engineers who are thoroughly familiar with the operation and construction of all units and auxiliaries. Correct listing is essential in order that every item be carefully noted and that no omission or duplication may occur. The following is a description of the method used and found to be successful by the writer.

The equipment should be listed in the following order:

Conduit
Cables and wires
High-tension compartments
High-tension switchboards (three- and two-phase)
Direct-current switchboards (inclusive of arc distribution switchboards)
Miscellaneous switchboards
Foundations
Rotaries and transformers
Generator and motor generator sets (alternating and direct current)
Mercury arc rectifiers
Storage batteries (including end cell switches)
Auxiliary apparatus
Miscellaneous apparatus

The detailing of the apparatus will be taken in the order in which it appears above.

The blueprints of the station to be appraised should be obtained and checked in the field, all corrections being noted on the prints. The prints of conduit runs should be referred to the company's superintendent of construction for changes of conduit sizes and runs, all

Reference	Conduit		Wires					Condulet Fittings	Location of Conduit	
	Size and Kind	Total Length	Number of Wires	Code Letter	Length in Duct	Length Out of Duct	Total Length		From	To

POWER PLANT INVENTORY—HEAD OF BLANK FOR LISTING MISCELLANEOUS CONDUIT AND WIRES

changes being noted on the prints. A form should then be designed to show the kind, length and size of conduit, how laid, duct formation and location. All high-tension and low-tension feeder conduit should then be measured from the prints and recorded. Machine conduit for each unit and storage-battery conduit are next taken. All miscellaneous conduit is listed last.

If blueprints of conduit runs are not available, the following procedure is recommended: Make up a floor plan to scale and plot in the size and kind of conduit at the various locations where they rise out of the floor or end in the manhole. The connecting up of the conduits to their proper locations can be done by an engineer who is familiar with the laying out of conduits in substations and power houses. If possible, it is also recommended that the conduit, etc., should be measured up and listed in the field.

Cable forms should show the location, size, insulation (thickness and size), thickness of sheath if any, number of cables in duct, length of cable in duct, out of duct and total length of cable. From the conduit sheets already listed the length of the cables in the conduit can be obtained. The sizes and insulation specification are found in the code sheets for the different sizes of machines. The cables outside of the conduit are measured in the field.

Reference	Quantity	Description of Equipment	Year Installed	Remarks

POWER PLANT INVENTORY—HEAD OF BLANK FOR LISTING GENERAL EQUIPMENT

Cables should be taken up to the busbars on bus cables but should not include them. The appraiser should obtain from the company a list of cables used for various purposes and use a code letter or number for each. This will facilitate the making up of a compact form for listing. The cables in the miscellaneous conduit should be listed with the conduit, a form being designed to include the cable code (letter or number) and length. The miscellaneous conduit is considered as all remote control conduits, meter conduits, fuse control, panel, etc.

The high-tension compartment should be divided into a general section and an individual section. The general section includes all general equipment that could not be assigned to an individual compartment, such as compartment material (brick or concrete), iron (frame work and wire screens, etc.), ground and bonding wire, insulators, barriers and covers (material and size), bus section transformers, copper buses, etc. The individual section includes compensators, transformers (current and potential), oil and knife switches, cables and wires (between buses and switches), panels, meters, etc.

High-tension switchboards should be divided into a general section and an individual section. The general section includes all equipment, conduit and wiring bus cables, ground wire, insulators, bus transformers, etc., which cannot be assigned to an individual panel, such as iron (frame work, screens, etc.). The individual section includes regulators with equipment common to it, oil and knife switches, cable from bus to switch, wiring on panel, meters, relays, etc. The three-phase switchboard should be listed before the two-phase switchboards when two-phase switchboards are installed in the station. The reason for this is the fact that stations are usually built to transform three-phase current to two-phase current. Therefore the three-phase equipment takes precedence over the two-phase equipment.

Arc distribution switchboards should be listed under the direct-current switchboards. The three-phase control switchboard for arc machines should be listed under high-tension switchboards. The direct-current switchboards are handled in the same manner as the high-tension switchboards, the general section being identical, while the individual section includes copper connections between knife switches, circuit breakers, and copper busbars, switchboard wiring, meters, panels, relays, etc. Miscellaneous switchboards such as charging panels, remote-control panels, meter panels, fuse panels, neutral switch panels, synchronizing panels, etc., should be noted, also the size and kind of material and meters mounted on them.

Reference	Location		Code Letter	Number of Cables	Length per Cable		Total Cable Length	Remarks
	From	To			In Duct	Out of Duct		

POWER PLANT INVENTORY—HEAD OF BLANK FOR LISTING CABLES

The foundations should be considered next, and the size, construction material (brick or concrete) footings, if any, should be noted. When machine foundations are common with the building foundations, they should be considered as part of the building and listed with it. This will prevent the duplicate listing of foundations.

Rotaries, including transformers and voltage regulators, should be designated by the manufacturer's name and serial number, the company's number, the voltage, the capacity in kilowatts, type, number of phases, speed and frequency. End play and speed limit devices, field rheostats and circuit breakers, except

Conduit

Reference	Length, Size and Kind													Wall Suspension	Ceiling Suspension	Building Wall	Trench Length	Trench Excavation	Number of Ducts	Duct Assembly	Location of Conduit	
	Iron Pipe							Tile			Fiber											
	1"	1¼"	2"	3"	3½"	4"		2"	3"	4"	1 Ch.	2 Ch.	4 Ch.								From	To

POWER PLANT INVENTORY—HEAD OF BLANK FOR LISTING GENERAL CONDUIT where circuit breakers are mounted on the switchboards, should be noted also.

For generators and motor-generator sets, the same information is required as specified for rotaries, as well as the method of connection to prime mover (direct belted or countershaft). When generators are driven by steam turbines and the cost includes both units (i.e. generator and turbine) it is suggested that one-third of the cost be credited to the electrical equipment and two-thirds to the mechanical equipment. The manufacturing companies, usually divide the cost of machine in the above-mentioned way. The foundation for these machines should also be considered in the same manner when it is common to both units.

When mercury arc rectifiers are listed, the starting panel should be included as it is usually included in the cost. The manufacturer's name and serial number, the company's number, the voltage, amperage, capacity in number and kinds of lamps, number of phases, type of panel, also the oil switches and meters mounted on it, should be noted.

Storage batteries should include the connecting coppers and the iron frame work supporting them from the end cell switches to the cell, also between cells. Specify the number and type of insulators, number of cells, size of cells, material cells are made of, how cells are supported, number and size of plates in each cell (positive and negative), type of plate and manufacturer's name. End cell switches should be designated by the manufacturer's name, the number of cells controlled, number of points and whether it is controlled electrically or by hand.

All transformers (current and potential) and voltage regulators, should be designated by the manufacturer's name and serial number and company's number.

The dates when equipment is bought and installed should be obtained from the records of the company. If the company has no records, it is often possible to get the date of purchase from the manufacturer.

All apparatus such as pumps, blowers, compressors, cranes, etc., how connected (direct or belted), capacity and manufacturer's name should be noted, as well as starting rheostats, switches and switch boxes that go to make up this type of equipment. These should be listed under the heading of Auxiliary Apparatus. All water, air and oil piping, fire apparatus, emergency kits, rubber mats, etc., should be charged to miscellaneous equipment. When the auxiliary and miscellaneous equipments are listed in power houses they should be credited to the power account to conform with a uniform system, if one is demanded by a public service commission.

Progress on Australian Electrification

The tunnel from Long Nose Point to Balls Head, in the electrification of the Sydney-North Shore line, Sydney, Australia, under construction, is nearly completed, the recent flooding having been successfully overcome, and it will be possible to lay the cables in a few weeks. At the White Bay power house, machinery capable of developing 30,000 hp. has been installed, and there is room for 60,000 hp. or 90,000 hp. in all, which is sufficient for the electrification of the whole of the suburban line. It is estimated that the North Shore system can be electrified for $1,461,000; it is also considered that the White Bay power house should be utilized at the earliest possible moment for this railway, and that the building of the new electric railway rolling stock should be commenced at once, in order to be ready for the electrification of the suburban line as soon as the power is available.

Vibration Theory of Rail Corrugation

In view of the attention that has been directed toward the subject of rail corrugation in this country, a pamphlet recently written in German by A. Meyer, member Royal Board of Public Works and manager Grosse Berliner Strassenbahn, is of timely interest, and a brief abstract of a translation is presented herewith. The pamphlet is of 87 pages and is published by H. S. Hermann, Berlin, 1915, price 2.5 marks.

The author begins by citing no less than eleven possible theories of corrugation which have been advanced from time to time, but states that none of them (with one partial exception, namely, the character of rail metal) has ever been demonstrated to be more than a contributory factor. He puts forward, therefore, the influence of perpendicular movements in the rails as a primary cause. As early as 1906, he says, comment was made on the fact that corrugations appeared in rails loose enough to allow vertical movement (in the form of high frequency vibrations) during the passage of cars. Whenever the acceleration of this movement was downward the wheel pressure was less, thus forming a crest; whenever this acceleration was upward the wheel pressure was more, thus forming a valley, and therefore the length between crests would correspond to the distance covered by the car during a single vibration of the rail.

Opportunity for such vibrations might be set up in rigid track by the introduction of one or more free lengths of rail, say 1 ft. long, that are not in actual contact with the concrete, because of careless construction, poor design or the like. In flexible track each length of rail between ties acts, of course, like a beam that is practically free to swing up and down whenever a rolling load strikes it a blow.

The vibration period of transversely vibrating beams is independent of their width, but is directly proportional to the square of the free length and to the square root of the density. It is also inversely proportional to the beam height, or thickness, and to the square root of the tensile strength or modulus of elasticity. Also, when beams are rubbed rapidly they vibrate longitudinally, maintaining their ordinary density at points of maximum movement, whereas the density at the no-movement points alternately increases or decreases. In this case the vibration period is independent of the force applied and the thickness of the beam, but is directly proportional to the length and to the square root of the specific weight and is inversely proportional to the square root of the elasticity.

On this basis the author undertakes to show by means of some elaborate calculations that the tendency to corrugate increases as both bending of the rail and its period of vibration decrease. Consequently, the strongest tendency toward corrugation is presented by rigid tangent track, and a much weaker tendency by elastic tangent track. On all curved track the tendency is even less than it is on elastic tangent track.

In actual service the theory is that a rolling, or sliding, load on a rail sets up high-frequency waves, or vibrations, of which those in a vertical direction are chiefly responsible for corrugation. As the rolling load is suddenly imposed on a section of free rail, the resulting vibration causes the rail head to move first away from the wheel and then back toward it, giving alternately minimum and maximum pressures between the wheel and the rail. When there is created a progression of waves due to establishing harmonics of the original simple vibration in the rail, the crests come into strong impact with the wheel while the valleys are practically relieved of load. The wheel thus passes with a shock from one wave crest to the next, causing excessive wear of the rail and a crowding forward, or displacement, of the rail metal at the points of impact. This condition grows worse if the rail is made softer and the wheel harder.

Theoretically, when the length of free rail increases 100 per cent the wave length increases 140 per cent, and the number of vibrations decreases correspondingly. Hence, the waves grow smaller as they approach the points of support, becoming infinitely small in theory. This cannot actually occur, however, because the support, or nodal point, is never absolutely rigid in practice, and, therefore, the corrugations must extend beyond it. However, the waves will be shorter at the support than at the point of greatest freedom of movement. As the speed of the rolling load increases the corrugation lengths increase, while the period of vibration and the number of vibrations do not change. Also, as the speed increases the coefficient of displacement of the metal varies as the square. For instance, if the speed increases from 10 m.p.h. to 20 m.p.h., the displacement of metal at the points of impact will be four times as great, but this displacement of metal is divided between the wheel and the rail in inverse relation to the hardness of each. Thus it should be possible to select the kind of rail and wheel compositions best suited for the track structure. As the destruction of track is so costly, the rail should be much harder than the wheel tires, although, of course, this will increase the displacement of the wheel metal because of the greater vibration energy of the rail when it is made of hard material.

No rigid construction will permit an economical relation between rail wear and wheel wear. In elastic construction the waves have a period of vibration that is considerably longer than in rigid track, and no demonstration is required to prove that the longer waves produce less noise and less wear for rails and wheels. Longer wave lengths may be obtained by increasing the "give" at the point of support, the change being roughly in proportion to the amount of the increase in "give."

The author calls attention to the desirability of having rolling mills produce a rail of variable composition throughout its cross-section, the head being hard and the supporting structure flexible to reduce the energy of vibration. Such rails, he says, will shortly be rolled according to the Melaun patent, the practicability of the step having been indicated by mechanical, physical and chemical tests which were made by the Royal Prussian Railways.

In conclusion the author discusses the various theories that have been advanced as to the cause of rail corrugation, stating that the character of rail composition could not be held responsible for the great variation existing in the lengths of corrugations. With regard to the influence of high speed he states that crests are thus made higher and rate of wear is greater, but that the resulting corrugations are less troublesome. With regard to the influence of excessive rates of acceleration and braking, the author suggests that the front truck of the car should have a much smaller load on the front axles than on the rear axles, the use of such maximum traction trucks tending to keep down corrugation in general. He contends that the motor drive is of little or no importance in causing corrugation, for the waves are plentiful enough on sections where motors are not in use at all, and he decries the possibility that corrugation can be caused by hard tires, these being of importance only in regard to rate of wear. Nosing may be associated with corrugation on curves, but it cannot be applied to the case of tangents.

In short, the author believes that, since vibration in the rail is the primary cause of corrugation, it is of most importance to do everything that is possible to minimize such vibrations, and he suggests the following remedies:

1. Use rails having the least possible height.
2. Use tough but not excessively hard metal for the rail, except in the head. The shape of the rail head also should conform to that of the wheel to reduce unit pressures and minimize displacement of metal.
3. The present single-web form of rail lowers the period of vibration, but a double-web rail such as has been suggested would increase the period of vibration, thus decreasing the tendency toward corrugation.
4. Avoid rigid tracks.
5. Avoid short distances between rail supports, especially on sections of track where acceleration and braking takes place.
6. Avoid rigid fastenings. Metal plates and metal ties are harmful. Where these cannot be avoided, they should be used in connection with wooden blocks or felt liners under compression. The rails should be installed on the ties as flexibly as possible to minimize the effect of establishing nodal points for any vibrations that may be set up.
7. In concrete construction, which is so costly to disturb, the rail should be harder than the wheel, but elsewhere it is possible to choose the most economical compositions for the particular conditions involved.

Diesel Engines in Texas

In a recent issue of the *Electrical World*, R. H. Burdick presented operating data for a number of small Diesel engine plants in the State of Texas where fuel oil containing 19,500 B.t.u. per pound was obtainable at a price of 3 cents per gallon. The actual unit production costs obtained in two of these stations between Sept. 1 and Dec. 31, 1915, are shown in the accompanying table. In the station at Paris as cited in the table there were three engines of 500 hp. each, while in the station at Tyler there were four engines of 225 hp. each. The difference between the figures for labor cost which appear in the table is due apparently to the difference in the load factors existing at the two plants, as the Paris station employed six men, whereas the Tyler station employed but four. The wide diversity in the figures for maintenance cost is accounted for by the fact that the Paris engines are of more modern design than those at Tyler, the former having been operated about eight months and the latter having done severe intermittent shop duty over a period of six or seven years prior to their installation at Tyler. The author estimated the cost of a 1050-kw. Diesel station at $145 per kilowatt and the cost of a 1100-kw. steam station at $100 per kilowatt. Assuming fixed charges of 15 per cent for the Diesel engine station (of which 8 per cent was for depreciation) and 12 per cent for a steam station he calculated that, at 50 per cent load factor, the total station output costs would be respectively 9.5 mills per kilowatt-hour and 11.4 mills per kilowatt-hour.

Data:

	Paris	Tyler
Station output (m. kw.-hr.)	1,565	499
Rating of plant (kw.)	1,050	600
Station factor, per cent	51	28½
Total fuel oil (gal.)	149,072	78,455
Pounds oil per kw.-hr. output	0.672	1.100
B.t.u. per kw.-hr. output	13,100	21,400
Production costs (mills per kw.-hr.):		
All labor	1.44	2.24
Fuel oil	3.07	5.18
Water	0.09	0.19
Lubricants and waste	0.04	0.56
Miscellaneous supplies and expense	0.10	0.29
Maintenance of engines	0.04	4.48
Maintenance of buildings	0.05	0.05
All other maintenance	0.15	0.61
Total production cost, mills	4.98	13.60

NEWS OF ELECTRIC RAILWAYS

INCREASE SOUGHT IN CLEVELAND ALLOWANCES

Cleveland Railway Asks That the Maintenance, Depreciation and Renewal Allowance Be Increased

At the meeting of the City Council of Cleveland, Ohio, on the evening of March 20, the Cleveland Railway asked that the maintenance, depreciation and renewal allowance be increased to 8 cents per car mile flat. At the present time the allowance is 4 cents for January, February, March, April, May and December, 5 cents for June and 6 cents for the other months. The company also asked that Council direct Fielder Sanders, Street Railway Commissioner, to permit the company to reduce its deficits and suspended accounts by such amounts per month as he deems proper.

There is a debit balance of $956,572 in the road and equipment suspended account and $73,440 balance in the depreciation and renewal suspended account, allowed by arbitration for over-expenditures previous to March, 1913. The deficit in the maintenance, depreciation and renewal reserve as of March 1, 1916, was $564,000. The company recalled the fact that the board of arbitration recommended the transfer from the interest fund to the maintenance, depreciation and renewal fund of amounts equal to these over-expenditures or as an alternative that the maintenance allowance be increased.

It seems likely that Mr. Sanders will oppose the increase of the allowance to 8 cents per car-mile. He said the suspense accounts and deficits were inherited from a former administration and were left for the present administration to consider. He expressed the opinion that such an increase would endanger 3-cent fares and that such a large allowance was unnecessary. Mayor Harry L. Davis said that the matter had to be opened some time and it had as well be now as any other time. If the demand is not allowed the company may ask for arbitration of the question.

Officials of the company feel that on account of the increasing business and the higher rate of fare, the suspended accounts and deficits should be reduced more rapidly than they have been in the past. The reduction should at least keep pace with the growth of the business. Considerable money is to be expended this year in track renewal and other improvements. J. J. Stanley, president of the company, said that he does not care to create any new deficits and for this reason asked that the allowance be increased to a point to cover the expenditures as they are made.

MEASURES AFFECTING ELECTRIC RAILWAYS PASSED IN KENTUCKY

Various measures of direct interest to the electric railways of the State were enacted at the last session of the Kentucky Legislature, which has just adjourned at the end of its regular biennial session. Probably of first importance to the street railways is the workmen's compensation law. This is virtually a compulsory measure, since it would deprive employers of five or more persons of the common-law defenses of assumption of risk, responsibility of a fellow servant, contributory negligence, etc. It does not provide for a State administered fund, but prescribes that insurance may be carried in commercial companies or in mutual organizations.

Another measure passed provides that parts of the rights-of-way of railroads may not be condemned for the use of poles carrying telegraph wires. This measure relates principally to the controversy between the Louisville & Nashville Railroad and the Western Union Telegraph Company, but would apply, it is stated, to electric railway lines in the State as well.

Electric railways and other corporations, if they have been paying off by the month, hereafter will pay at least twice monthly under the provisions of another act so providing. This has been signed by the Governor. Proponents of the measure urged that long waits for his money imposed a hardship on the laboring man and contributed to the ill-gotten prosperity of the loan shark.

An anti-pass act prohibits certain public officials from accepting transportation favors.

A measure designed to increase the powers of the State Railroad Commission so as to give it authority over joint rates failed of passage.

PENSIONS ARRANGED FOR NEW YORK EMPLOYEES

Outline of Pension System Regulations of the Interborough Rapid Transit Company

A pension system has been established by the board of directors of the Interborough Rapid Transit Company, New York, N. Y., for the benefit of employees of the company, taking effect on Jan. 2, 1916. The benefits of this pension system will apply to employees who have attained the age of seventy years and have been in the service of the company or its predecessors not less than twenty-five years, and to employees who have been twenty-five or more years in such service and who, in the opinion of the board of pensions, have become physically and permanently disabled.

The pension department is to be administered by a board of officers, to be known as the board of pensions, to be appointed by the president, subject to the approval of the board of directors.

Subject to the approval of the president, the board of pensions is to have power to make and enforce rules and regulations for the care and operation of the department; to determine the eligibility of employees to receive pension allowances; to fix the amount of such allowances; to prescribe the conditions under which such allowances may inure.

Physical examination by two physicians appointed by the board of pensions is to be made of employees recommended for retirement who are under seventy years of age, and a report thereof, with the recommendation of the examining physicians, is to be transmitted by the secretary to the board of pensions for consideration in determining such cases.

Service is to be computed from the date since which the person has been continuously in the service, as shown by the pay-rolls, to the date when retired, eliminating in the final result any fractional part of a month. Leave of absence, suspension or dismissal followed by reinstatement within one year, or temporary lay-off on account of reduction of force is not to be considered as a break in the continuity of the service. Persons who leave the service relinquish all claims to the benefits of pension allowance.

The pension allowances authorized by the board of directors to be paid monthly are upon the following basis:

For each year of service one per centum of the average monthly pay for the ten years next preceding retirement, provided, however, that in no case shall the pension allowance for employees retired, in accordance with the provisions of the regulations, be made less than $20 a month.

The company in each year is to make an appropriation of an amount not to exceed $50,000 in payment of pension allowances for the year. If the pension allowances create demands in excess of the appropriation, a new basis ratably reducing the pension allowance is to be established to bring the expenditures within the limit of the fund. Notice of such new basis is to be given before the beginning of the year in which it may be decided to put the same into effect.

In the event that any person is receiving accident or sick benefits from the relief department at the time the pension is granted, the pension allowance paid is to be for the difference between the amounts received from such sources and the amount which otherwise would be the pension allowance.

The acceptance of a pension allowance is not to debar any employee from engaging in other business.

OPPOSITION TO PROPOSED PHILADELPHIA CHANGES

Modification of the So-Called Taylor Rapid Transit Plan Provokes Opposition

The announcement of the proposed modification of the plans for the new rapid transit system in Philadelphia, referred to in the ELECTRIC RAILWAY JOURNAL of March 11, page 512, has stirred up considerable opposition from several factions. Mayor Smith has finally accepted responsibility for the change in the routing of the subway under the City Hall so that the delivery stations would be outside of the foundations of the big building topped by Father Penn's statue. He has declared, however, that beyond this he had not considered Director of City Transit Twining's plans in any formal manner, and that if the people of Philadelphia wanted the Taylor plans carried out, they will get what they wanted.

Senator Penrose and the Mayor would seem to be aligned against each other. The Senator is reported to have said:

"I feel that I owe it to my friends in the various sections of the city who are menaced by the proposed emasculation of the city's admirable plans for transit developments to stand by them to the end. South Philadelphia needs a subway which will carry passengers around the loop through the business district, as well as through North Philadelphia directly. North Philadelphia must have elevated branches and express tracks in addition to local tracks to Arch Street. The district consisting of the Parkway, the northwest section and the Roxborough district must be provided with proper delivery and through system for passengers. The Woodland Avenue line is a vital necessity. There will be absolutely no division of opinion among ward organizations and civil bodies and among the people generally regarding the vital necessity that the Taylor plans be constructed to carry people between all parts of the city for one fare.

To this the Mayor rejoined as follows:

"Former Director Taylor, who occupies rooms adjoining the suite of Senator Penrose, appears to be following a dispassionate attitude like myself in refusing to make any criticism of Mr. Twining's plans until we are informed by Mr. Twining what his plans actually contemplate. The people of Philadelphia need not get excited like the Senator—their interests will be satisfactorily cared for and they will get just what they want, and that without assistance or interference from Mr. Penrose."

SUMMARY OF DALLAS APPRAISAL FIGURES

The Figures of Dr. Bemis for the Dallas Railway Properties Presented in Tabular Form

The "model" traction and lighting franchise of the city of Dallas, Tex., in process of printing, will be voted upon by the people at the general election on April 4. It was at first understood that the people would vote only as to whether the city charter should be amended to permit the city to adopt the ordinance, but a statement issued by the Mayor explains that the full ordinance will also be voted upon. If both the proposed amendments and franchises are defeated there will be no change in the traction and light situation. Neither will there be any change if the charter amendment is defeated, but the proposed ordinances carry. If, however, only the amendment to the charter is carried and the franchises are beaten, it will be a year before another franchise can be submitted, as the franchise ordinances will provide that they cannot be adopted without a vote of the people at the next regular city election.

The terms of the ordinance were reviewed in the ELECTRIC RAILWAY JOURNAL for Feb. 26, page 417. One of the provisions is that the electric light property shall be separated from the railways. The Dallas Consolidated Electric Street Railway is to purchase and consolidate in one company the Metropolitan Street Railway, the Rapid Transit Railway and the Northern Texas Traction Company. The final summary of values of property owned by Stone & Webster as submitted to the city by Edward W. Bemis shows $3,765,111 as the cost to reproduce new the property of the Dallas Electric Light & Power Company and $2,985,964 as the cost of reproduction less accrued depreciation. These figures are as of Sept. 30, 1915. The figures of the railway companies as of Sept. 30 follow, those in column "A" showing the cost of reproduction new and those in column "B" showing the cost of reproduction new less accrued depreciation:

	Northern Texas Traction Company		Dallas Consolidated Electric Street • Railway Rapid Transit Company and Metropolitan Street Railway	
	"A"	"B"	"A"	"B"
Engineering and superintendence	$103,865	$80,887	$328,460	$248,332
Right-of-way	336,608	336,608	4,978	4,978
Other land	30,073	30,073	109,438	109,437
Grading	134,717	126,736	176,767	126,000
Ballast	73,579	60,376	256,591	212,214
Ties	53,087	37,699	94,465	76,951
Rails, rail fastenings and joints	92,618	66,327	447,682	313,870
Special work	19,272	13,806	217,069	168,527
Track and roadway labor	50,164	40,939	185,100	132,018
Paving	44,108	24,645	675,486	553,392
Roadway machinery and tools	100	75	14,714	11,743
Bridges, trestles and culverts	72,273	50,400	20,259	18,311
Crossings, fences and signs	4,789	4,544	....	....
Signal and interlocks	4,401	1,490	3,962	3,551
Telephone and telegraph	709	609	....	....
Poles and fixtures	15,576	12,449	33,207	22,479
Distribution system	50,547	43,301	172,288	148,530
Shops and carhouses	21,179	18,098	182,013	167,249
Miscellaneous structures	2,019	1,361	....	....
Supplies	300	300	62,967	62,968
Total, Division 1	$1,109,985	$950,724	$2,985,446	$2,381,150
Passenger cars	$226,064	$180,798	$554,565	$357,251
Service equipment	875	628	10,443	7,961
Electric equipment of cars	83,572	67,501	252,007	155,369
Shop equipment	1,956	1,174	20,766	18,170
Furniture	1,114	703	13,306	11,308
Miscellaneous equipment	....	....	3,253	2,117
Total, Division 2	$313,491	$250,804	$854,341	$552,176
Substation building	9,073	8,385	....	....
Substation equipment	64,443	55,504	....	....
Transmission system	3,968	3,471	....	....
Total, Division 3	$77,484	$67,361	....	....
Law expense	16,692	....	$55,000	....
Interest	62,546	....	203,022	....
Taxes	5,015	....	16,912	....
Promotion expense	18,338	....	60,000	....
Insurance	206	....	632	....
Total, Division 4	$102,698	$88,799	$338,556	$279,139
Grand total	$1,603,660	$1,355,690	$4,178,353	$3,212,467
Thirty-five cars owned by Dallas Equipment Co.	....	....	231,011	221,967
Grand total, including Dallas Equipment Co.	....	....	$4,409,366	$3,434,433

The following statement has been given out by Charles F. Wallace reiterating the stand taken some time ago:

"It has come to my attention that, notwithstanding repeated assertions to the contrary, some people are still saying, and others are still believing that the street railway and lighting properties will accept the Lindsley franchises if the proposed charter amendments carry, and the franchises are approved.

"It is so necessary for intelligent action that every voter should understand fully the position which the interests I represent have taken and will maintain with reference to these franchises, that I wish to state that position again clearly, officially and finally.

"In a statement made on Feb. 20 I said these companies would be unable to go forward and develop under the terms that have been offered them, and that, therefore, they could not be accepted. Mr. Baker on behalf of the companies has so stated. Mr. Coke on behalf of the largest interest in the properties has so stated. Both Mr. Baker and Mr. Coke acted with full authority and made their statements before the Commissioners on March 1 at a meeting open to the public.

"I wish to repeat now my former statement that neither the owners of the street railway and lighting properties in this city nor the companies can accept the Lindsley franchises, and because they cannot, they will not accept them. Any statements that may hereafter be made to the contrary can only be made for the purpose of misleading the citizens."

A detailed statement outlining the procedure by the city in any contingency following the election on April 4 on the franchises and charter amendments will be issued within a short time by Mayor Henry D. Lindsley. This statement will take into consideration the contingency of adoption of the charter amendments, approval by the voters of the franchises themselves, and the refusal of Stone & Webster to accept the grants. Mayor Lindsley stated on the day following the issuance of the statement by Mr. Wallace quoted above, that he believed that Stone & Webster will not refuse the franchises, notwithstanding the statements that have been made.

An offer to submit to the voters of Dallas at the election to be held on April 4 a proposal of arbitration of the franchise differences between the city and Stone & Webster has been forwarded to Charles F. Wallace, local representative of the corporation. This proposition will be submitted to the voters along with the city's proposed franchises. Its submission will be conditioned upon agreement by Stone & Webster to bind themselves to accept the franchises if they are approved by the voters in preference to the arbitration proposal.

Thus, if a majority of the voters should decide that "the valuation and rates of return fixed by Dr. Bemis and the Board of Commissioners are fair and just," then under the terms of the present proposition Stone & Webster would be obligated to accept the franchises as drawn with the stipulated valuations and rates of return. But if the people should vote that "the valuations and rates of return in these franchises be determined by arbitration," then Stone & Webster would be obligated to accept the franchises as drawn except as to valuations and rates of return, and in such matters would be bound by the result of arbitration.

BAY STATE STREET RAILWAY PLACES LARGEST SURFACE CAR ORDER OF YEAR

C. F. Bancroft, superintendent of motive power and machinery of the Bay State Street Railway, Boston, Mass., has awarded a contract for 200 trucks and 200 semi-convertible cars of the type described in the ELECTRIC RAILWAY JOURNAL of Oct. 23, 1915, page 854, to the Laconia Car Company, Boston, Mass. The Laconia company was the lowest bidder on the new rolling stock. Bids covering electrical equipment were opened March 22, and it is expected that the latter contract will be signed about April 1.

This order for 200 cars is the largest surface car order placed this year, and naturally will be welcomed by the industry as another sign of the return of good business. Other large car orders placed to date during 1916 are the following: New York Municipal Railways, 200 subway cars; Public Service Railway, Newark, N. J., 197 cars, 177 of which are to be built in its own shops and twenty of which have been ordered from an outside car builder; Cincinnati (Ohio) Traction Company, 100 cars (reported); Kansas City Railway, fifty cars.

OPEN DISCUSSION BEFORE NEW YORK COMMITTEE

There was an open discussion on March 17 before the Thompson committee, which is inquiring into the work of the New York Public Service Commissions, as to the advisability of transferring jurisdiction over subway construction from the Public Service Commission to some municipal body. There were many divergent expressions of opinion. The Citizens' Union in a memorandum said that it believed any legislation to accomplish the purpose of transferring supervision over construction to the city would be exceedingly unwise and adverse to the best interests of the city, particularly at this time.

Theodore P. Shonts, president of the Interborough Rapid Transit Company, has been the principal witness recently. The committee reviewed a great deal of the ground leading up to the present rapid transit construction contracts, going again into the change in attitude on the part of the late Mayor Gaynor toward the present so-called dual system. Mayor Mitchel and Comptroller Prendergast also have appeared as witnesses in connection with the unsigned memorandum of March 22, 1910, by Mr. Shonts to Chairman Wilcox of the commission which it has been explained was to serve merely as a basis for negotiations.

PITTSBURGH SUBWAY FRANCHISE EXPLAINED

The subway franchise asked for by the Pittsburgh Subway Company was before the committee on public service and surveys of the City Council of Pittsburgh, Pa., on March 21. A. O. Fording, general counsel for the company, explained that the company would like to build a subway from Liberty Avenue and Ferry Street along Libert Avenue, up Oliver Avenue to Grant Street, thence to Webster Avenue and Fullerton Street, through Herron Hill to Center Avenue and Grant Boulevard, where the track would rise to the surface. Surface franchises would continue out to the East End. Turning off from the main subway would be another line running from Herron Hill and Grant Boulevard to the Forbes Street entrance of Schenley Park. The company does not contemplate a downtown loop at present, but would have two downtown stations. Mr. Fording said that the subway outlined would cost $15,000,000 to $20,000,000.

In Council Mr. Dailey presented a resolution that the President of Council invite A. Merritt Taylor, Philadelphia, Pa., to report on the question as to what rapid transit facilities should be constructed.

STORY ON RED SPECIAL TRIP

An interesting story on the trip of the "Red Special" train of the American Electric Railway Association to the San Francisco convention appears in the March issue of the *Railroad Man's Magazine*, published by the Frank A. Munsey Company. It is from the pen of Thaddeus S. Dayton, who was a member of the party and was connected with the secretary's office as publicity agent of the association during the trip. It is entitled 'The Flight of the Genius Special," and the passengers on the train, according to the caption under the heading, included "wizards of the rail, givers of voice to the people, conquerors of the cataract, founders of inland empires, openers of the wilderness."

The account of the trip is written in attractive style, and several entertaining anecdotes are related of members of the train crew and passenger list. The story concludes with an account of how L. P.. Crecilius started a stalled motor bus in which some of the members of the party were touring the Yosemite region. He discovered the trouble was due to the loss of magnetism by the magneto, and he remagnetised it by transferring some magnetism from another magneto by means of his jack knife.

Latin American Market Inquiry Proposed.—The Bureau of Foreign and Domestic Commerce at Washington announced on March 21 that it would soon begin an exhaustive investigation of South American markets. Special agents of the bureau assigned to the task are expected to leave about April 15. The textile, wearing apparel and electrical goods markets will in particular be studied.

Increase in Wages in Reading.—The Reading Transit & Light Company, Reading, Pa., voluntarily increased the pay of its motormen and conductors from 23 cents to 24 cents an hour. President E. L. West of the company said: "We are trying in every way possible to improve our railway service. Our motormen and conductors have done and are still doing their share to help the cause along. The increase is in appreciation of their efforts."

C. E. A. Accountants Issue Report.—The compiling committee of the Central Electric Railway Accountants' Association has just issued a new pamphlet report, dated Janary, 1916. This contains lists of officers and members, an index to accounting forms on file in the secretary's office, a synopsis of decisions and recommendations by the association in regard to handling interline accounts, a list of committee reports and papers published in previous pamphlets, and the various addresses and papers presented at the Indianapolis meeting on June 11-12, 1915, and the Detroit meeting on Dec. 7-8, 1915.

Scranton Men Seeking New Terms.—The present agreement beetween the Scranton (Pa.) Railway and its employees expires on April 1. The men are seeking a new contract to run until April 1, 1918. They have asked for a 20 per cent increase in the wages of all carhouse men, shopmen and power-house employees and for a flat wage rate of 30 cents an hour for all motormen and conductors. The trainmen now receive 22 cents an hour the first year; 24

cents an hour the second year, and 26½ cents an hour the third year and thereafter.

Strike of Shop Employees in St. Louis.—Two hundred employees of United Railways, St. Louis. Mo., walked out of car shops on March 17 because forty-five men had been laid off as there was no work for them. To a committee of their associates President Robert McCulloch said the company had been unable to run a full shop on account of the high prices of materials due to the European war and that this necessitated suspending the men.

$60,000 Carhouse Fire in Massachusetts.—The Palmer, Mass., carhouse of the Springfield & Eastern Street Railway was about two-thirds destroyed by fire on the night of March 17. Nineteen cars valued at $50,000 were gutted and the damage to the building is estimated at $10,000. The property lost was fully insured. The rolling stock put out of commission consisted of four closed and twelve open passenger cars, two snow ploughs and a dump car. Several cars stored at the front of the house were saved. The loss affects the Springfield Street Railway, which owned the cars and operated the road. Most of the rolling stock destroyed was operated between Springfield and Palmer.

Cincinnati Plans Maturing.—E. W. Edwards, chairman of the Rapid Transit Commission of Cincinnati, Ohio, announced at a meeting of the Cincinnati Real Estate Exchange on March 14 that no resolution has been adopted by the commission to the effect that the street railway system in that city would be condemned, and the property leased to a company which would operate both the local lines and the rapid transit loop, if satisfactory arrangements cannot be made otherwise. On the other hand, it was expected that the company would co-operate in securing the loop. A retail market will be established in the main interurban terminal station on the site of the old city hospital to handle the products shipped on the interurban trains.

Ohio Commission Has Authority to Require Inventory.—Attorney-General Turner has rendered an opinion to the Ohio Public Utilities Commission to the effect that the commission has authority to instruct a public utility company to file an inventory and valuation of its property, when the question of rates for service is pending, and that the law conferring that authority is valid and enforceable. This opinion was rendered after the Toledo Railways & Light Company, through its attorneys, had denied the authority of the commission to compel it to file an inventory and appraisal, as desired by Toledo city officials. The attorney-general, however, says that there must be a question of rates pending; that the request must come from the City Council and that the commission is under no obligations to consider unofficial requests.

What Mr. Witt Is Likely to Report.—Peter Witt, former street railway commissioner of the city of Cleveland, Ohio, who was retained by the Chamber of Commerce of Lynn, Mass., to report in connection with the application of the Bay State Street Railway to the Public Service Commission for permission to increase its fare unit from 5 cents to 6 cents, has returned to Cleveland, but it is expected that he will resume his studies of the Bay State Company's system soon and appear at the hearings before the commission. It is said unofficially that Mr. Witt is inclined to favor the consolidation of the Boston Elevated Railway and the Bay State Street Railway, the operation of one-man cars in outlying districts and the turning of cars from north of Boston through the East Boston tunnel.

Reorganization of New York Commission Complete.—The Senate of the State of New York, on March 16, confirmed the nominations made by Governor Whitman of Travis H. Whitney and Charles S. Hervey, both of Brooklyn, to be members of the Public Service Commission for the First District. Mr. Whitney succeeds Commissioner J. Sergeant Cram, whose term expired on Jan. 31, 1916. His term of office, therefore, will expire on Jan. 31, 1921. Mr. Hervey succeeds Commissioner George V. S. Williams, who resigned in January. Mr. Hervey's term will expire on Jan. 31, 1917. It is now an entirely new commission, the oldest member, in point of service, being Col. William Hayward, who took office on April 1, 1915. The new chairman, Oscar S. Straus, was appointed in December, 1915, and Commissioner Henry W. Hodge in January, 1916.

Financial and Corporate

ANNUAL REPORTS

Chicago Surface Lines

The gross earnings, expenses and distributed residue receipts of the Chicago (Ill.) Surface Lines for the twelve months ended Jan. 31, 1915 and 1916, follow:

	1916	1915
Passenger cars	$31,061,878	$31,299,201
Chartered cars	4,175	5,206
Funeral cars	4,805	5,516
Mail cars	60,673	71,767
Mail carriers	24,837	24,837
Newspaper cars	8,291	8,040
Freight earnings	801	874
Garbage car service	27,499	22,492
Advertising	221,338	218,744
Rents of buildings, etc	80,754	91,712
Sale of power	82,292	86,642
Interest on deposits	105,175	120,129
Miscellaneous	8,243	10,888
Gross earnings	$31,690,761	$31,966,048
Maintenance	$2,650,658	$2,464,564
Renewals	2,535,261	2,557,284
Operation of power plants	2,779,718	2,781,907
Operation of cars	9,376,311	8,786,524
General expense, including traffic expenses and those of Board of Supervising Engineers	1,966,780	1,945,924
Taxes	1,732,629	1,353,078
Total expenses	$21,041,356	$19,889,275
Residue receipts	$10,649,405	$12,076,773
Divided:		
Chicago Railways, 59 per cent	$6,283,149	$7,125,296
South Side Lines, 41 per cent	4,366,256	4,951,477

The showing made by the Chicago Surface Lines, comprising the Chicago Railways and the South Side Lines (Chicago City Railway, Southern Street Railway and Calumet & South Chicago Railway), was not so favorable in 1915 as in 1914. For the year ended Jan. 31, 1916, the lines showed a falling off in gross earnings of $275,287 or 0.86 per cent as compared to the preceding year, while the total expenses of operation increased $1,152,081 or 5.79 per cent. As a result the divisible residue receipts suffered a loss of $1,427,368 or 11.81 per cent.

The bulk of the decrease in gross earnings naturally came in passenger car earnings, which fell off $237,323 or almost 0.76 per cent. Earnings from chartered cars, funeral cars, mail cars, freight traffic, rent of buildings, sale of power, interest on deposits and miscellaneous sources also showed varying degrees of losses, while only the earnings from newspaper cars, garbage cars and advertising had gains. The gross earnings of the surface lines showed a heavy decline during the first eight months of the fiscal year. The loss up to Sept. 30, 1915, including the loss in receipts from a two days' strike, totaled $695,753. With October, however, the gross earnings began to show a slight increase. In the remaining months of the fiscal year the gain was about 5 per cent, so that the net decrease for the year was only the before-mentioned $275,287.

The cause for the large increase in operating expenses may be found in the higher payments for maintenance, car operation and taxes. There was an increase of $20,856 in traffic and general expenses, but this was more than counterbalanced by the decrease of $22,023 in renewal expenses and $2,189 in expenses of power plant operation. The largest increase in amount was in the case of car operation expenses, which rose $589,787 or 6.37 per cent, due to the increased wages effective on June 1, 1915, after the strike settlement. Next in amount and much higher in percentage increase were the tax payments, which jumped $379,556 or 28.04 per cent. The remainder of the increased operating expenses came from the maintenance group, which showed a rise of $186,093 or 7.55 per cent. This increase was for both way and structures, and equipment, no division for these two classes being made in the annual report of the Chicago City Railway, from which the foregoing table is taken.

The gross earnings of the Chicago Surface Lines amounted to $31,690,761, expenses $21,041,356 or 66.4 per cent of the gross (62.22 per cent in 1915), leaving residue receipts of $10,649,405. These were divisible 59 per cent or $6,283,149 to the Chicago Railways and 41 per cent or $4,366,256 to the South Side Lines. The income statement of the Chicago City Railway, the main one of the South Side Lines, follows:

41 per cent of the residue receipts of Chicago Surface Lines	$4,366,256
Joint account expenses, interest on capital investment of the Chicago City Railway and Calumet & South Chicago Railway, and net earnings of Southern Street Railway	3,500,467
Net earnings of Chicago City Railway	$865,789
City's proportion, 55 per cent, as per ordinance	476,184
Company's proportion, 45 per cent, as per ordinance	$389,605
Interest on capital investment	2,507,908
Income from operation	$2,897,513
Other income, net	81,582
Gross income	$2,979,095
Interest on bonds outstanding	1,565,555
Net income	$1,413,540
Surplus at Jan. 31, 1915	183,617
Surplus	$1,597,157
Dividends, 8 per cent	$1,440,000
Miscellaneous	21,035
Total	$1,461,035
Surplus at Jan. 31, 1916	$136,122

Thus the Chicago City Railway produced a net income of $1,413,540 after paying all operating expenses and bond interest. This net income applicable to dividends equaled 7.85 per cent on the capital stock at par, as compared to 9.83 per cent for the preceding fiscal year and 9.43 per cent for 1910, the lowest percentage back that far. The company had to resort to surplus for the declaration of its dividends, the dividend excess over the net income for the year being $47,495. Moreover, the dividend payments in 1915 aggregated only 8 per cent as compared to 9 per cent in 1914 and 10.5 per cent in 1913. The 1915 payment was the lowest since 6.75 per cent in 1907, the high point being 1910 with 10 per cent and 6 per cent extra. During the last fiscal year the Chicago City Railway built 4.64 miles of single track and reconstructed 14.93 miles of single track. Its total mileage is now 317.04 miles.

Twin City Rapid Transit Company

The comparative statement of income, profit and loss of Twin City Rapid Transit Company, Minneapolis, Minn., for the twelve months ended Dec. 31, 1914 and 1915, follows:

	1915	1914
Revenue from transportation	$9,401,233	$9,227,602
Revenue from other railway operation	52,731	56,618
Total railway operating revenue	$9,453,964	$9,284,220
Way and structures	$995,556	$964,240
Equipment	728,085	685,526
Power	839,673	847,275
Conducting transportation	2,582,226	2,506,351
Traffic	49,297	46,579
General and miscellaneous	909,295	881,850
Transportation for investment—credit	39,504	49,138
Total railway operating expenses	$6,064,628	$5,832,183
Net operating revenue	$3,389,336	$3,452,037
Taxes assignable to railway operation	687,454	593,078
Operating income	$2,701,882	$2,858,959
Non-operating income	23,927	15,425
Gross income	$2,725,809	$2,874,384
Rent for leased roads	$3,000	$3,000
Interest on funded debt	989,843	983,743
Net loss miscellaneous physical property	12,442	....
Miscellaneous debits	8,248	....
Total deductions from gross income	$1,013,534	$986,743
Net income transferred to profit and loss	$1,712,275	$1,887,641

The foregoing statement, which is prepared on the basis of the official I. C. C. classification, is different from that of preceding years, but the 1914 figures have been adjusted in order to make them comparable. The increase of $169,744 or 1.8 per cent in railway operating revenues, which was brought about by an increase of $173,630 or 1.9 per cent in transportation revenue and a decrease of $3,887 or 6.8 per cent in other railway operating revenue, was more than offset by the increase of $232,445 or 3.9 per cent in operating expenses. This increase in operating costs arose mostly from increases of $31,316 or 3.2 per cent for maintenance of way and structures, $42,559 or 6.2 per cent for maintenance of equipment, $75,875 or 3.0 per cent for conducting transportation and $77,945 or 9.3 per cent for general and miscellaneous.

Moreover, the taxes assignable to railway operation also showed a large increase of $94,376 or 15.9 per cent, so that the operating income decreased $157,077 or 5.5 per cent. The non-operating income increased $8,502 or 55 per cent, while the deductions from gross income increased $26,791 or 2.7 per cent, with the result that the net income decreased $175,366 or almost 9.3 per cent. The report of the company attributes the decrease in net income largely to the operation of 24.34 miles of new lines and extensions put into operation in November, 1914, and to the increase of $94,376 in taxes, this last being due to an increase of nearly 13 per cent in the rate of taxation in both Minneapolis and St. Paul.

During 1915 the company charged to depreciation $1,015,900 as compared to $994,072 in 1914. The total expenditures for additions and replacements were $2,190,793. The average total single-track mileage operated during 1915 was 438.68 miles, and the gross passenger revenue per mile of single track operated was $21,308. During 1915 the company carried 185,654,985 revenue passengers, an increase of 1,298,022, while the transfers redeemed totaled 69,259,767, an increase of 2,517,767. The ratio of operating expenses and taxes to revenue rose from 69.09 per cent in 1914 to 71.24 per cent in 1915. In 1915 the company paid 7 per cent on its preferred stock and 6 per cent on its common stock. The rate earned on the common stock was 6.83 per cent, this being a drop from 8.05 per cent in 1914 and from 7.22 per cent in 1910, the lowest back to that time.

Northern Ohio Traction & Light Company

The comparative statement of income, profit and loss of the Northern Ohio Traction & Light Company, Akron, Ohio, for the years ended Dec. 31, 1914 and 1915, follows:

	1915	1914
Gross earnings	$3,890,750	$3,636,084
Operating and taxes	2,373,010	2,237,428
Net earnings	$1,517,740	$1,398,656
Interest on funded debt and notes payable	628,309	606,898
Available for dividends	$889,431	$791,758
Dividends on preferred stock	199,281	182,364
Dividends on common stock	450,000	450,000
Surplus	$240,150	$159,394

The gross earnings of the company for 1915 gained $254,666, or 7.0 per cent, while the operating expenses and taxes increased $135,582, or 6.6 per cent, so that the net earnings showed a gain of $119,084, or 8.5 per cent. In spite of an increase of $21,411, or 3.5 per cent, in interest on funded debt and notes payable, and of $16,817, or 9.2 per cent, in dividend payments on preferred stock, the surplus for 1915 amounted to $240,151 as compared to $159,394 for the preceding year.

The increase in gross earnings was mostly brought about by a gain of $109,035, or 3.0 per cent, in passenger earnings; $119,738, or 18.5 per cent, in light and power earnings; $20,668, or 23.4 per cent, in freight earnings, and $8,262, or 16.5 per cent, in park earnings. The increase in operating expenses arose from the following factors: Maintenance of equipment, an increase of $49,403, or 16.5 per cent; conducting transportation, an increase of $29,705, or 4.5 per cent; general expenses, an increase of $112,414, or 21.2 per cent; maintenance of way and structures, a decrease of $51,235, or 14.2 per cent, and operation of power plants, a decrease of $4,704, or 1.1 per cent.

The depressed industrial conditions that marked the end of 1914 continued into 1915, and in February the gross earnings of the company reached the low point of $260,451. With spring, however, there came a general quickening of business in all lines, which would have shown more favorably in railway earnings had not jitney buses made their appearance in Akron. Competition from this source continued throughout the summer and the autumn, but in December the combined influence of a regulatory ordinance and the wearing off of the novelty brought a large decline in the number of jitneys. In spite of the foregoing factors and the rainy and cool weather during the summer, the earnings in July amounted to $371,736. After dropping back to $339,599 in October, they arose with accelerated industrial activity to $379,817 in December, the last-named month showing the highest net earnings for the year.

The gross earnings per mile in 1915 were $12,973 as compared to $12,637 in 1914, while the net earnings per mile in the two years were $4,574 and $4,444 respectively. The operating ratio for the last fiscal year was 60.99 per cent, as compared to 61.53 per cent in 1914. The trackage of the system was increased 4.27 miles during the year, making a present mileage of 241.04. The total expenditures for additions and improvements during the year were $651,741. The output of the power stations was 88,355,252 kw.-hr. in 1915, an increase of 18.2 per cent. The operation of interurban limited cars is said to be a growing branch of the company's service, and the gross earnings from this source in 1915 were $373,705, or 52.68 cents per car-mile. The company during the year made a monthly charge of $5,000 to operating expenses to cover depreciation of cars and equipment.

MEXICAN OUTLOOK STILL UNCERTAIN

Deposit of Securities Requested to Facilitate Negotiations for Restoring Lines to Owners

Brief mention was made in the ELECTRIC RAILWAY JOURNAL of March 11, page 517, of the formation of a protective committee for the bonds of the Mexico Tramways and its affiliated corporations, the Mexican Light & Power Company, the Mexican Electric Light Company and the Pachucta Light and Power Company. In order that the committee may be fully representative and speak with authority in dealing with the government, bondholders are urgently invited to deposit their bonds, on behalf of the committee, at the head offices of the London County & Westminster Bank or the Union of London & Smith's Bank, or at the London or Edinburgh offices of the Bank of Scotland. It is reported from London that there is at present no idea of any reorganization of the companies, and that the committee is merely endeavoring to avoid a break with the government so that operations may be resumed on a more profitable basis when the political situation has cleared.

It will be recalled that in May, 1915, a circular was issued by the directors of the Mexico Tramways explaining the difficulties caused by the conditions of unrest in Mexico. As announced in the ELECTRIC RAILWAY JOURNAL for June 5, 1915, page 1086, the directors of the company stated at that time that the working of the tramways had been arbitrarily taken over by the military authorities, with consequent complete cessation of revenue to the company and deterioration of installation and rolling stock; that the receipts of the light and power companies had seriously diminished, owing largely to non-payment by the authorities of bills for street lighting and power; that the business of the company operating in the Pachuca district had greatly decreased on the shutting down of many of the mines, and that so large an amount of paper money had been issued by each authority that the value of the Mexican dollar had fallen from 25d to 5d, making remittances almost impossible. Conditions are said not to have changed materially since then and the tramways are still operated by the military authorities.

The London *Economist* says that receivers have been appointed by the Canadian and English courts for the Mexican Light & Power Company, one of whom, at the request of the committee and the trustees, visited Canada and the United States, and discussed the situation with the trustees and directors. With regard to the tramways, negotiations have been carried on by the companies' representatives, both in the United States and in Mexico, with the friendly assistance of the British Foreign Office, and lately Señor Carranza has signified his intention of restoring the management of the tramways to the company. It is to facilitate these negotiations that the deposit of securities is now asked.

A recent newspaper dispatch from Mexico City stated that the property of the company was about to be returned to its legal owners on Señor Carranza's instructions.

Bloomington & Normal Railway & Light Company, Bloomington, Ill.—Bodell & Company, Providence, R. I., and Richter & Company, Hartford, Conn., are offering $432,500 of 6 per cent guaranteed cumulative preferred stock of the Bloomington & Normal Railway & Light Company at par and accumulated dividend. The stock is redeemable at the option of the company at 105 and dividend. The dividend is guaranteed by indorsement by the Illinois Traction Company, which also guarantees the par value in the event of liquidation or dissolution. The Bloomington & Normal Railway & Light Company has $1,200,000 of common stock outstanding, $450,000 of 6 per cent cumulative preferred stock and $1,680,000 of bonds, of which $137,000 are held in the sinking fund.

Cities Service Company, New York, N. Y.—The directors of the Cities Service Company on March 15 declared a dividend of 3 per cent on the $17,481,422 of common stock, payable in convertible debentures on July 1 to holders of record of June 15. A cash dividend of one-half of 1 per cent was also declared, payable on Aug. 1 to holders of record of July 15. This restores both classes of stocks to the original 6 per cent cash dividend basis. Common stock warrants already outstanding were made exchangeable for bonds or stocks on May 1. The preferred stock warrants must be exchanged prior to May 1 or they will be called.

Crooked Creek Railroad & Coal Company, Webster City, Iowa.—Walter R. Dyer, Boone, Iowa, said to represent the Fort Dodge, Des Moines & Southern Railroad, has purchased under foreclosure the property of the Crooked Creek Railroad & Coal Company. The road is 18 miles long. It extends from Webster City to Lehigh. Electrification of the line is said to be contemplated.

Electric Bond & Share Company, New York, N. Y.—The gross income of the Electric Bond & Share Company for the year ended Dec. 31, 1915, amounted to $1,820,337, while the net income totaled $1,401,085. During the year preferred dividends were declared to the extent of $344,646 and common dividends to the extent of $433,778, leaving a surplus income for the year amounting to $622,660. The surplus and undivided profits at the close of business on Dec. 31, 1915, amounted to $4,244,566, as compared to a surplus of $440,599 at the beginning of business on March 15, 1905.

Harrisburg (Pa.) Railways.—The net earnings of the Harrisburg Railways for the year ended Dec. 31, 1915, are said to have been $33,511 less than the net earnings for 1914, the decrease being from $221,330 to $187,819. The gross operating revenues for 1915 amounted to $914,936, a decrease of $78,993 from the 1914 results. During 1915 the company carried 22,435,553 passengers, or 1,225,748 less than the number carried in 1914. The decreased earnings are attributed to unregulated jitney competition, combined with unfavorable weather during the park season, and to some extent with the increased use of automobiles. It is estimated, however, that by far the largest part of the decrease, possibly 90 per cent, was caused by the unregulated jitneys. The loss in revenue necessitated a reduction to 1 per cent of the dividend payable on Oct. 1 to the preferred stockholders. It is stated that the original license fee of $5 required of jitneys in Harrisburg has been increased, and, in addition, a $2,000 bond must be filed. Since the ordinance with such provisions became effective, the number of jitneys operating has been materially reduced.

Lancaster & York Furnace Street Railway, Millersville, Pa.—The appraisers appointed by the Lancaster County Court to value the assets of the Lancaster & York Furnace Street Railway have presented two reports. One places the assets at $59,484 as junk, and the other at $167,350 as an operating unit. John M. Groff and John H. Myers, the receivers of the road, have been ordered by the court to sell the road at public sale on April 15, subject to the first mortgage of $150,000. The suspension of operation by the company was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 22, page 187.

Mountain Railway, West Orange, N. J.—The overhead equipment, tools and two cars, the property of the Mountain Railway, were recently sold for $285 at public auction. The Federal Iron & Steel Company, Newark, bought the stuff for junk. The sale of the rails was postponed until April 3 at the request of a former stockholder, who stated that a proposition had been made to run a gasoline car over the line.

New York State Railways, Rochester, N. Y.—A quarterly dividend of 1¼ per cent has been declared on the $19,952,400 of common stock of the New York State Railways, payable on April 1 to holders of record of March 23. This compares with 1 per cent in January.

Philadelphia & Western Railway, Upper Darby, Pa.—An initial dividend has been declared on the $2,000,000 of preferred stock of the Philadelphia & Western Railway. The payment ordered by the directors was 1¼ per cent, and it was announced as a quarterly disbursemenet, which places the stock on a full 5 per cent annual basis. Dividends on the preferred stock became cumulative as of Jan. 1 this year. The present dividend requires the payment of $100,000 a year, and the report of the company just issued, covering operations for the twelve months ended Feb. 29, shows that the dividend was not quite earned, the surplus balance for this period having been only $96,577. There is, however, a large undivided profit account.

Public Service Corporation of New Jersey, Newark, N. J.—During February the total business of the Public Service Corporation of New Jersey showed a gross increase of $410,227, or 14.5 per cent, over the corresponding month of last year. The balance available after payment of operating expenses, fixed charges, sinking fund requirement, etc.; for amortization, dividends and surplus was $327,557, and the increase in surplus available for dividends was $66,506. For the two months ended Feb. 29, 1916, the gross income in total business was $737,631, or 12.4 per cent. The balance available for amortization, dividends and surplus was $832,722, and the increase in surplus available for dividends totaled $135,755.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has deposited funds to pay the following matured coupons: Oakland, San Leandro & Hayward, $250,000 of first mortgage 6's of 1922, coupon due on March 1, 1916; Alameda, Oak Park & Piedmont Electric Railway, $18,000 of first mortgage 6's of 1923, coupon due on Jan. 1, 1916; Oakland Transit Company, $1,121,000 of first mortgage sinking fund 6's of 1918, coupon due on Jan. 7, 1916; Oakland Traction Company 6 per cent equipment notes, coupon due on Jan. 1, 1916. The payment on the first three issues is being made at the National Park Bank, New York, and in San Francisco.

Southern Iowa Railway & Light Company, Albia, Iowa.—Alfred C. Mueller, receiver, on May 3 will sell at Albia all the property of the Southern Iowa Railway & Light Company and the Albia Gas Company. The system includes 10 miles of street and interurban railway, transmission and service lines, heating mains and service equipment. The property has been operated by the receiver since June 8, 1915. The court failed to approve the previous sale of the property, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, page 333.

Washington (D. C.) Interurban Railroad.—The Public Utilities Commission of the District of Columbia has authorized the Washington & Rockville Railway to acquire $150,000 face value of the 5 per cent first mortgage thirty-year gold bonds of the Washington Interurban Railroad and 1000 shares of the capital stock of the company of a par value of $50 each. This purchase, which has also been authorized by the Public Service Commission of Maryland, covers all the securities of the successor to the Washington Interurban Railway, sold at foreclosure in December, 1915.

Winnipeg (Man.) Electric Railway.—For the fiscal year ended Dec. 31, 1915, the net earnings of the Winnipeg Electric Railway and its subsidiaries were $1,331,737 as compared to $1,769,114 in 1914. Fixed charges totaled $835,635 and surplus earnings, $496,101. The addition of the surplus brought forward from the previous year made $1,637,598. Quarterly dividends were paid at an average rate of 9.5 per cent per annum, totaling $855,000. The decrease in earnings was caused by the general depression following the first winter of the war, coupled with the advent of jitneys in the spring. An excellent crop had a stimulating effect on the company's business, and the net earnings for November, December and January last compare favorably with a similar period in any previous year.

DIVIDENDS DECLARED

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred.

Capital Traction Company, Washington, D. C., quarterly, 1¼ per cent.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1½ per cent, preferred A.

Connecticut Valley Street Railway, Greenfield, Mass., 3 per cent, preferred.

Halifax Electric Tramway, Halifax, N. S., quarterly, 2 per cent.

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred.

New York State Railways, Syracuse, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.

Ridge Avenue Passenger Railway, Philadelphia, Pa., quarterly, $3.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred; quarterly, 1¼ per cent, preferred.

Toronto (Ont.) Railway, quarterly, 2 per cent.

Tri-City Railway & Light Company, quarterly, 1½ per cent, preferred.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

TABLE OF MONTHLY EARNINGS

Period		Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
BATON ROUGE (LA.) ELECTRIC COMPANY						
1m., Jan.,	'16	$17,827	*$9,202	$8,625	$3,497	$5,128
1 " "	'15	15,633	*10,197	5,436	2,180	3,256
12 " "	'16	193,045	*107,209	85,836	28,263	57,573
12 " "	'15	179,437	*114,246	65,191	25,099	40,092
BROCKTON, & PLYMOUTH STREET RAILWAY, BROCKTON, MASS.						
1m., Jan.,	'16	$8,076	*$7,545	$531	$1,105	†$574
1 " "	'15	7,462	*7,478	†16	1,145	†1,161
12 " "	'16	115,821	*96,500	19,321	13,452	5,869
12 " "	'15	121,885	*101,967	19,918	13,219	6,698
CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.						
1m., Jan.,	'16	$34,120	*$19,190	$14,930	$6,556	$8,374
1 " "	'15	29,054	*17,783	11,271	6,721	4,550
12 " "	'16	362,280	*207,835	154,445	79,007	75,438
12 " "	'15	349,149	*210,339	138,810	77,863	60,947
COLUMBUS (GA.) ELECTRIC COMPANY						
1m., Jan.,	'16	$17,947	*$30,745	$41,202	$28,688	$12,514
1 " "	'15	60,767	*26,872	33,895	28,792	5,103
12 " "	'16	732,396	*325,913	406,483	344,440	62,043
12 " "	'15	686,388	*301,001	385,387	328,148	57,239
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.						
1m., Jan.,	'16	$495,559	*$211,285	$284,273	$213,397	70,876
1 " "	'15	473,192	*199,436	273,756	211,127	62,629
JACKSONVILLE (FLA.) TRACTION COMPANY						
1m., Jan.,	'16	$53,047	*$36,356	*$16,691	$14,735	$1,956
1 " "	'15	54,760	*37,502	17,258	13,448	3,810
12 " "	'16	609,855	*427,692	182,163	179,185	2,978
12 " "	'15	707,469	*467,405	240,064	153,223	87,841
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
1m., Jan.,	'16	$27,453	*$16,615	$10,838	$7,473	$3,365
1 " "	'15	26,073	*16,724	9,349	7,796	1,533
12 " "	'16	290,535	*178,916	111,619	90,946	20,673
12 " "	'15	303,917	*192,650	111,267	91,547	19,720
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Jan.,	'16	$23,936	*$13,772	$10,164	$7,751	$2,413
1 " "	'15	20,231	*13,236	6,995	7,381	†386
12 " "	'16	261,746	*147,356	114,390	86,073	28,317
12 " "	'15	261,371	*168,091	93,280	86,843	6,437
SAVANNAH (GA.) ELECTRIC COMPANY						
1m., Jan.,	'16	$66,135	*$43,927	$22,208	$23,316	†$1,109
1 " "	'15	70,590	*46,744	23,846	23,409	437
12 " "	'16	789,758	*515,671	274,087	278,400	†4,313
12 " "	'15	840,768	*550,693	290,075	275,727	14,348
TAMPA (FLA.) ELECTRIC COMPANY						
1m., Jan.,	'16	$86,705	*$43,840	$42,865	$4,297	$38,568
1 " "	'15	85,359	*40,971	44,388	4,425	39,963
12 " "	'16	982,394	*505,770	476,624	52,216	424,408
12 " "	'15	986,202	*517,194	469,008	53,851	415,157

*Includes taxes. †Deficit.

Traffic and Transportation

WAUPACA FARE INCREASE MODIFIED

Fare of 12½ Cents by Ticket Substituted for Proposed Charge of 15 Cents

The Railroad Commission of Wisconsin has accepted the modifications proposed by the company in the case involving the increase in fare from 10 cents to 15 cents on the line of the Waupaca Electric Light & Railway Company between the Soo Line depot, Waupaca, to the Grand View Hotel.

On Oct. 21, 1915, the commission received a letter from the company proposing an increase in passenger fares to become effective on Nov. 21, 1915. It was proposed that three 5-cent zones be established in place of the two existing zones between the Grand View Hotel and the Soo line depot in Waupaca. In addition to the cash fares it was proposed to sell reduced tickets to school children in effect from Sept. 1 to July 1 good for passage between Grand View and the Soo Line depot, ten for $1, and school tickets between Grand View and school No. 6 at ten for 75 cents. It was also proposed to sell family tickets, transferable, good between Benedicts and the Soo Line depot, twenty tickets for $1.75, and tickets good over the entire line or through three zones, twenty for $2.70. In place of the 5-cent zones existing on the line from the Soo Line depot to Athletic Park and from Athletic Park to Grand View Hotel it was proposed to establish zones as follows: Soo Line depot to Waupaca city limits; Waupaca city limits to Benedicts; Benedicts to Grand View Hotel. With these modifications in zones the fare over the entire line was to be 15 cents instead of 10 cents.

On Oct. 25 a complaint was received declaring that the increases proposed were unreasonable, and this complaint was later supplemented by a petition of about 350 names, alleging that the rates as proposed would be extortionate. A hearing was held in December before the commission at Madison. The position taken by the attorney for the city was that if upon examination of the books it was shown that in the judgment of the members of the Commercial Club and the Common Council the proposed increases were justifiable, the objection to the change in fares would be withdrawn by the city and the club. During January, 1916, an examination by the city's accountant, H. C. Caswell, Jr., C. P. A., of Oshkosh, Wis., resulted in a formal notification by the city attorney that the city desired to withdraw opposition to the proposed increase in fares.

At the hearing and subsequently, the original proposal of selling twenty tickets for $2.70 was modified to twenty tickets for $2.50 or 12½-cent fare over the entire line, and twenty tickets for $1.75 modified to twenty for $1.50, good between Benedicts and the Soo Line depot. The school tickets were modified so that ten tickets for 75 cents, good over any part of the line, would take the place of ten tickets for $1, and the ten tickets for 75 cents as originally proposed. The commission decided that as these modifications were in favor of the patrons, and since an examination seemed to show that they would meet the conditions and be fair to both parties, it would accept the rate schedule as modified.

AUTOMOBILE DECISION RENDERED IN ILLINOIS

In a decision handed down on March 13 the Illinois Public Utilities Commission held that an automobile service was not a jitney business unless it operated over specified routes and on a schedule. The decision was made in the case of the Southern Illinois Light & Power Company against W. W. Horton and Leo F. Kramer, Hillsboro, Ill. The petition asking that Messrs. Horton and Kramer be restrained from operating until they had obtained a certificate of convenience and necessity was, therefore, dismissed.

At the same time this decision was made it was announced that an appeal had been taken to the Sangamon County Circuit Court in the Yellow Cab case from Chicago, in which the commission made a similar ruling.

If the decision is upheld in court the jitney case brought by the Springfield Consolidated Railway against jitney men in Springfield may fail.

In the Hillsboro ruling the commission points out that the automobiles have no specified routes over which they operate on schedule time, that the cars frequently are engaged by telephone, that they frequently run to different parts of the city to carry passengers as ordered, and that they do a cab business. For this reason they cannot be considered common carriers and subject to commission jurisdiction.

PENNSYLVANIA JITNEYS ARE COMMON CARRIERS

In the Scranton Case the Commission Rules That a Certificate of Public Convenience Is Necessary

The Public Service Commission of Pennsylvania through Commissioner John Monaghan has ruled that individuals operating automobiles for hire between fixed points are common carriers under the law, and as such must obtain "certificates of public convenience" from the commission. The commission's order is based on complaints filed by the Scranton Railway against M. J. Walsh, W. H. Owens, S. Wilson and F. Williams, of Luzerne County. In his opinion Mr. Monaghan says:

"It is argued that the term 'common carrier' was intended to be used in a limited sense; but any doubt as to the meaning of the term 'common carrier' in the act is swept away by the very broad definition of that term contained in Sec. 1, Par. xxx. The expression 'any and all' common carriers means no more or less than their ordinary use and signification indicates, *i. e.*, all common carriers and not less than all, if the ordinary meaning of very common words and language is to be given them.

"It is contended by the respondent in the present case that the term 'common carrier' as used in the first section of the act, having been preceded and followed by certain named common carriers, restricts the general term to only such carriers as are named; but this contention is without any weight when it is noted that among the specially-named corporations over which jurisdiction is given are several that are not common carriers at all; in addition to which, should we confine our jurisdiction to the corporations specified by name, we would be obliged wholly to ignore the general term 'any and all common carriers.'

"Anyone who holds himself out to the public as ready to undertake for hire or reward the transportation of goods from place to place and so invite the custom of the public, is in the estimation of the law a common carrier.

"A careful review of the facts in the case leads us to the inevitable conclusion that the respondent is a common carrier of passengers under the accepted legal definition of that term at common law, and also under Sec. 1 of the act specifically defining the term 'common carrier,' as including all common carriers of passengers as well as of goods or property. The language conferring jurisdiction upon the commission in Pennsylvania is so clearly explicit and unambiguous as to leave no doubt of our jurisdiction over common carriers of the class represented by the respondent.

"We have, therefore, come to the conclusion that the respondent is a public service company and is entitled to all the rights and liable to all the duties imposed by the public service company law. The respondent being a public service company, may not lawfully begin business without the approval of this commission. . . . As we interpret the act no proposed corporation intending to embark in public service business and no individual partnership or unincorporated association of individuals intending to embark in public service business may do so, unless it or he has first obtained the approval of this commission evidenced by a certificate of public convenience. . . . An applicant intending to operate a motor-vehicle in the business of a public service company must apply for and obtain the consent of this commission."

The Scranton case has been referred to previously in the news columns of the ELECTRIC RAILWAY JOURNAL and was reviewed briefly by C. L. S. Tingley, president of the Pennsylvania Street Railway Association and second vice-president of the American Railways, at the meeting of the association, reported in this paper for Dec. 18, 1915, page 1207.

The commission entered an order requiring Messrs. Walsh, Owens, Wilson and Williams to cease operating until they have applied for and obtained from the commission a certificate of public convenience in accordance with the provisions of the public service company law.

TORONTO RAILWAY AFFECTED BY THE WAR

At a conference on March 13 between R. J. Fleming, manager of the Toronto (Ont.) Railway, Mayor Church and the Board of Control, Mr. Fleming assured the comptrollers that he was anxious to comply with the desire for better service and asked that the threatened indictment of the company for overcrowding its cars be not proceeded with. The company was greatly handicapped by the fact that since the war started more than 1200 of its employees had resigned from the service to go to the front. For the first time in its history the company had to advertise for men and could not obtain them. Out of 175 men taken on early in March only forty-three had completed their training. Despite these obstacles the company was operating more cars daily than in October.

After considerable discussion it was decided to withdraw the indictment proceedings and to recall the bill before the Legislature requiring the company to provide free transportation for soldiers. All other matters in dispute will be referred to the recently appointed traffic commission. This was satisfactory to Mr. Fleming, who outlined a number of improvements which the company intended to carry out in the near future. He was quite willing to consult the traffic commission on all matters instead of appealing to the Ontario Railway Board, if the commission would meet him in a friendly spirit. At the close of the conference Mr. Fleming stated that he was not in favor of employing women as conductors. He thought the work and long hours too arduous for women.

Settling Niagara Falls Accident Claims.—Application has been made to the provincial courts of Ontario by the legal department of the International Railway, Buffalo, N. Y., for ratification of twenty-two settlements made by the claim department for deaths and injuries resulting from the Queenstown, Ont., wreck on July 7, last. A total of $30,000 has been paid out in making the twenty-two settlements. Many cases are still pending.

Hourly Service Between Galveston and Houston.—The Galveston-Houston Electric Company has resumed hourly service between Houston and Galveston, Tex. This is the first hourly service since the coast storm in August which destroyed the causeway across Galveston Bay. Since that time cars have been operated every two hours. Increase in the traffic and strong indications for additional increases are the reason given by officials of the line for the reestablishment of the old service.

Skip-Stop Trial in Newark.—The Public Service Railway, Newark, N. J., on recommendation of the Board of Public Utility Commissioners and on request of residents along the line, has arranged for a sixty-day trial, beginning on April 1, of the skip-stop plan on the Bloomfield Avenue line between Branch Brook Park and Caldwell. Twenty-two stops each way will be eliminated. Temporary signs will be erected to indicate the stopping points. The stops will be arranged on the equalization plan. If the public is pleased with the plan it is probable that it will be made permanent.

Safety-first Textbook Recommended.—G. W. Knox, general manager Oklahoma (Okla.) Railway, in an address recently made before the Electrical Luncheon Club in Oklahoma City expressed the belief that some day textbooks would be published upon "safety first" and that they would become a part of the regular public school curriculum. He also described many of the modern methods employed to prevent accidents on electric railways as well as the system of education being carried on in safety work. Mr. Knox for many years has been a strong advocate of safety-first methods.

Service Increased in Vancouver.—W. G. Murrin, general superintendent of the British Columbia Electric Railway, Vancouver, B. C., put new schedules into effect on the city lines on March 15, greatly increasing the service. The new schedules provide increased service, particularly during the noon hour, with a special shopping service for the convenience of Fourth Avenue patrons desiring to go downtown to shop in the afternoon. Mr. Murrin states that these changes represent an additional expenditure of $40,000 per annum, compared with the service in operation prior to March 15.

City Attorney Answers Fare Petition.—City Attorney Hoan of Milwaukee, Wis., has filed with the Railroad Commission of Wisconsin his answer to the application of the Milwaukee Electric Railway & Light Company for permission to increase its fares. He asks that the plea of the company be dismissed. Mr. Hoan, who is the Social-Democratic candidate for Mayor, contends that the company is overcapitalized; that its power charges are too high; that unjustifiably large sums have been set up for depreciation, damage claims, insurance reserves, etc.; that the zone fares are an annoyance, etc.

New Transfer System Proposed for Columbus.—S. G. McMeen, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, on March 17 submitted to City Solicitor Scarlett the new transfer system which has been worked out recently. He desires to secure an opinion as to whether the changes conform to the franchise contract with the city and are legal. The new transfers will specify routes and transfer points and will allow fifteen minutes for transferring. The company found that the privileges allowed under the transfers now in use have been abused. The new system was devised to prevent such abuse.

Shall Women Be Employed on Street Cars?—This question is being asked by the Detroit (Mich.) United Railway in *Electric Railway Service*, which is published by the company and distributed to the public. In introducing a number of letters on the subject which were received from readers the company said in the issue of its paper for March 10: "Evidently our readers are not agreed upon the proposition we discussed a short time ago—whether women of this country should enter the new field of labor recently developed as a result of the European war. We mean as to being employed as motormen or conductors on city street cars. Of the letters received by us all but one are against the novelty, but we desire to add that another of the letters before us is an application from a woman who wants to be a motorman. We are, of course, not at liberty at this time to give her name. Read these letters; you will find them interesting. Does any one of them express your views?"

City Files Its Answer in Trenton Fare Case.—The city of Trenton, N. J., has filed in the Federal Court in that city its answer to the supplemental bill recently filed by the Trenton & Mercer County Traction Corporation, asking that the United States District Court prevent the enforcement of the Public Utilities Commission order restraining the railway from putting into effect its order discontinuing the strip tickets. The city denies that portion of the corporation's supplemental bill which sets out that the order of the commission is unjust, unreasonable, discriminatory, confiscatory, erroneous and illegal, and that it should be set aside. The bill also denies that the board has no jurisdiction to make the order and that the act, concerning public utilities, confers no power upon the board to make such an order. It likewise denies that the order impairs the obligations of the charter, ordinances and contracts, by which the fare for transportation of each passenger over the age of five years shall be 5 cents within the city limits.

Final Argument on Rochester Jitneys on April 12.—At the hearing before the Public Service Commission of the Second District of New York, Commissioner Emmett sitting, in Rochester, N. Y., on March 20 the New York State Railways closed its case against the jitneys that desire to continue to operate there after the expiration of the license granted to them before the public utility law was amended to bring the jitneys under commission jurisdiction. Among the witnesses for the railway were Elmer E. Strong, superintendent of transportation of the company; William O. Ingle, auditor of the company; Joseph K. Choate, vice-president of J. G. White & Company, and John J. Dempsey, superintendent of the New York Municipal Railway Corporation (Brooklyn Rapid Transit System). Mr. Ingle presented data to show that the decrease of $225,000 in gross earnings of the company in Rochester for the year closed recently was due largely to the jitneys. Commissioner Emmett announced that submission of briefs and final argument in the case will take place before the commission in Albany on April 12.

Personal Mention

Mr. W. W. Grayson, traveling auditor, has left the Puget Sound properties of Stone & Webster to return to the Boston office.

Mr. C. M. Marsh, who has been superintendent of transportation of the Wheeling (W. Va.) Traction Company, has been made assistant general superintendent of the company.

Mr. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., has been appointed chairman of the street and interurban railway section of the International Rotary Club.

Mr. George W. Lang, who recently returned to the service of the Ottawa (Ont.) Electric Railway as claim agent, has been appointed acting superintendent during the absence of Mr. F. D. Burpee, superintendent, on military service overseas.

Mr. N. McD. Crawford, who recently resigned as president and general manager of the Reading Transit & Light Company, Reading, Pa., has accepted an engagement with the E. W. Clark Management Association and will make his headquarters at Columbus, Ohio.

Mr. A. J. County, formerly a special assistant to President Samuel Rea of the Pennsylvania Railroad, has been elected vice-president of that company in charge of the accounting department. Mr. County entered the service of the Pennsylvania Railroad in 1890 and assisted in the promotion and acquisition of new lines for the Pennsylvania System.

Mr. F. E. Fisher, general superintendent of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., was the subject of one of the recent personal sketches which the Joliet *Evening Herald* is running under the title "How Joliet Men Climbed the Ladder of Fame and Fortune." Mr. Fisher was born in Elyria, Ohio, on Dec. 29, 1860. He has been in business since he was fifteen years old.

Mr. John Edbauer, general passenger agent of the Niagara Gorge Railroad, Niagara Falls, N. Y., has returned from a conference in Chicago with representatives of Western steam lines with the assurances that Western trunk lines will co-operate to make Niagara Falls a winter tourist point as well as a summer resort. Special low rate excursions will be run next winter if present plans are carried into execution. Officers of Niagara Falls commercial organizations are also co-operating with the officials of the Great Gorge Route.

Mr. E. D. Stevens, formerly of the Leyden division of the Denver (Col.) Tramway, has been appointed trainmaster of the interurban lines. His territory will include the Inter-Mountain and the Golden and Leyden lines west of the Denver County line, and he will have authority over passenger, freight and express movements. Mr. Stevens entered the tramway company's service as a motorman on Aug. 15, 1890, on the East division. He continued in the service until June, 1900. He entered the service of the Denver & Northwestern Railway on Feb. 17, 1903, helping in the work of construction. After the lines were completed and had been placed in operation he became a trainman with the company.

Mr. John B. Crawford, who was formerly connected with the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has resigned his position as division superintendent of the Central Illinois Public Service Company at Marion, Ill., where he has been since 1912. Here he had jurisdiction over a division in which the Central Illinois Public Service Company was operating electric light and water properties in thirty-five communities. In the past Mr. Crawford has been connected with a number of railways, including the Lexington & Interurban Railways, Lexington, Ky.; the Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.; the Winona Interurban Railway, Warsaw, Ind.; the Groton & Stonington Street Railway, New London, Conn., and the Hartford (Conn.) Street Railway.

Mr. E. J. Pearson has been appointed a vice-president of the New York, New Haven & Hartford Railroad, with headquarters in Boston. He will act as a general assistant to Mr. Howard Elliott, chairman of the board and president of the company, and in particular will have charge of all matters relating to construction, operation and maintenance. Mr. Pearson was graduated from Cornell, with the degree of Civil Engineer, in 1883. He has had a large experience in construction and operation, particularly in terminal work, not only on the Northern Pacific Railway, but in cities like Chicago, St. Louis, Kansas City, and recently at New Orleans, where the Texas & Pacific has just completed important terminals. He has also had a long training in the analysis of operating problems and in economical methods of carrying on railway business.

Mr. Malcolm M. Inglis has been appointed manager of the Port Arthur (Ont.) Civic Railway. Mr. Inglis is a Scotchman, and was educated at the high school in Stirling and the Glasgow and West of Scotland Technical College. He entered business in 1901, with Mavor & Coulson, Ltd., engineers and electricians, Glasgow, serving a regular apprenticeship in their various departments, and in addition completing two years in the designing department for electrical machinery. In 1908 he severed his connection with Mavor & Coulson and accepted a staff appointment with Johnson & Phillips, Ltd., London, England, as chief tester and outside erector, and in 1909 became assistant designer to Professor Kahn of the Brush Electrical Engineering Company, Loughborough, England. In 1901 he accepted the position of chief electrical engineer to W. J. Craig & Sons at their Brynkinalt collieries, North Wales, which position he resigned in 1911. From 1911 to 1915 Mr. Inglis was electrical engineer to the town of Yorkton, Sask.

Mr. W. E. Haseltine, the new president of the Wisconsin Electrical Association, is secretary and general manager of the Ripon Light & Water Company, Ripon, Wis. Mr. Haseltine was born in Schofield, Wis., in 1874, and studied chemical engineering at the Massachusetts Institute of Technology. He left school in 1896 before he was graduated and went to Alaska, where he did some engineering work in connection with the White Pass & Yukon Railroad. In 1899 he returned to the home of his parents in Ripon, Wis., where he and his father bought out the various interests owning the Ripon Light & Water Company. Mr. Haseltine was first made secretary of the company, and later his father, Mr. C. P. Haseltine, president of the company, turned over the management to him. Mr. Haseltine has been a member of the Wisconsin Electrical Association since its organization and served as its first vice-president during 1915.

W. E. HASELTINE

Mr. Thomas F. Wickham, secretary-treasurer of the Union Gas & Electric Company, Cincinnati, Ohio, has been elected second vice-president of the company in charge of the electric operating department. Mr. Wickham has been associated for the last six years with A. B. Leach & Company, New York, and the properties controlled by that firm, having for three years been in charge of their public utility properties in Macon, Ga. For six years prior to that time he was associated with J. G. White & Company, Inc., New York, in the operation of their public utility properties. Before going to New York, Mr. Wickham was general auditor of the Montreal Light, Heat & Power Company, Montreal, Can. Mr. Wickham is also secretary-treasurer of Columbia Gas & Electric Company, which controls the Union Gas & Electric Company, and as comptroller has charge of the operation of the South Covington & Cincinnati Street Railway and of the electric department of the Union Light, Heat & Power Company, both of Covington, Ky., and controlled by the Columbia Company.

Mr. Edward C. Spring, manager of the Philadelphia division of the Lehigh Valley Transit Company, Allentown, Pa., has been appointed superintendent of transportation of the entire system, assuming in addition to his present work the duties of the late George E. Miller, superintendent of transportation. Mr. Spring will have supervision of all the railways of the company. Mr. Spring has been in charge of the Philadelphia division of the company since 1912. Before that he was assistant to the president of the Philadelphia & Western Railway, Upper Darby, Pa. Mr. Spring is very well known in Pennsylvania, New England and in the Middle West. Before becoming connected with the Lehigh Valley Transit Company in 1910 as assistant to the president of the company he was general superintendent of the Dayton, Covington & Piqua Traction Company and before that was superintendent of the Newton & Boston Street Railway and the Wellesley & Boston Street Railway. He also for a time represented a syndicate of Dayton capitalists as operating manager of the electric railway, electric light and water properties in Lawrence and Parsons, Kan. He is a past president of the New England Street Railway Club and the Central Electric Railway Association.

E. C. SPRING

Mr. H. M. Ashenfelter, master mechanic of the Galesburg & Kewanee Electric Railway, Kewanee, Ill., for the last two and one-half years, has resigned and will retire in April from railway work to his fruit farm at Seville, Ohio. Mr. Ashenfelter started his career with the Westinghouse Electric & Manufacturing Company in 1897. Later he accepted the position of master mechanic of the South Bend Street Railway, now the Chicago, South Bend & Northern Indiana Railway, which position he held for ten years. The following four years he spent on his farm in Ohio, but took up railway work again in 1912 as master mechanic of the Vincennes (Ind.) Traction Company. He resigned from the company at Vincennes to become connected with the Galesburg & Kewanee Electric Railway.

Mr. Clark Verner Wood, who was elected president of the New England Street Railway Club on March 23, succeeded Mr. J. T. Harmer last year as president of the Springfield (Mass.) Street Railway Mr. Wood was born in Woodstock, Vt., in 1863; was graduated from the local high school in 1881, and immediately entered railroad service as a telegraph operator on the Grand Trunk system. He was soon promoted to yardmaster and station agent. Later he entered the service of the Boston & Maine Railroad, after which he became a freight cashier on the New York, New Haven & Hartford Railroad. After officiating as agent at various points on the latter system, including Providence, R. I., Mr. Wood was offered the post of general passenger agent of the Pittsburgh & Lake Erie system, and went to Pittsburgh, where he later became private secretary to Mr. J. G. Odell, the vice-president. Mr. Wood next became superintendent of the West Side Belt Railroad and the Pittsburgh Terminal Railway & Coal Company, which owned about seventy-five mines in the Pittsburgh district. He was then called to the superintendency of the Wabash Railroad, and had charge of the operation of the entire system, including more than 400 miles of track, with extensive coal and iron docks at Cleveland and Toledo. In 1900 Mr. Wood entered the electric railway field at the request of Judge J. H. Reed, president of the Philadelphia Company, who required his services in the development of freight traffic on the Pittsburgh Railways. In 1906 Mr. Wood went to Boston to take charge of traffic problems on the electric railway lines owned and controlled by the New England Investment & Security Company, paying special attention to the building up of patronage on the systems centering around Worcester and Springfield. In 1908 he went to Springfield, his headquarters being transferred with other offices from Boston. Here he devoted his attention to all classes of traffic and their development, becoming vice-president in charge of operation in 1913. Besides being president of the Springfield company he is vice-president of the Worcester Consolidated Street Railway, the Milford, Attleboro & Woonsocket Street Railway, the Intersate Consolidated Street Railway, and the Attleboro Branch Railroad. The new president of the club has a host of friends and is deservedly appreciated as an executive by the local public.

C. V. WOOD

Mr. W. B. Atwood, who, up to Feb. 1 was vice-president and general manager of the Geneva, Seneca Falls & Auburn Railway, Seneca Falls, N. Y., has been appointed general superintendent of the railway operations of the Wheeling Traction Company and affiliated companies as successor to Mr. G. O. Nagle, resigned. Mr. Atwood entered railway work with the Pittsburgh & Lake Erie Railroad, with which he served as an engineer on construction for more than two years. He terminated this connection in 1901, and for the ensuing four years was a student of civil engineering at Cornell University, where he was graduated in 1905. For a short period thereafter he was engaged in engineering work on Dam No. 5 on the Ohio River. He resigned from this work in 1906 to become connected with the Ohio Electric Railway as resident engineer of construction. In March, 1908, Mr. Atwood became superintendent for the Ashtabula Rapid Transit Company and the Pennsylvania & Ohio Railway. He was connected with these companies until November, 1910, when he resigned to accept the position of vice-president and general manager of the Geneva, Seneca Falls & Auburn Railway.

W. B. ATWOOD

Mr. I. L. Oppenheimer, president Ohio River Electric Railway & Power Company, Pomeroy, Ohio, recently gave an interesting address on "Public Utilities, the Community and the Obligations of Both" before the Pomeroy Business Men's Club on the occasion of its second annual banquet. Mr. Oppenheimer's chief theme was that utilities are performing their obligations to the community by rendering the best service commensurate with the returns received, but that if the utilities are not prospering and yielding a fair profit on their investment and the risk involved, the community is not meeting its obligations. A utility was said to be of little value to a community unless it had a chance to prosper.

OBITUARY

George A. Gilfillian, formerly acting general manager and consulting engineer of the Morris County Traction Company, Morristown, N. J., and since November, 1912, in business as a consulting engineer with offices in Pittsburgh, died at Battle Creek, Mich., on March 19. Mr. Gilfillian was educated at the University of Pittsburgh. After a year as assistant engineer of the Pittsburgh & Western Railroad he entered electric railway work. He was engineer in charge of electrification of the lines of the Pittsburgh & Birmingham Street Railway, and he continued as chief engineer of the company until it was merged with the Pittsburgh Railways. In 1896 he opened up an office in Pittsburgh as consulting engineer. In the fall of 1909 he became connected with the Morris County Traction Company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.
An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Akron & Youngstown Electric Railway, Pittsburgh, Pa.**—Incorporated to construct a line between Akron and Youngstown. Capital stock, $100,000. Officers: Thomas L. Childs, Akron, president; H. D. McCutcheon, Shannon Building, Pittsburgh, vice-president; H. A. Hausgen, Chicago, secretary, and Frederick G. Reigert, Pittsburgh, treasurer.

FRANCHISES

Riverside, Cal.—The Riverside, Rialto & Pacific Railroad has received a franchise from the Council to construct a single-track line on Colton Avenue between First Street and Allen Place, Riverside.

Peoria Heights, Ill.—The Council of Peoria Heights has refused the application of the Peoria & Chillicothe Electric Railway for a fifty-year franchise in Peoria Heights. [March 4, '16.]

Baltimore, Md.—The Board of Estimate on March 20 approved the ordinance authorizing the Maryland Electric Railway to extend the St. Paul Street line of the United Railways & Electric Company into and through the property of the Roland Park Company at Guilford.

Fredonia, N. Y.—The Town Board of Fredonia, after a conference with officials of the Buffalo & Lake Erie Traction Company, has refused to grant the company's request for modifications in the franchise through Fredonia. The company is endeavoring to obtain concessions from the towns between Erie and Fredonia and threatens to abandon the line unless the concessions are granted.

St. Thomas, Ont.—Decision was reserved by the Dominion Railway Commission on March 11 in the case of the application of the London & Port Stanley Railway for the right to lay additional tracks on the streets of St. Thomas to connect with the Michigan Central Railway.

Spring City, Pa.—The Pottstown & Phoenixville Railway has received from the Council a one-year's extension of time on its franchise to construct a line in Spring City.

State College, Pa.—The Lewiston & Reedsville Electric Railway has asked the Council for a franchise to construct and operate a line in State College.

Nashville, Tenn.—The franchise of the Nashville Traction Company is revoked and the bond of $200,000 declared forfeited in an ordinance passed by the City Commission of Nashville, Tenn. It is alleged that the company has failed to keep to the terms of the franchise and particularly that a provision forbidding a merger with the Nashville Railway & Light Company has been violated. It is contended, on the other hand, that the so-called merger was a matter of sale of stock by stockholders of the Nashville Traction Company and not a corporate action.

Spokane, Wash.—The Spokane Traction Company has received a franchise from the Council to construct an extension on Madelia Street from Broadway to Boone Avenue. The Council has also granted the company the right to take up its tracks on Boone Avenue from Madelia Street to the west end of the approach of the present Boone Avenue bridge across the Spokane River.

TRACK AND ROADWAY

Lacombe & Blindman Valley Electric Railway, Lacombe, Alta.—It is reported that efforts are now being made to complete this company's line from Lacombe to Rimbey. J. C. Gibson, Toronto, president. [March 13, '15.]

Fort Smith Light & Traction Company, Fort Smith, Ark.—More than $50,000 will be spent by this company during the next few months in improvements to its system, including the reconstruction of portions of the Eleventh Street and Grand Avenue lines. New rails and 6-in. steel ties will be used. Tile drains will be placed underneath the tracks to prevent moisture troubles and the ties will be set in a concrete bed. The grounds at Electric Park, which is owned by the company, will be improved with new flower beds, shrubbery, etc., and arrangements are being made for several amusement features this summer.

Pacific Electric Company, Los Angeles, Cal.—Construction work on the Pacific Electric Railway elevated road, to extend from the rear of the Pacific Electric Building at Sixth and Main Streets to San Pedro Street, has been begun.

Bristol & Plainville Tramway, Bristol, Conn.—This company is completing preparations for placing its lighting and power wires underground in the center of the city as soon as the weather conditions are favorable. The necessary cables, connections, etc., have all been ordered and some of the material has been received. The conduits for this underground wiring were laid last season. When the work is completed all wires with the exception of the trolley wire will be removed.

New York, New Haven & Hartford Railroad, New Haven, Conn.—Work will be begun at once by this company on the construction of a new bridge over the Thames River between Groton and New London. The contract for building the abutments and piers for the bridge has been awarded to Holbrook, Cabot & Rollins, the lowest bidder.

Atlanta, Ga.—J. L. Murphy, Atlanta, representing the promoters of the proposed interurban electric railway from Atlanta to Anderson, S. C., states that no company has as yet been organized and no surveys made of the proposed line. The preliminary inquiries along the line were made with the idea of organizing a corporation should the responses be satisfactory. As yet the conclusion has not been determined.

Mississippi Valley Railway & Power Company, Rock Island, Ill.—A branch line from Aledo, Ill., to Muscatine, Iowa, is among the plans of the Mississippi Valley Railway & Power Company, which will take over the Rock Island Southern Railway and all its subsidiary companies.

Evansville (Ind.) Railways.—This company has begun the construction of an extension of its line down Washington Street, Rockport, from Fifth Street to the Ohio River. The construction of this line will enable passengers to reach cars with greater ease and dispatch from boats on the Ohio River.

Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind.—It is reported that plans are being made by this company to double-track its line between South Bend and Elkhart.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company reports that during the next eight weeks contracts will be placed for 26 miles of new track construction.

Boston, Mass.—Bids will be received by the Boston Transit Commission until noon, April 11, for the construction of Section J, Dorchester Tunnel, in and near Dorchester Avenue and Boston Street from about 80 ft. north of Dexter Street to about 30 ft. south of Ralston Street, South Boston. The section is about 1000 ft. long. The structure will be mainly of reinforced concrete and structural steel. The work includes the Andrew Square Station. [March 11, '16.]

Minneapolis & Central Minnesota Railway, Minneapolis, Minn.—This company reports that it expects to resume construction work next May on its proposed line from Minneapolis to St. Cloud, 65 miles. Contracts will soon be let for grading, ties, steel and poles. E. G. Potter, 318 Andrews Building, Minneapolis, president. [April 17, '15.]

Twin City Rapid Transit Company, Minneapolis, Minn.—Improvements involving an expenditure of approximately $1,500,000 are planned in St. Paul this year by the Twin City Rapid Transit Company. Heavy 90-lb. rails with inter-rail paving will be laid on Selby Avenue from Milton to Fairview Avenue; Como Avenue from the Great Northern bridge to Dale Street; North Snelling Avenue from the Great Northern bridge to Como Avenue, and a single-rail extension of the Randolph Street line from Snelling to Cleveland Avenue, as authorized some time ago.

McComb & Magnolia Railway & Light Company, McComb, Miss.—It is reported that this company's line will be placed in operation within six months. Guy M. Walker, New York, president. [Nov. 13, '15.]

***Emma, Mo.**—The Emma Creamery Company is reported interested in the construction of an electric line from Sweet Springs to Emma.

United Railways, St. Louis, Mo.—The special committee appointed by Mayor Kiel to suggest plans for transportation service within Forest Park voted on March 11 to drop further consideration of a trolley line until the motor omnibus line authorized by a bill recently introduced in the Board of Aldermen has been tested. The trolley line is favored by the Municipal Art Commission and was suggested by the St. Louis Art League with a view to providing transportation facilities to the Art Museum. The route suggested by the Art League is not favored by Park Commissioner Cunliff. President Kinsey, of the Board of Public Service, suggested a trolley line to connect with the Laclede Avenue line of the United Railways and to reach all points of interest in the park, but suggested that the omnibus line first be given a test.

Fallon (Nev.) Electric Railroad.—This company reports that it is now ready to lay track on its proposed line from Fallon to Sand Springs and expects that the line will be ready for operation about Sept. 1.

City Electric Company, Albuquerque, N. Mex.—Work has been begun by this company on the reconstruction of track on its South Edith Street line.

Piedmont & Northern Railway, Charlotte, N. C.—Operation has been begun on this company's extension between Belmont Junction and Belmont.

Hillsboro, Cynthiana, Bainbridge & Chillicothe Traction Company, Hillsboro, Ohio.—The Ohio Public Utilities Commission has granted this company authority to issue and sell $1,300,000 of its first mortgage bonds at 80, $200,000 of its preferred stock at 80 and $140,000 of its common stock at 75. When these securities have been sold and the funds are in hand for the construction of the road, then $160,000 of common stock may be issued to the promoters to pay for promotion and other expenses. [Mar. 11, '16.]

London (Ont.) Street Railway.—This company plans to double track its line on Dundas Street East.

St. Marys, Ont.—Blanchard Township, one of the few municipalities that defeated the London-Toronto hydro-radial railway proposition in January last, indorsed it on March 13, the ratepayers carrying it at the polls by a majority of twenty-three.

***Klamath Falls, Oregon.**—Property owners and residents of the Malin section, 35 miles south of Klamath Falls, have under contemplation the proposition of constructing an electric railway line from Malin to Klamath Falls, via Poe Valley and Olene. Klamath Falls has been asked to cooperate in the enterprise. It is reported that farmers near Malin are willing to furnish the right-of-way free of charge and do all the necessary grading without cost, providing Poe Valley and Klamath Basin east to Olene and Klamath Falls will do likewise.

Johnstown & Somerset Street Railway, Johnstown, Pa.—Work on this company's proposed line between Johnstown and Somerset is progressing rapidly, and it is reported that the first section of the line between Holsopple and Jerome will be completed and ready for operation by July 1. When the first division of the road is in operation work on the second division will be conducted from both ends of the line. It is expected that the entire line will be completed by the first of next year. [Sept. 18, '15.]

Milford, Pa.—Surveys have been begun of the proposed line from Milford to Port Jervis. Construction will begin as soon as weather conditions permit. [Dec. 18, '15.]

South Fork-Portage Railway, Johnstown, Pa.—Work on this company's proposed line between South Fork and Portage is progressing rapidly. About 3 miles of ties and rails have been laid and it is expected that the road will be ready for operation about June 1. Robert Pearce, Portage, president. [Sept. 4, '15.]

***Philadelphia, Pa.**—An ordinance authorizing the Mayor to create a loan of $1,500,000 for the construction of a double-track street railway to connect Bustleton, Fox Chase, Somerton and Byberry was introduced in the Philadelphia Council on March 16. The ordinance was referred to the finance committee.

***Akron & Youngstown Electric Railway, Pittsburgh, Pa.**—This company, which has recently been incorporated, will construct a line between Akron and Youngstown, 50 miles. The contract for the construction of the line has been awarded to H. D. McCutcheon & Company, Shannon Building, Pittsburgh, and calls for the immediate beginning of the work and its completion before the end of this year. The proposed line will connect the systems of the Pittsburgh Railways, Pittsburgh, Harmony, Butler & Newcastle Railway, Northern Ohio Traction Company and the Mahoning Valley Traction Company. The improvement will cost about $3,000,000, exclusive of terminal facilities. Direct trolley connection between Pittsburgh and Cleveland will be afforded by the construction of the line. Thomas L. Childs, Akron, president.

Rhode Island Company, Providence, R. I.—Several track changes, including the relocation of existing lines and the laying of new ones, are planned by the Rhode Island Company for the coming spring. Petitions for permission to make the improvements have been filed with the City Clerk, and will be acted upon shortly by the committee on railroads.

Citizens' Street Railway, Clarksville, Tenn.—This company has announced that it will be prepared to begin operations by April 1. Difficulties and delays in getting certain materials needed for reconstruction of tracks, etc., and for repairing wire systems have delayed resumption of service. When service does begin it will be on a practically reconstructed line and with thoroughly renovated rolling stock. This company recently took over the Clarksville & Dunbar Cave Railway.

Nashville Railway & Light Company, Nashville, Tenn.—It is reported that a contract has been signed by the Nashville, Chattanooga & St. Louis Railway, the City of Nashville and the Nashville Railway & Light Company for the construction of a reinforced concrete viaduct to replace the steel structure on Charlotte Pike. The cost is estimated at $45,000.

***Jane Lew, W. Va.**—It is reported that plans are being made to construct a line from Jane Lew to Berlin, connecting with the Monongahela Valley Traction Company's line at Jane Lew. It is stated that the line would eventually be extended to Lorentz and Buckhannon. Dr. Collins, Jane Lew, is interested. Mayor Goodloe Jackson of Jane Lew may be able to give further information.

Janesville & Madison Traction Company, Madison, Wis.—A report from this company states that 3 miles of track have been laid between Madison and Blooming Grove on its proposed line from Madison to Janesville, 42 miles. Grading is in progress from Lake Waubesa to McFarland and on the rest of the line it will be begun in April. The overhead work has been completed from Town Hall to McFarland, catenary construction being used. Contracts for construction will be let by the company during April, May and June. G. Pickhardt, 1004 Majestic Building, Milwaukee, president. [May 1, '15.]

SHOPS AND BUILDINGS

Alton, Granite & St. Louis Traction Company, Alton, Ill.—This company will erect a new depot at Wood River, Ill.

Springfield (Mass.) Street Railway.—The Palmer carhouse of the Springfield & Eastern Street Railway, which is operated by the Springfield Street Railway, was about two-thirds destroyed by fire on March 17. Nineteen cars, valued at $50,000, were gutted and the damage to the building is estimated at $10,000.

United Railways, St. Louis, Mo.—A building to provide offices for the line department and material yards and storerooms for the track department is being erected on this company's property at Spring and Park Avenues. The office building will be 50 ft. wide, extending back 100 ft., and will be two stories high. The structure will be of brick with concrete floors. The line department storerooms will be 50 ft. wide, extending back 200 ft., one story high. The walls of this building will be of corrugated iron. The first floor of the brick building will be used as a storehouse for the line department, while the offices of the superintendent and his assistants will be in the front portion of the second story. Immediately back of these offices will be two large locker and assembly rooms for the employees, one for the white men and one for the colored men. On each side of the building will be a loading platform with tracks. A specially constructed switch will permit the narrower gage steam cars to be switched on to the electric tracks. The building will be surrounded by extensive switching yards, touching various parts of the material yards. It is expected the building will be ready for occupancy early in May.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has awarded the contract for station finish work on seven stations of the new Broadway subway to D. C. Serber, the lowest bidder, at $344,716. The contract for completing station finish on the Hunter's Point Avenue station on the Queensboro subway was awarded to the Degnon Contracting Company, the lowest bidder, at $32,219.

POWER HOUSES AND SUBSTATIONS

Iowa Railway & Light Company, Cedar Rapids, Iowa.—This company will begin the construction of a new power house just off North First Street on April 1. Material for the building and all the machinery have been purchased by the company.

Owensboro City Railway, Owensboro, Ky.—During a recent severe windstorm the smokestack of this company's power house was blown down. Another is being erected at a cost of $800.

Boston (Mass.) Elevated Railway.—This company has awarded a contract to the General Electric Company for a 35,000-kw. turbo-generator to be installed in its South Boston power station by Dec. 1, 1916. The addition of this unit will increase the capacity of the station to 80,000 kw. Provision has been made in the contract for the temporary installation of a 10,000-kw. turbine to facilitate handling next winter's load, in case the manufacturer is unable to complete the specified delivery.

Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.—A report from this company states that it has placed an order with the General Electric Company for one 500-kw. rotary converter and automatic substation apparatus to be installed at Spring Lake. An order has also been placed for ten No. 201-A railway motors and five P.C. control equipments.

Cleveland (Ohio) Railway.—This company has applied to the City Commissioners for permission to rebuild and enlarge its Cedar Avenue power station at a cost of $345,000.

Oklahoma Railway, Oklahoma City, Okla.—The Westinghouse Electric & Manufacturing Company has recently sold to the Oklahoma Railway a 3750-kw. turbogenerator unit for its plant.

Toronto, Ont.—The provincial government has purchased the Seymour interests in Central Ontario for $8,350,000. These interests comprise more than twenty companies and will give the hydroelectric commission complete control of power in the province.

Northwestern Electric Service Company, Erie, Pa.—This company, which has taken over the Northwestern Pennsylvania Railway, will construct a high-tension transmission line from Erie through Fairview, Girard, Albion, Springboro, Conneautville to Harmonsburg. The present high-tension line of the railway extending from Erie to Cambridge Springs will be extended through Venango and Saegertown to Meadville and Harmonsburg, thereby completing a loop service of approximately 95 miles, delivering power to all points in territory for railway, light and power use. Power will be purchased from the Erie County Electric Company, at Erie, with a reserve plant of the company at Meadville, Pa.

Virginia Railway & Power Company, Richmond, Va.—This company has contracted for the addition of a 12,500-kw. unit for its Reeves Avenue station at Norfolk, to be installed during the coming summer.

Manufactures and Supplies

ROLLING STOCK

New Jersey & Pennsylvania Traction Company, Trenton, N. J., is reported as rebuilding five cars.

Twin City Rapid Transit Company, Minneapolis, Minn., is planning to construct during the year at least 100 new cars.

Third Avenue Railway, New York, N. Y., has ordered one dump car from the Differential Car Company, Nashville, Tenn.

United Traction Company, Albany, N. Y., has ordered ten additional city cars from the Wason Manufacturing Company.

Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio, has ordered five suburban cars from the Cincinnati Car Company.

Tidewater Power Company, Wilmington, N. C., which recently lost three cars by fire, has awarded a contract to The J. G. Brill Company to replace this equipment.

Springfield (Mass.) Street Railway on March 17 lost nineteen cars in a fire which destroyed its Palmer carhouse. It is reported that ten new cars have been ordered from the Wason Manufacturing Company to replace this equipment.

Bay State Street Railway, Boston, Mass., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 5 as expecting to purchase 200 new cars, has ordered 200 double-truck, semi-convertible cars, also 200 pairs of trucks, from the Laconia Car Company.

Brooklyn (N. Y.) Rapid Transit Company is preparing specifications for 100 new surface cars of a type probably somewhat similar to that of the center-entrance cars which this company has now in service. The design has not yet been approved.

Schenectady (N. Y.) Railway will order sixteen new cars, to cost $12,000,000, for delivery not later than Oct. 1. Six of the cars will be used for interurban service between Albany, Schenectady and Saratoga. Ten of the new cars will be of the low-step, prepayment type for use in Schenectady.

Kansas City (Mo.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of March 11 as having asked for bids on new cars, have ordered fifty cars from the St. Louis Car Company. The cars will be of the same type as those put in service by the railway company seven months ago. Contracts for twenty-five additional cars will be awarded later. The new cars will cost close to $6,000 each, or about $500 more than the previous purchase cost.

Northern Ohio Traction & Light Company, Akron, Ohio, has ordered from the Jewett Car Company five additional interurban car bodies of the same type as the ten interurban car bodies ordered about a month ago. The first ten interurban car bodies were also ordered from this manufacturing company, and not from another car builder, as stated in the specifications previously published.

Public Service Railway, Newark, N. J., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1916, as having ordered twenty interurban cars from The J. G. Brill Company, has specified the following details forf this equipment:

Date of delivery,	10 May 15, 10 June 15
Seating capacity	52
Bolster centers, length,	23 ft. 11 in.
Length of body	35 ft. 11 in.
Length over vestibule,	45 ft. 11 in.
Width over sills	8 ft. 4 in.
Width over all	8 ft. 7 in.
Height, rail to sills,	2 ft. 11 11/16 in.
Sill to trolley base,	8 ft. 5 13/16 in.
Body	Semi-steel
Interior trim,	Cherry, stained mahogany
Headlining	Agasote
Roof	Monitor
Underframe	Steel
Car trimmings,	Brill, statuary bronze
Control	West. H. L.
Couplers,	Tomlinson, type A, form 8
Curtain fixtures	Nat'l L. W.
Curtain materials	Pantasote
Destination signs	Hunter
Gears and pinions	West.
Gongs	Brill Dedenda
Hand brakes,	Sterling-Meaker "Giant"
Heaters	Consol.
Headlights	Trolley Sup. Co.
Motors	West. 307 CV
Paint,	Anglo-American Surfacers, Mosers color
Push buttons	Brill
Sanders	Hanlon Sander Co., air
Sash fixtures	Brill
Seats	Brill Winner
Seating material,	Cane in 10, Fabrikoid in 10
Step treads	Moulded lead, Brill
Trolley catchers	Knutson No. 5
Trucks	Std.
Varnish	Anglo-American
Ventilators	Automatic

TRADE NOTES

H. L. Brownell, public safety engineer of Chicago, formerly in charge of the safety work department of the Chicago Surface Lines, began a week's campaign at Youngstown, Ohio, on March 20.

Drake Railway Automotrice Company, Chicago, Ill., has changed its name to Drake & Drake. The new firm will be located in the Edison Building instead of in the Commercial National Bank Building, as formerly.

Curtain Supply Company, Chicago, Ill., has appointed George E. Fox, formerly Southeastern representative, as Western sales agent with headquarters in Chicago. T. P. O'Brien has been appointed Southeastern sales agent of The Curtain Supply Company, with headquarters at New York, the appointment becoming effective April 1. Mr. O'Brian was formerly connected with the O. M. Edwards Company, Syracuse, N. Y.

United States Cast Iron Pipe & Foundry Company, Burlington, N. J., announces the removal of its Southern sales and traffic offices from Chattanooga, Tenn., to 1002 American Trust & Savings Bank Building, Birmingham, Ala. This change becomes effective April 1.

Holden & White, Chicago, Ill., have taken over the entire sales of the Wasson air retrieving trolley bases made by the Wasson Engineering & Supply Company, Milwaukee, Wis. This product will be marketed through the affiliated representatives of Holden & White, who have just moved into new offices in the Fisher Building, 343 South Dearborn Street.

Franklin Railway Supply Company, New York, N. Y., has appointed Ralph G. Coburn sales manager of its electrical department. Mr. Coburn has been associated with this company for the past seven years, being formerly in charge of its Chicago office and for the last few years Eastern sales manager, with headquarters in New York, where he will continue in his new capacity.

Eclipse Railway Supply Company, Cleveland, Ohio, will equip with its automatic fenders, in the immediate future, all the cars of the Southern Pacific Railroad's street railway systems in Oregon. The company owns and operates street railway lines in Eugene, Albany and Salem. The Eugene City Council has passed an ordinance allowing the company to install fenders on the Eugene cars and the other cities named, according to T. L. Billingsley, general superintendent of the Southern Pacific Railroad system in Oregon, will have no objections to the innovation.

Graphite Lubricating Company, Bound Brook, N. J., manufacturer of "Bound Brook" graphite and bronze trolley-wheel bushings, owing to the great increase in its business, has enlarged both its office force and shop capacity. The company has erected a new office building and a new foundry. In addition to the changes made at the Bound Brook plant, the company has also built a new plant at Lincoln, N. J. It has on order at the present time more than 1,000,000 bushings. Both shops are being worked day and night in order to handle the increased production without any unnecessary delay to customers.

Sydney O. Swenson has become a member of the engineering offices of Putnam A. Bates. Mr. Swenson was electrical engineer of the Kansas City Terminal Railway for the past four years, having charge of all electrical work pertaining to the new Union Station and terminal facilities. From August, 1907, to July, 1911, Mr. Swenson was assistant electrical engineer of the Detroit River Tunnel Company and was engaged on all engineering work in connection with the electrification of the Michigan Central Railroad at Detroit, Mich., and Windsor, Ont. Previous to joining the Detroit River Tunnel Company Mr. Swenson was with the New York Central & Hudson River Railroad for two and one-half years on the electrification of the New York Central at New York. From June, 1899, to March, 1905, Mr. Swenson was in the engineering department of the Commonwealth Edison Company, Chicago, and was engaged on general engineering work in connection with the expansion of this large public utility company. Mr. Swenson was graduated from the University of Illinois in 1899.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 43,800, which illustrates and describes its incandescent headlights for electric railway service. The headlights referred to are of three classes, i. e., for low-speed city service, for moderate-speed city and suburban service, and for interurban service. All of these headlights are arranged to use focus-type Mazda lamps. The headlights can be furnished with reflectors made of aluminum, silver-plated brass, or with silvered-glass mirror. The bulletin describes headlights which may be mounted on the front car dash or recessed, or many be transferred from one end of the car to the other at the end of a run, in which case the connections are made by suitable plugs and receptacles. The publication contains information relative to the selection of not only the proper headlight but of the incandescent lamp used with it, contains connection diagrams, description of rheostats for use with the incandescent headlights, and also dimensions. This company has also issued Bulletin No. 46,023, which describes briefly its arc-circuit voltmeter, which is a special instrument designed for testing d.c. series arc circuits. The approximate dimensions and the connections, together with prices, are included.

U. T. Hungerford Brass & Copper Company, New York, N. Y., with branches in Philadelphia, Boston, Baltimore and San Francisco, has issued a 400-page catalog, handsomely bound, illustrating its complete line of brass and copper sold under its trademark, "Star Brand." The contents are classified in separate departments, thereby providing the trade with a concise price list, together with lists showing material aggregating more than 5,000,000 lb. carried in stock ready for prompt shipment of such standard articles as: copper and brass in sheets, rolls, rod and wire; seamless brass and copper tubes, condenser tubes; Tobin bronze and yellow metal (Muntz) rods; brazed brass and bronzed tubes; German silver, phosphor bronze and commercial bronze; copper rivets and burs, braziers' rivets, copper nails and tacks; soldering coppers, solder, brass and iron chain; brass and iron escutcheon pins, wood and machine screws; brass and copper wire cloth; copper leaders and gutters; brass and bronze railings and fittings, and numerous other brass and copper articles. The company calls attention to the fact that the unusual delays in deliveries, largely owing to the European situation, make this immediately available supply of obvious advantage.

Hubbard & Company, Pittsburgh, Pa., have issued a complete catalog of their standard pole line hardware and specialties. This book, in its completeness and thorough method of treatment, well constitutes an encyclopedia of buying materials. In listing the articles a photograph of the article has been furnished, together with an adequate description and table of sizes and dimensions. Wherever needed, use has been made of photographs and detailed drawings showing the way the materials are used in actual practice. The book contains 616 illustrations and 260 pages, 8½ in. x 10 in., and is printed on a suede finish offset paper which is particularly agreeable to the reader's eyes. It has a dark green, flexible paper cover and can be conveniently rolled up and carried about in one's pocket, thus making it useful for practical purposes. The book is divided into sixteen sections, in each of which material is grouped according to the purpose for which it is used, as follows: pole work material, guying material; cross-arms, pins and fittings; high-tension arms and fixtures; pole top pins and fixtures; secondary distribution fixtures; Universal lightning arresters; transformer mounting material; Peirce service wire brackets; hammer drills and expansion bolts; street lamp suspension devices; electric railway overhead and third-rail material; cable suspension material, underground cable material, telephone and telegraph wiring, line and track construction tools and Bates expanded steel poles.

NEW PUBLICATION

Business Psychology. By Hugo Münsterberg. La Salle Extension University, Chicago, Ill. Leather.

Most books on the subject of psychology in business are full of either technical subleties or else vacuous popular gossip about the "mysteries of the mind," but Professor Münsterberg's work is a sensible discussion, intelligible to the layman, of the basic psychological principles which must be known before the real worth of the application of psychology to business can be appreciated. The practical services of psychology in business are ably described.

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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STUPIDITY IN LEGISLATION

The *Engineering Magazine* is performing a public service in directing attention to two bills now in Congress prohibiting time studies of work done by any employee of the United States government, or paying any premiums, bonus or cash reward to any such employee except for suggestions resulting in improvement or economy in the operation of any government plant. Both of these measures, our contemporary says, have been introduced at the behest of the leaders of the labor unions, and would, of course, put a stop to all plans of scientific management or the introduction of the premium or piece-work system of paying for work and is against the interests of both the employees and the government. The array of expert testimony presented by the magazine in defense of this position, while imposing and impressive, was really not necessary to show the pernicious character of the bill. As Mr. Edison points out, the worst enemy of all workers is an inefficiently managed shop, yet the labor leaders cannot comprehend the fact. We trust that an effective protest will be made in Congress against the passage of this reactionary bill.

DAMAGE FROM ELECTRIC RAILWAY FIRES

Need for safeguarding electric railway carhouses, car equipment, repair shops, power houses and other buildings with more adequate provisions for fire prevention and fire extinction is emphasized by the alarming number of conflagrations which have occurred within the last five months. During this period there have been reported in our columns eleven electric railway fires of serious nature, involving losses estimated at about $650,000. These disasters include the destruction of eight carhouses, one power house, ninety-eight cars and a number of miscellaneous buildings and equipment. The net loss to the companies affected is represented not only by the factor of lost property value not covered by insurance, but also by the larger loss involved during the period of reconstruction through revenue no longer earned by the destroyed cars, improper maintenance and depreciation of car equipment owing to lack of carhouse and repair shop facilities, and suspension of service owing to disabled power generating equipment. Considering the extent of the losses mentioned a more general adoption of fire-proof or fire resisting materials in construction, a more careful system of protection against fire hazards and a more widespread installation of fire-extinguishing apparatus certainly seem imperative.

FAKE ELECTRIC RAILWAY PROMOTERS

While the spurious electric railway promoter is not in the same class with the personal injury faker, he has, nevertheless, become equally noxious because he reflects upon the integrity of the electric railway industry and is a menace to its future development. The electric railway, as a mode of transportation, appeals to the laymen living in districts where steam railroad transportation is infrequent. Too often the desire for this improved transportation overcomes a community's better judgment, and the people fall an easy prey to irresponsible promoters. The awakening leaves an impression upon the community that is lasting, and in many instances has made it difficult for those who are responsible to obtain the confidence and support they should have to make a prospective electric railway a reality. Whenever these spurious promoters endeavor to deceive the public served by electric railways, the railway managements should make it their business to see that the promoter's irresponsibility is exposed. While it is true that the industry is standing still at this time, the condition is only temporary, and railway managers should at least fortify against the future. On the other hand, these spurious promoters, particularly in the Central West, have been most active during the business depression, and have sought franchise rights along routes which operating companies would seriously consider in more prosperous times.

"MANNERS MAKE THE (PLATFORM) MAN"

A field for work in promoting good public relations is furnished by the employees of the electric railway, particularly those in the transportation department. The number of individual patrons with whom the management can meet is relatively small, but each patron comes into contact with the platform men several hundred times each year. These are trite statements, but they suggest that in the selection of platform men proper attention should be given to getting men who are well-mannered as well as otherwise capable. One can talk indefinitely about courtesy, but talk won't teach courtesy to boors in any walk of life. And in a way, for the reason outlined above, it is just as important to have gentlemen on the platform as in the board room. There are two elements in good manners which are important on the platform; first, a desire to serve, and, second, dignity or composure. The first is a universally inherent quality, as can be proved by asking any chance pedestrian how to find a street or house for which one is seeking. Being inherent, this quality is capable of development even in grown men. Dignity is a trait difficult of acquirement by most people, who are apt to be irritable, or garrulous, or familiar, or servile, or something else undignified. It is doubtful if these faults can be entirely overcome in the adult. Men afflicted with them should not be placed in positions where they must meet, serve and often placate the public. Highly-polished manners are not necessary, indeed would be out of place, but surely a consistent effort should be made to get good material to begin with, and then to give due recognition to the men who are a real credit to the company.

ADVERTISING ELECTRIFICATION TO TOURISTS Effective publicity destined to stimulate tourist travel over its transcontinental lines is being utilized at present by the Chicago, Milwaukee & St. Paul Railway, following the completion of the initial electrification of its route over the Rocky Mountains. The days are passed when a change in motive power from steam to electricity could possibly be regarded only from the engineering standpoint. The traveling public is interested in a big task of this kind, involving the electrification in due course of nearly 500 miles of main line, the use of the most powerful electric locomotives ever built, and the supply of power from mountain streams. Even the broad principle of regenerative braking strikes the imagination of the reflective passenger, and the better maintenance of schedules, smoother riding caused by greater evenness of speed, enhanced comforts due to greater cleanliness, and the improvement of views from car windows and observation platforms, due to the elimination of smoke and cinders, are real "talking points" for the railway passenger agent. More and more the interrelation of all departments of a modern transportation company and their combined influence upon the patronage of the public is coming to be recognized. The use of electric power means much to the comfort of the passenger, and the company is wise in expatiating upon its advantages. There is a lesson for the smaller electric railway in this telling advertisement by the St. Paul of new facilities, which will undoubtedly play its part in directing patronage to that progressive system.

VIBRATION THEORY OF RAIL CORRUGATION In the issue of last week we published an abstract of the somewhat radical ideas on rail corrugation recently put forward by A. Meyer, of the Greater Berlin Street Railways. His theory to the effect that corrugation is due primarily to high-frequency vibrations in the rail (which thus acts like a banjo string) has logical grounds, at least, because the extraordinary regularity of most corrugations gives evidence that vibration must exist somewhere. Mr. Meyer does not deny the existence of contributory causes for the phenomenon, being in accord, as a matter of fact, with R. C. Cram in his belief that the shape of the rail head has an appreciable influence. However, his suggestions for obviating the difficulty are aimed solely toward the elimination of such rail vibrations as may produce waves of sufficient amplitude and frequency to cause displacement of metal in the rail head wherever the wheel strikes the crest of one of them. This answer to the baffling problem of corrugation will, no doubt, be of interest to way engineers, and the proposed remedy of having so flexible a track construction that the vibration period becomes too long to cause severe impacts is well supported by practical experience. On the other hand, the theory, taken in its entirety, is not without weak points. Carried to its logical conclusion it would mean that the worst condition which could prevail would be a rigid track (to produce the greatest severity of vibration) and hard wheel treads (to produce the greatest displacement of rail metal). Such a condition might be considered to be presented by the concrete track supports and chilled-iron wheels that were common some years ago, yet at that time corrugation was apparently less of a problem than it is in the present day, when relatively soft steel wheels and flexible track are more common. As the first book devoted entirely to the exposition of one theory of rail corrugation the publication is interesting. We do not believe, however, that it will accomplish very much in settling the controversy. What is needed is less theory and more actual proof.

"COMING BACK LIKE REAL MEN"

Another great corporation, the Du Pont de Nemours Powder Company, has shown its wisdom by establishing a publicity department. This has been done within the past month. It is, however, with respect to an earlier activity of the same company that its policy affords a suggestion of value to the electric railway fraternity. This activity became known in connection with the trial in New York of a suit for libel brought against the Du Pont company by one of the magazine muckrakers whose name is more or less familiar to the public.

The magazine man got hold of a contract between the Du Pont and a German concern which he construed as an agreement to sell to or exchange government secrets with Germany. The contract was so represented in the articles published in *Harper's Weekly*. Our government was cognizant of the terms of the contract, and the Du Ponts might have disregarded the attack without any more serious consequences than injury to the feelings and reputation of its officials. Instead of ignoring it, however, the company wrote a letter to magazine editors and newspapers setting forth the facts of the case and intimating that the author of the articles in question was not a writer whose productions were desirable to publish. It was on this latter statement that the author sued for libel. The judge took the case from the jury and decided for the Du Pont company, remarking that the statements made in *Harper's Weekly* were libelous *per se*, and that the defendants were "real men for coming back at him as they did."

The application of this incident to the affairs of electric railways is obvious. Instead of letting "libels *per* *se*" go unanswered or failing to call their authors to account, every criticism should be answered so effectively that it will not be repeated. In a short time the result of such a policy is to make editors chary of any attack unless they have an unanswerable, or at least a thoroughly investigated, case against the corporation. This is not a theory; it is the practical and proven outcome of nailing every lie that is printed, or, as the judge who tried the Du Pont case said, "coming back" like real men.

Further proof of the practicability and wisdom of such a policy is found in the system adopted recently by John D. Rockefeller, Jr. Every published criticism of the Rockefellers or Rockefeller institutions is answered by a personal letter, accompanied by such data or evidence as may be necessary to show that the criticism or misrepresentation was unjustified. No publication, however obscure or innocuous, is overlooked. If the Red Dog (Ariz.) *Banner* says that the Rockefellers are grinding the faces off the employees of the Bayonne refinery, Mr. Rockefeller writes the *Banner* editor at once with full particulars. The same care is taken respecting such remote charges as that John D., Sr., stole the first dollar he ever had from a blind apple-seller in Cleveland. If such a policy is found necessary and desirable by Mr. Rockefeller regarding attacks which can do him and his interests no real harm, it is vital that electric railways should answer effectively the kind of attacks which really are injurious because they reach the minds of tens of thousands of customers, voters and jurymen.

Action of the kind which we have in mind is instanced by the letters to the *Saturday Evening Post* by W. T. Waters and John A. Beeler, as published in recent issues of this paper. These letters were sent in answer to an editorial criticism of rush-hour car service in that paper and should do a great deal to help hasten an era of more fair-minded journalism. This tendency seems already to have begun in the magazine field, where the popularity of the exposé article, although by no means obsolescent, appears at least to have passed its zenith, owing to an increasing consciousness and dislike of exaggeration on the part of the readers. Nevertheless, many editorial writers in the daily newspapers continue their refusal to weigh evidence in a patient and judicial manner, either because the rush of time and competition incident to daily paper journalism prevents their collecting sufficient data or because they are slaves to a predetermined policy or prejudice which is deaf to facts.

By inaugurating an untiring follow-up system of publicity, as advocated by Mr. Waters, company spokesmen can, to their great ultimate advantage, wield an important influence. The press will gradually regard the chance of being "scooped" on a superficial comment as less dangerous than the fear that unless they give their half-baked, although sincerely written editorials more thorough attention in the oven of investigation the reading public will file their subscription blanks in another part of the stove.

THOMPSON COMMITTEE RECOMMENDATIONS

Although the Thompson committee has not yet completed its investigation, a draft of some of the recommendations made to the present Legislature was published this week. Among the recommendations perhaps the most important was a proposed division of the work of the present Public Service Commission for the First District. According to the plan, the work of supervising the construction of subways in New York would be put in the hands of a new commission, leaving to the present body its present regulatory powers over the public utility companies. Undoubtedly, the work of supervising subway construction in New York, superimposed upon the other regulatory work of the commission, constitutes a tremendous task and gives emphasis to the suggestions made in the last annual report of the American Telephone & Telegraph Company by President Vail that one of the dangers of utility regulation is an overworked commission which cannot give proper attention to all the matters which come before it. We do not believe, however, that it would be at all wise at this stage of the work to divest the Public Service Commission of its powers and duties in the oversight of the construction of the subway systems now being installed in New York. Four years ago the question might have been different, but the work of planning and design is now largely over, and the commission has a large staff of engineers to supervise the actual construction. A change now would not only delay the completion of a work which will be of great benefit to the city, but it would result in a division of the responsibility for the entire work after it is finished, which would be exceedingly detrimental. The old proverb about not changing horses in mid-stream applies here with particular force.

Since it secured its new lease of life about five weeks ago, the Thompson committee has accomplished very little in throwing new light on the conditions surrounding the making of the present subway contracts to which it has been giving the greater part of its attention. Everyone knows that in the negotiations preceeding the final contracts, various plans and the methods by which they could be financed were discussed between the representatives of the city, on the one hand, and the interests back of existing systems, as well as with other financiers, on the other. Some of these plans reached the stage of public discussion and some did not, but all were rejected as inadequate. Therefore, we can see no benefits in resurrecting them now and speculating as to whether the city would not have been better off if one of them had been adopted. The present plan, it is true, makes each of the railway companies in a sense a preferred partner in its undertakings with the city, but this condition was thoroughly understood at the time by both the representatives of the city and the public at large. We do not believe that any mistake was made, but if there was the work cannot be stopped now and negotiations re-begun, and if this is the case, why spend time in discussing plans that were abandoned?

Electric Operation on the C., M. & St. P.

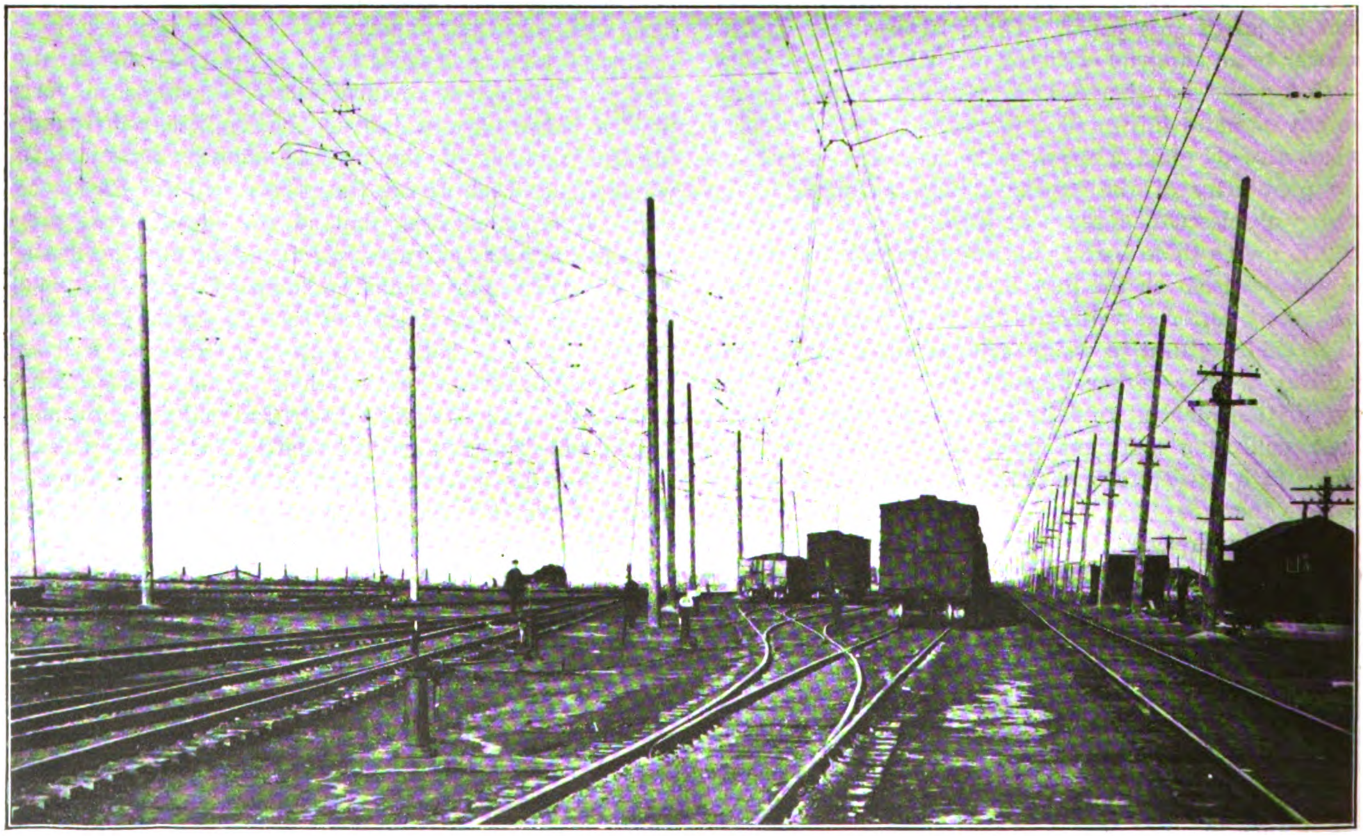
Operation of the First Engine Division of the Electrified Zone Has Been Going on During the Past Three Months with Thoroughly Satisfactory Results—Existing Shop Facilities Are Utilized for the New Equipment—No Changes in Track Construction Have Been Made

THE early stages of electric operation on the Chicago, Milwaukee & St. Paul Railway have been remarkable for their freedom from operating difficulties of any kind. For more than two months all steam freight engines have been off the first of the four divisions to be electrified, and, in addition, electric locomotives have been regularly used to handle the fast transcontinental passenger trains "Olympian" and "Columbian." Until recently, nine electric engines have been doing all the work of the division, which extends between Deer Lodge and Three Forks, but a total of twelve locomotives is to be provided ultimately, and all of these not now in actual service are en route from the General Electric Company's plant at Erie, Pa. This number includes two passenger engines and two freight engines that are equipped with lighting sets and oil heaters for supplying passenger trains with steam heat in case the locomotives are called upon for passenger service. The lighting sets consist of motor-generators that transform the 3000-volt current in the contact wire to 125 volts, this reduced voltage being required for charging the storage-batteries of the regular train-lighting systems, which operate at 86 volts.

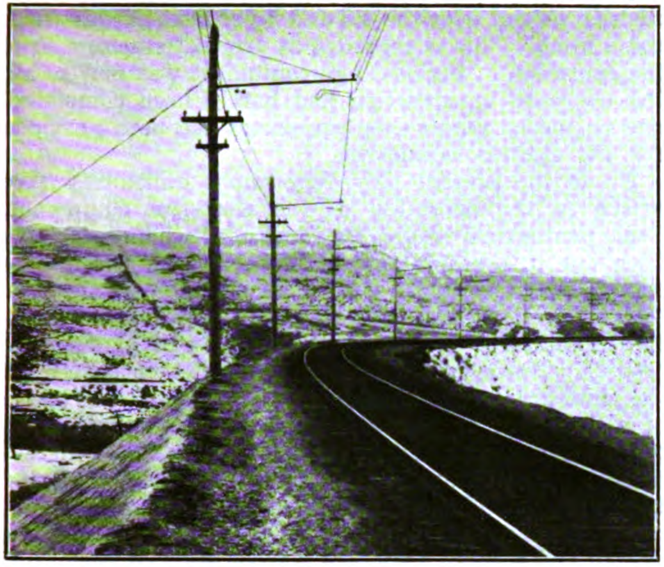
On the division at the eastern end of the zone, adjoining the Deer Lodge-Three Forks division, the overhead construction has been in place for some time, although power has not been permanently turned on to the line, and this recently enabled the electric equipment to demonstrate its possibilities in a decidedly novel manner. Early in February, during a very severe cold spell, three steam locomotives of the Mallet type were caught on a siding some miles east of Three Forks and died there. To get these engines into the roundhouse at Three Forks, so that they could be thawed out and returned to service, it was decided to turn power on to the overhead contact system east of Three Forks so that an electric engine could go out onto this division and haul in the three dead steam machines. This was done with so much success that a second trip was made for two other engines which also had died upon an outlying siding.

A prominent feature of the early operations has been that the train speeds have been very materially increased. The electrically operated freight trains make the run of 115 miles between Three Forks and Deer Lodge in seven and one-half hours, whereas, under steam operating conditions which formerly existed, the schedule time was between twelve hours and fourteen hours. Electric operation with passenger trains is equally successful, and it is not unusual for the fast train "Olympian" to make up as much as forty-five minutes in the run of 115 miles in case it reaches the electric zone somewhat behind time.

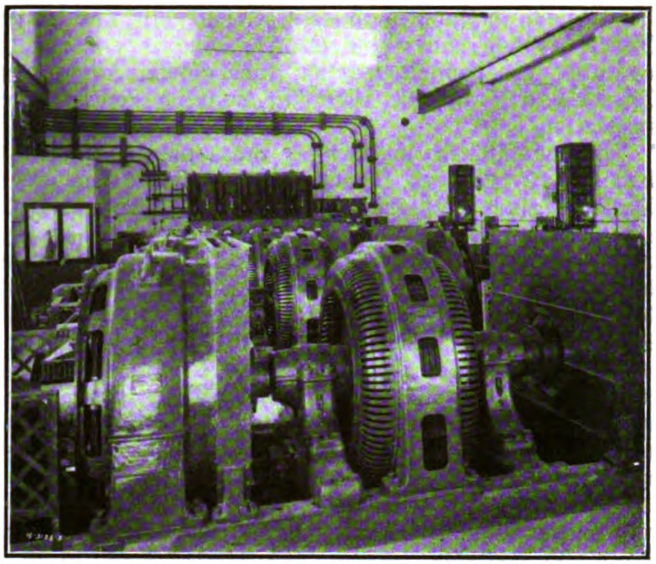
Since electric operation was inaugurated, some three months ago, there has been a complete absence of difficulty of any kind in connection with the equipment,



ST. PAUL ELECTRIFICATION—VIEW OF EAST BUTTE YARD SHOWING ABSENCE OF FROGS IN OVERHEAD CONSTRUCTION



ST. PAUL ELECTRIFICATION—TYPICAL TRACK CONSTRUCTION IN ELECTRIC ZONE



ST. PAUL ELECTRIFICATION—EXTERIOR OF TYPICAL SUBSTATION IN SUBSTATION

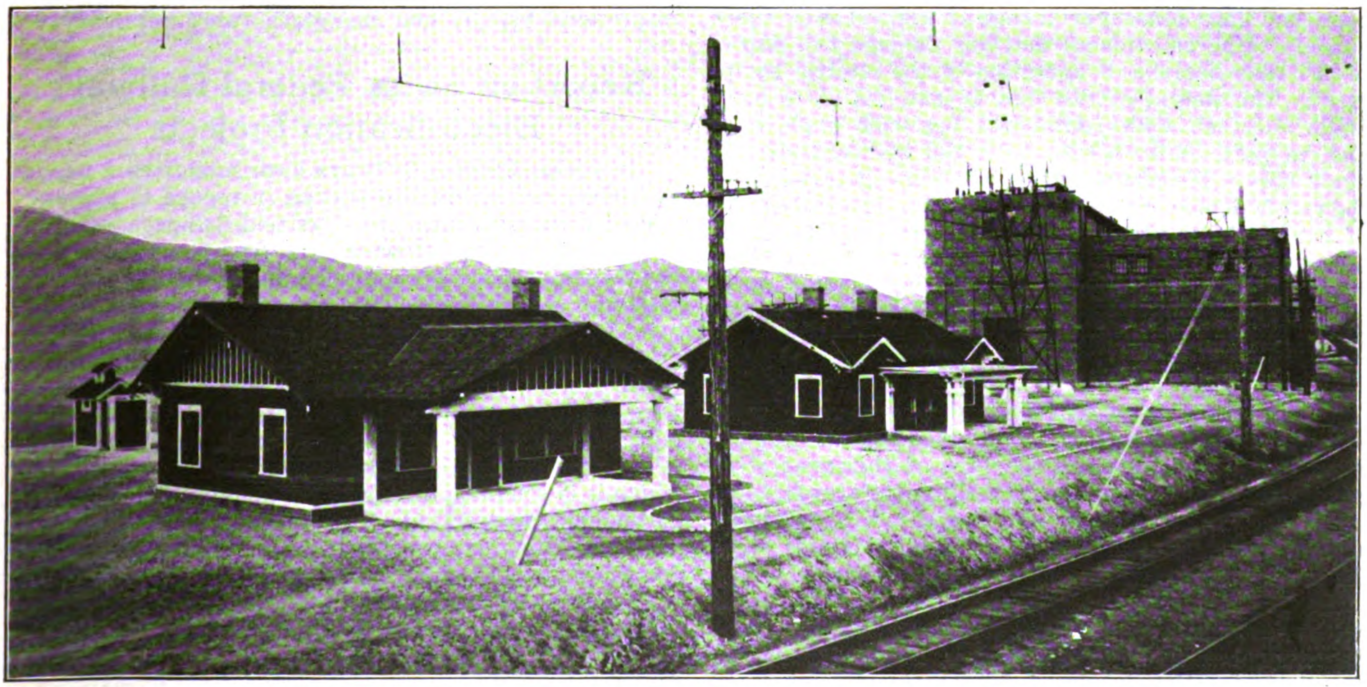
including the new apparatus for regeneration. The overhead contact system is never even mentioned. For this, it may be said, there has been introduced the somewhat unusual plan of having the current collection made by the contact of copper on copper, elaborate tests having demonstrated that, under the existing conditions, this combination was better than steel on copper or steel on steel. The copper pans on the pantographs are lubricated with grease.

Another feature of the overhead construction, which is equipped with double contact wires, is that no frogs are used anywhere on the entire 440 miles of electrified line, and this makes the contact system exceptionally flexible so that arcing between the pantograph and the contact wires is literally negligible. One of the accompanying illustrations shows the manner in which the frogs for turn-outs on the contact wire have been eliminated at the entrance to a yard.

Satisfactory progress is reported in the equipping of the three other divisions that go to make up the complete electric zone. All of the forty-three electric locomotives that will ultimately be operated will be shipped before next November, and, according to present expectations, the complete installation will be in regular operation by Jan. 1, 1917, the Missoula division, lying west of Deer Lodge, being scheduled for complete electric operation during the coming summer. At the western end of the electric zone the six substations will be completed within a few months. The overhead wiring for the 152 miles of route between Deer Lodge and the town of St. Regis has already been erected, leaving only 55 miles of overhead construction between St. Regis and Avery, which should be equipped before the coming summer, to complete the western end of the electric zone.

UTILIZATION OF EXISTING FACILITIES

For the repairs of the electric locomotives there have been utilized so far as is possible the facilities existing prior to the introduction of electric operation. All heavy repairs are to be made at the shop at Deer Lodge, and running repairs and inspections are now



ST. PAUL ELECTRIFICATION—EXTERIOR OF TYPICAL SUBSTATION AND OPERATORS' BUNGALOWS being made in the roundhouses at that point and Three Forks. When the whole electric zone is electrically operated, the roundhouses at Harlowtown, Avery and Missoula will also be used for running repairs and inspection.

The roundhouses at each of these points originally had 110-ft. stalls so that they could house the large Mallet engines that are in service on the several divisions. Recently these stalls have been extended by the addition of vestibules to make them 120 ft. long, this length being sufficient to house the electric locomotives. No changes have been found necessary for the roundhouse turntables, since these were originally 115 ft. long. The electric locomotives move onto the turntable at the Deer Lodge shops under their own power, and thence into the roundhouse stalls under power from a low-voltage circuit. The turntable is electrically operated, using 220-volt current, and mounted in the turntable cab is an additional controller from which current at the same voltage is supplied to the locomotives. From this controller a reel pays out the lead running to a socket which has been connected up with the contactor panel on the locomotive, and which is readily accessible from the turntable platform. This plan for using electric power to and from the stalls was developed at the shops after a cable and steam-operated winch had been used for some time.

Since the inauguration of electric operation it has become evident that most of the heavier machine tools with which the roundhouses on the electric zone are equipped will be unnecessary when the entire service is handled by electric engines and the steam locomotives have been taken off all four engine divisions which go to make up the complete electric zone. In consequence, a number of these tools are to be moved to the shop at Deer Lodge, where, as mentioned before, most of the heavy repairs to electric locomotives will be made. However, all of the roundhouses that will be used for inspections and running repairs are built with drop pits so that they will serve for making heavy repairs to the running gear of the locomotives in case an emergency makes that necessary.

No changes are contemplated in the track construction that is used within the limits of the electric zone, and, after nearly three months of operation of the heavy electric locomotives, including those which have been handling passenger trains at high speeds, there appears to be no evidence that any damage will accrue to the rails because of operation of the electric equipment. The weight of rail that is installed is, in part, 85-lb. A.S.C.E. with continuous four-bolt angle bars and, in part, 90-lb. A.R.A. with 100 per cent six-bolt angle bars. Tie plates are installed on all curves, and the rail is double spiked on the outside. The rail joints, of course, have been bonded, the bonds being of the pin-driven type. These are 35 in. long and of 250,000 circ. mil capacity, the pin-type bond having been adopted merely for convenience in installation on the existing track.

OPERATING NOTES

A representative of this journal who recently went over the electrified portions of the road reports that the operating difficulties since the first of this year were greatly increased by the fact that temperatures down to 40 deg. below zero were experienced, snowstorms blocked the lines, and during the highest water since the road opened a main-line bridge was burned. The congestion due to operating difficulties was increased by the fact that freight traffic doubled in the month of February, but in spite of unfavorable conditions the electric locomotives replaced fifteen steam engines in regular service over the 1.6 and 2 per cent grades without a hitch. This is regarded as very satisfactory since the operation of high-voltage equipment was new to all, the overhead construction had barely been completed, and no special repair shop equipment had been provided for the electric locomotives.

Up to the present only very minor difficulties have arisen in the operation of the electrical equipment. Some pantograph trouble has developed which may have been due to the fact that it has not been possible to establish and maintain clearances perfectly at the outset and partly because the operators have not had sufficient experience to foresee the dangers of pantograph trouble. However, no change in weight or design of the pantographs has been deemed necessary. The cause of a flash-over or burn-out which occurred recently in one of the motor armatures has not yet been determined; the armature is now being stripped at the Deer Lodge shops. This accident was not at all serious, because on the next trip to the roundhouse the trouble was located and a spare armature was substituted with only a short layover.

Experience thus far at the Deer Lodge shops would indicate that when electric locomotives have entirely replaced all steam engines handled at this point, the reduction in the shop force will be about as follows: boilermakers, 98 per cent; blacksmiths, 60 per cent; machinists, 20 per cent. At present the shop attendants provided especially for the electric locomotives include three crews, each consisting of three electricians and three helpers.

No difficulty was experienced in developing within a short time proficient crews for all of the electric locomotives from among the local men formerly handling steam equipment. The new men, however, are not put in charge of a locomotive until they have passed a thorough course of training, have become particularly proficient in the location of trouble, and have demonstrated a thorough understanding of the wiring systems which are employed.

Since the regular operation of electric trains began about the middle of January not one of the electric locomotives in regular service has been laid up in the shops for more than a day at a time. In fact, they have been needed constantly for service, and there have been only the brief periods between runs in which to make such inspections, repairs and changes as were necessary.

Report on Swiss Federal Railways Electrification Projects

The Swiss Federal Railways have submitted a report to the Council of Administration in regard to the suggested electrification of the Erstfeld-Bellinzona section of the St. Gothard Railway. It is first pointed out that the three-phase system would be unsuitable for the purpose in view, while the advocates of direct-current operation based their contentions on experience with lighter trains and pressure far below 3000 volts. The single-phase system, which is already employed on the Lötschberg Railway, can now be recommended for adoption without reserve. The report also discusses the problem of uniformity in the form and frequency of current which it is sought to attain in the distribution of energy throughout Switzerland. The Amsted and Ritom power stations, which are proposed for the supply of current for the Erstfeld-Bellinzona section, will be able to furnish energy not only for this section but also for the whole line from Lucerne to Chiasso, the electrification of which, it is now understood, will not be long deferred.

Proceedings at A. R. E. A. Convention

A Clearance Diagram for Structures and Reforestation for Timber for Ties Were Among the Subjects Discussed—New Officers Elected

ABSTRACTS of a number of the American Railway Engineering Association's committee reports which were of special interest to electric railways were published in the ELECTRIC RAILWAY JOURNAL for March 25, and the action taken by the association on their various features is set forth in the following paragraphs.

The convention was opened by the president of the association, Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines west of Pittsburgh, with an address in which he reviewed the progress of the year. Following the reports of Secretary E. H. Fritch and Treasurer G. H. Bremner, the committee report on signals and interlocking was presented. This was largely a report of progress, and it was accepted without discussion.

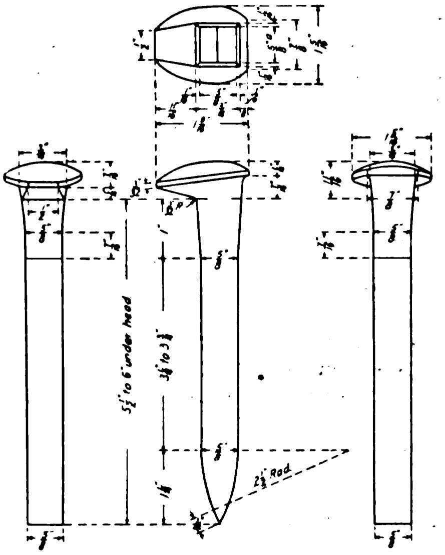
Track construction and flangeways in paved street crossings and in paved streets, which were subjects considered by the committee on signs, fences and crossings, brought out a lively discussion. Some objection was raised to the standard construction recommended by the committee for street crossings, some of those who took part in the discussion being of the opinion that a more permanent form of construction was desirable, and others failing to approve the use of standard section rails laid in the horizontal position to form the flangeways. However, the proposed construction was finally adopted by the association for inclusion in the Engineering Manual.

At an evening session of the association held on March 21, Robert W. Hunt and C. W. Gennet, Jr., presented an illustrated paper entitled "The Nick and Break Test in the Inspection of Steel Rails." This called attention to the merits of the nick and break test, which was abandoned some years ago, as compared with the drop test which was substituted. Experience with the former test at the plant of the Algoma Steel Corporation, Sault Ste. Marie, Canada, gave conclusive evidence that it was a more efficient method of exposing interior mechanical defects than the test now required by the association's rail specifications. A large number of pamphlets containing this paper with illustrations were published and may be had from Robert W. Hunt & Company upon request.

Revised specifications for cross-ties were submitted by the committee on ties, and they were approved for insertion in the Manual with a few unimportant changes. In connection with the report of the commiteee on conservation of natural resources, L. A. Downs, general superintendent Illinois Central Railroad, took issue with the claims for reforestation in so far as railroads are concerned. A number of railroads have reported on the subject of tree planting, and after twelve or fifteen years have found the results of their work a dismal failure. Out of 270,000 trees planted by the Illinois Central Railroad near Du Quoin, Ill., fifteen years ago, as Mr. Downs put it, the company has a "crop of lead pencils and fence posts." In his opinion it took too long and was too expensive for railroads to undertake raising ties by reforestation.

The report of the rules and organization committee on clearances for structures, aroused more interest than any other topic discussed at the convention. In the beginning the discussion related largely to the question of whether a clearance diagram should be adopted at this time. The principal reason for adopting minimum side and vertical clearances at this time was pending state and national legislation which, in the opinion of many of the members, would impel the use of some minimum clearances whether the association expressed itself or not. The form and dimensions of the proposed clearance diagram were discussed at length, and revised dimensions adopted. G. W. Kittredge, chief engineer New York Central Railroad, New York City, opposed approving the diagram as originally submitted because it failed to take into account the adopted standard clearance lines for third-rail and permanent way structures in rolling equipment, and it was decided that the standard third-rail clearances should form the lower 24 in. of the general clearance diagram. The 8-ft. side clearance originally proposed was reduced to 7 ft. 6 in., or 15 ft. for the over-all maximum width of the diagram, and the vertical dimension fixing the overhead clearance line was made to read 22 ft. 6 in. from the base of rail rather than from the top of rail, as suggested by the committee.

A clearance of 13 ft. for parallel tangent tracks in new construction was then recommended by the committee and adopted by the association, attention being called to the fact that this clearance would have to be corrected for tracks on curves. To meet conditions where it would be necessary to encroach within the minimum clearance diagram, the committee recommended the following exceptions for new construction: 1. Grade crossing elimination work in cities. 2. Separation of grades in new construction work in cities or other restricted situations. 3. Loading platforms along side tracks, freight houses, warehouses, piers, etc. 4. Doors of engine houses and other buildings, the design of which makes the recommended clearances impracticable. 5. Coach or other yards where the available space is very restricted. 6. New work when the physical conditions make the recommended clearances impracticable. 7. Platforms at coach-floor level in subways and other similar situations. 8. Overhead clearances on track used exclusively for passenger service. 9. Other special situations requiring special clearances. These exceptions were approved by the association. This committee also submitted a number of special recommended clearances for equipment such as switch stands, signal stands, water columns, tanks, coaling stations, etc., which conformed to the minimum clearance requirements.



PROPOSED STANDARD CUT SPIKE (REVISED DRAWING)

In connection with the design for cut spikes which was submitted by the committee on track, the chairman called attention to the fact that the wrong design for cut spikes had been printed in the bulletin, and submitted a sketch of the cut spike which the committee recommended for approval by the association as standard. The sketch shown herewith replaces the one printed last week. Owing to this fact the adoption of the standard cut spike by the association was deferred until the next annual meeting. The revisions of the existing specification relating to the physical properties and tests, were then approved by the association. At the close of this committee report it was recommended that it take up the question of the limit of safe wear of rail on curves and the extent to which the various standards adopted by the association are being used. The new definition for dense and sound Southern yellow pine submitted by the special committee on grading of lumber, was adopted after brief discussion. The tentative grading rules for hemlock lumber, which were submitted at the 1915 convention, were also adopted by the association as standard practice. Owing to the limited time for consideration the approval of the specifications by the committee on rail for medium carbon-steel track bolts with nuts, quenched alloy steel track bolts and nuts, and for quenched carbon and quenched alloy steel joint bars was deferred until the next annual meeting.

At the close of the session Secretary Fritch announced that the following officers had been elected for the ensuing year: President, A. S. Baldwin, chief engineer Illinois Central Railroad; first vice-president, J. G. Sullivan, chief engineer Western Lines, Canadian Pacific Railroad; second vice-president, C. A. Morse, chief engineer Chicago, Rock Island & Pacific Railroad; treasurer, George H. Bremner, district engineer, division of valuation Interstate Commerce Commission, and secretary, E. H. Fritch. On the evening of March 22 the annual dinner of the association was held in the Gold Room of the Congress Hotel. President Trimble acted as toastmaster, and addresses were delivered by Hon. Rodolphe Lemieux, ex-postmaster general of Canada; J. A. Brashear of Pittsburgh, Pa.; A. W. Brunner, architect, New York City, and the Rev. Allen A. Stockdale, Toledo, Ohio.

Railway Signal Association Meeting

The Feature of the Proceedings at Chicago on March 20 Was an Elaborate Study of the Various Indications Provided in Three Standard Schemes of Signaling

At a stated meeting of the Railway Signal Association held at the Auditorium Hotel, Chicago, on March 20, 1916, a number of committee reports were presented and discussed, among them being one by the committee on signaling practice in which there was submitted an analysis of the meanings of commonly-approved signal indications. The analysis covered in particular the aspects involved in the three schemes of signaling that previously had been presented to the association, and the committee discussed in detail the purpose of each of these aspects and the consequent action required of the engine-man. In the report the text was elaborated by a complete set of diagrams illustrating the various conditions involved.

The first of the three schemes covers the simple form of indication given by a single semaphore arm or light on a mast, by means of which can be given the three fundamental signals, namely, stop, proceed with caution, and proceed. Scheme No. 2 is a development of the former which is provided primarily for the purpose of covering medium-speed movements and low-speed movements by means of an additional arm or light upon the mast. Scheme No. 3 includes the fundamental indications of the first scheme as well as those given by the additional arm required in the second scheme, but in addition, by the use of a third arm of short length, it provides for two indications in connection with movements at each of the two limited speeds, one requiring a train to proceed with caution and at the same time not to exceed the specified speed, and the other restricting the movement in no way except as to speed.

The aspects for the stop indication are essentially the same in all three schemes; that is, all arms on the mast, whether there are one, two or three, are horizontal. The action required is that the train should be stopped before its front end passes the signal. If the signal is distinguished by one or more of the approved designations, such as a number plate, a red marker light below and to the left of the active light, or the use of a pointed blade, thus identifying the signal as intended for use under automatic block system rules, the train may proceed after stopping. Otherwise the train must remain stationary until either some open indication is given, or else movement past the signal is authorized in a prescribed way.

The aspects for the indication, proceed with caution, are also essentially the same in all three schemes; that is, the arm at the top of the mast is in a diagonal position and any other arms on the mast are horizontal. Under the caution indication it is not necessarily the case that a train should be so run that it can be stopped at the known location of the next signal. Because of unavoidable close spacings of signals it is sometimes necessary to give the caution indication at each of two or more signals in the rear of the point where the stop is required, so that a train receiving the indication at the first of such a series of signals will have stopping distance before reaching the stopping point.

The aspects for the proceed indication also are essentially the same in all of the three schemes; that is, the arm at the top of the mast is in vertical position and any other arms on the same mast are horizontal. The action thus permitted is that the train shall proceed under no restriction that might otherwise be indicated by the signal.

In schemes Nos. 2 and 3 the several indications relating to slow-speed and medium-speed have been applied to the control of speed rather than to routes because complete and satisfactory route signaling at interlockings is impracticable and because definite limitation of speed on routes leading over turnouts or crossovers is essential for safe operation. In these schemes, two limits for the speed were introduced because a single limited speed would necessarily have to be low enough to insure safe movement over the shortest turnouts and crossovers generally installed at interlocking plants on the particular road. However, turnouts and crossovers are not all in one class as to the safe speed for movement over them, and therefore it was recognized that provision must be made for signal indications relating to at least one intermediate limit of speed. To this the general term "medium speed" has been used in the wording of the report, so that each road may specify for it any actual rate of speed that suits its own conditions.

In scheme No. 2 the indication, proceed at low-speed, wherein the upper arm is horizontal and the lower one diagonal, requires the train, when passing and proceeding beyond the signal, to move at such a low rate of speed as conditions may require through the low speed territory, this being generally the territory covered by the limits of the interlocking. Beyond that territory the speed must continue to be governed by the conditions, so that the low-speed indication is the caution indication of scheme No. 1 with a low-speed limit added.

The indication, proceed at medium speed, wherein the upper arm is horizontal and the lower one vertical, is primarily to limit the speed to the prescribed rate and it goes without saying that in a particular case lower speed must be required by conditions having nothing to do with the signals. However, in the absence of any restricting conditions aside from the signals, a train receiving the medium-speed indication is free to proceed at the specified rate throughout the territory covered by the indication, and beyond that territory to increase its speed unless it is restricted by another signal. When a signal gives the medium-speed indication the distant signal in the rear must give the caution indication so that a train which must not exceed medium speed when passing the medium-speed signal will not reach that signal unchecked.

Quite frequently there is but one route for movement over which the medium-speed indication of scheme No. 2 is given at a particular signal. The indication is then practically a route indication also. But if there are two or more medium-speed routes beyond a certain signal the indication, of course, gives no clue to the particular route that is set up. In such cases the control of the signal should be so complete that the medium-speed indication cannot be given unless the route set up is clear for such a distance that a train can safely enter it at medium speed and still have room for stopping after the engineman discovers that the train is on the wrong route.

With regard to the dwarf signal in either scheme No. 1 or No. 2 it may be said that this must be approached with caution by all trains. Consequently the caution indication requires a train to proceed with caution at the signal, or at such low speed as conditions beyond the signal may demand. It is a proper indication for low-speed movement over turnouts or crossovers. The proceed indication should not be given at a dwarf signal when speed is restricted unless the restriction is permanent and affects all movements governed by that signal.

In scheme No. 3 the limited-speed indications have been elaborated by adding to the familiar terms "proceed with caution" and "proceed" the words "on low-speed route" or "on medium-speed route," which make it clear that when the train is to go, the speed is limited to low-speed or medium-speed. Of these indications, the one permitting a train to proceed with caution on low-speed route, which is indicated by a diagonal position for the short lower arm and horizontal upper arm or arms, is used to govern movements over low-speed routes to main tracks with the current traffic when conditions do not permit unrestricted movement at low-speed, to govern movements to sidings and to main tracks against the current of traffic, and to govern closing in or permissive movements. The indication, proceed on low-speed route, is made when the short lower arm moves to vertical and it provides for no restriction by signals other than that of speed. Under this indication the speed may be increased as soon as the train is through the territory covered by the indication. The principal use of the indication is to permit heavy trains to pull through low-speed turnouts or crossovers to a clear main track with the advanced signal, where there is one, at caution or proceed. When a signal gives either of these low-speed route indications the distant signal in the rear should be at caution.

The action required by the indication, proceed with caution on medium-speed routes, which is given by horizontal top and bottom arms and diagonal middle arm, is that the train shall proceed with caution through the territory covered by a caution indication on the track reached by the medium-speed route. Except for closing-in movement, the indication is given for movements over medium-speed routes under any conditions that do not permit the indication, proceed on medium-speed route. The latter indication, in which the middle arm moves to vertical, is of exactly the same effect and is to be given under the same conditions as the medium-speed indication of scheme No. 2. It may govern to a signal in advance, giving the indication, proceed with caution on medium-speed route, when the conditions beyond are such that a train may maintain medium-speed up to that signal.

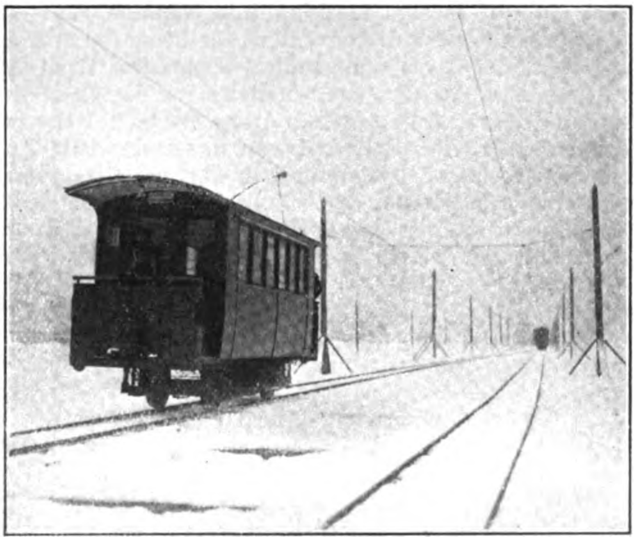
Still another indication is provided for under scheme No. 3, namely, reduce to medium-speed, given by a diagonal top arm and vertical lower arm or arms. Ordinarily the indication is given as a "medium-speed distance indication" when the signal in advance is giving one of the medium-speed route indications.

With regard to dwarf signals in scheme No. 3, the arm of the dwarf signal in the diagonal and vertical position gives the same indication for low-speed routes as the bottom arm of a high signal in the same position which has the arm or arms above it in horizontal position. The slight elevation of the arm and light above the track distinguishes the open indications of the dwarf signal from those of the one arm high signal. In this scheme, therefore, the arm of a dwarf signal may be in vertical position for movements over a low-speed turnout or crossover in any situation, provided, of course, that the indication, proceed on low-speed route, may properly be given under the existing conditions.

Electric Railway on the Ice

Temporary Tracks Laid on the Frozen Neva River in Northern Russia

IN the northern States in this country, winter is looked upon chiefly by the railway manager as the time when he has to keep his snow plows and sweepers ready for action and keep the tracks clear of snow for the operation of electric cars. In Northern Russia, however, winter affords an opportunity for temporary additional track construction. The accompanying illustration shows an electric car crossing the Neva River near Petrograd on the ice. Temporary tracks have been laid on the frozen surface of the river, and temporary poles have been erected to support the overhead system. Fortunately the winters are sufficiently long near Petrograd to make this form of construction worth while.



TEMPORARY TRACK OVER THE NEVA RIVER

Motors and Phase Converters on the N. & W. Locomotives

Structural and Design Details of the Induction Motors and the Induction Phase Converters Used on the 270-Ton, Single-Phase, Three-Phase Locomotives Which Have Been in Operation for the Past Ten Months Between Bluefield and Vivian, W. Va.*

By J. V. DOBSON

Railway Engineering Department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE power for the operation of the Norfolk & Western locomotives is delivered from the single-phase contact wire to the primary of the locomotive transformer at 25 cycles, 11,000 volts, and is there stepped down to 725 volts. At this voltage a phase converter changes the power from single phase to two phase and then, by means of the well-known Scott connection on the transformer, three-phase energy is supplied to the driving motors. There are four driving motors per cab or eight motors per locomotive, each having an hourly rating of 410 hp. and a continuous rating of 325 hp. at the rated voltage and at 14 m.p.h. The continuous rating at 28 m.p.h. is 375 hp.

The heavy freight service on mountain grades imposes very severe starting requirements. The specifications required that the motors should be able to deliver the maximum drawbar pull for a period of five minutes with the locomotive wheels at rest. Tests taken by a dynamometer car show that the motors are able to deliver 20 per cent in excess of this required starting tractive effort.

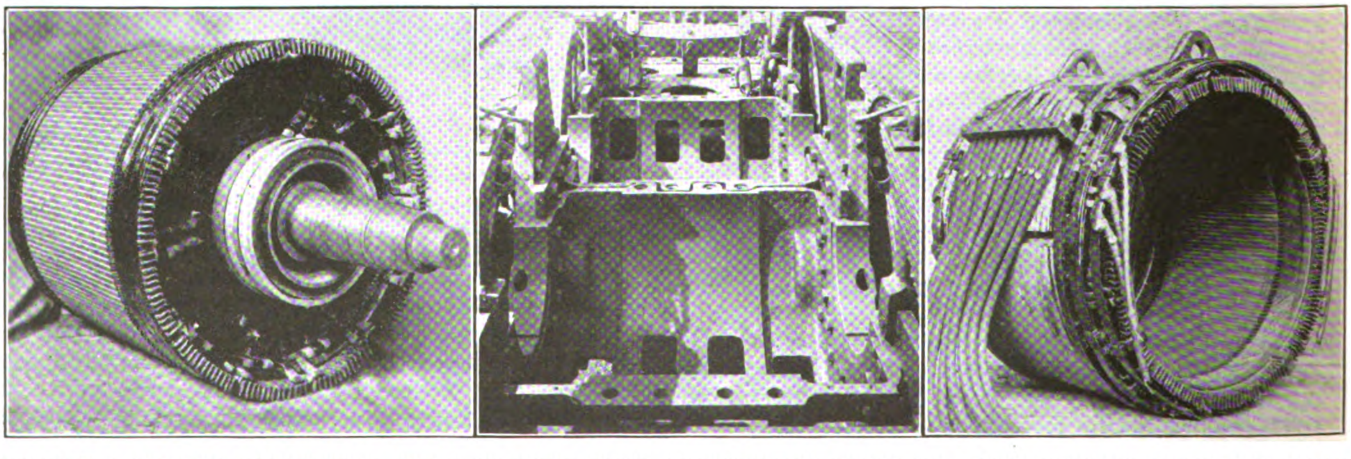
THE MOTORS

The motors are of the three-phase wound-secondary induction type, of rugged design to withstand the mechanical shocks peculiar to locomotive service. They are mounted in pairs in each truck, with the pinions of each pair of motors meshing into common gears.

In order to provide convenient facilities for overhauling the locomotives some radical departures from usual railway practice have been made in the design of these motors. Vertical lifts with a crane are by far the more convenient, as the crane operator has more control over the apparatus he is handling in vertical lifts than in sidewise movements; especially is this true in the handling of motors, where there is danger of damaging the insulation. With this in view, the cast-steel motor frame was made of semi-cylindrical shape and bolted permanently between the locomotive side frames. The stator, rotor and housings together are lowered into this frame and can be quickly and conveniently bolted into place.

The stator is turned to accurate outside diameter to fit the bore of the frame, and is held in place by two steel keys parallel to the axis and bolted to the motor frame. The stator punchings are built up on a mandrel and riveted between cast-steel end rings under hydraulic pressure. Longitudinal holes in the core provide suitable ventilating ducts. The stator winding is of formed diamond shape coils of strap copper insulated with a high-grade heat-proof insulation. Retaining rings on both the inside and outside of the end winding keep the coils rigidly in place. The wiring around frame details is securely clamped. The rotor core is assembled on a cast-steel spider with the standard dovetailing of punchings on the spider arms, and the punchings are bolted under pressure between end plates, designed also to serve as supports to the coil extensions. The rotor coils are placed in partly-closed slots and secured with fiber wedges. The end windings are banded to care for the centrifugal forces incidental to high rotor velocities. As two locomotive speeds of 14 m.p.h. and 28 m.p.h. are secured by pole-changing in both the rotor and stator, six collector rings are necessary, three at each end of the rotor.

Oil-ring lubrication of the motors is used. A cast-steel housing contains the bearing and provides suitable oil-well capacity, the housing cap being secured by four bolts. Split bronze bearings with babbitted linings are used. The upper half bearing has oil grooves and there are two oil rings, side by side, insuring lubrication even though one of the rings should refuse to turn, due to friction of the ring against the bearing wall. Bearing renewal is accomplished by removing the cap, raising the armature slightly in the air gap and turning the bearing on the shaft. In order to strengthen


NORFOLK & WESTERN LOCOMOTIVES—VIEWS OF MOTOR ROTOR OR SECONDARY, TRUCK AND MOTOR HOUSING AND WOUND MOTOR STATOR OR PRIMARY

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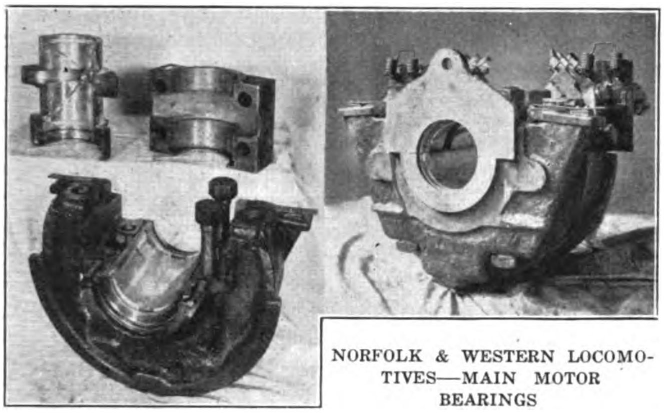
* This installation was described in detail in the issue of the ELECTRIC RAILWAY JOURNAL for June 5, 1915, page 1058.


NORFOLK & WESTERN LOCOMOTIVES—MAIN MOTOR BEARINGS

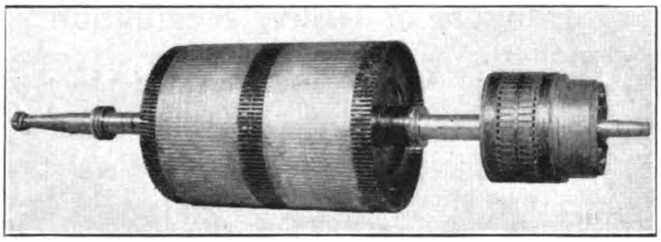
the windings against the injurious effects of deposits of coal dust, both rotor and stator are dipped in varnish and then baked, a process which very materially strengthens the insulation against voltage strains due to creepage. This is an important precaution because, as the locomotives operate in the coal fields, the pushing locomotive is frequently enveloped in clouds of dust from the tops of the cars, some of which is carried into the air ducts and deposited in the windings.

By means of longitudinal ducts in both rotor and stator, forced air is taken in at one end and exhausted at the other. With this method of ventilation there are no sharp corners such as occur with radial ventilation. The ventilating air is secured from a blower mounted on the shaft of the phase converter.

THE PHASE CONVERTER

To facilitate locomotive overhaul the phase converter is also designed to provide for vertical lifts. The phase converter, starting motor and blower fan are mounted as a unit, readily removable from the locomotive. It is also possible to remove all but the frame, leaving the latter bolted in place. Further, the fan, the starting motor stator and the starting motor rotor are each independently removable.

The converter frame is of simple construction. Since the machine delivers but little mechanical torque, the frame has only to carry the converter weight and to withstand the vibrations and shocks due to end thrust. The half-cylinder construction, therefore, is ideal for this service. The starting motor end is liberally ribbed to enable it to withstand locomotive end shocks. The frame is faced on the longitudinal center line; therefore it is possible to bore the stator seat, housing seats and starting motor seat with one setting on the boring mill. This provides for accurate alignment of rotors in the air gap.

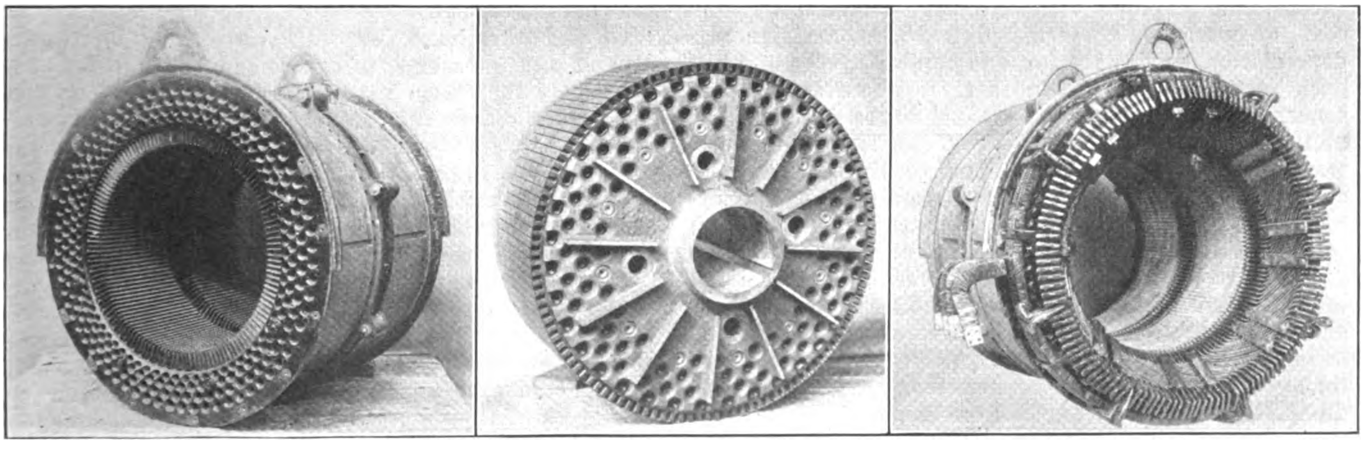

NORFOLK & WESTERN LOCOMOTIVES—PHASE CONVERTER ROTOR WITH STARTING MOTOR ARMATURE

It was proved by tests that for this particular type of machine central duct ventilation is both economical and effective. The problem then became one of building up a substantial stator core with suitable ducts without adding too much to the axial length, since this was a limitation in the design. The two halves are built up independently and riveted under pressure between cast-steel end plates. The end plates at the center have machine lugs, a lip on the one engaging a recess on the other which centers the two halves during assembly. In order to prevent flaring of the punchings, brass finger plates are used and, on account of the depth of iron, insulated bolts are used, properly spaced on a circle near the roots of the teeth. In addition, fish-paper U-pieces are placed at the ends of each slot to prevent the end of the iron from cutting into the insulation. A sheet-steel disk is placed between the two halves so that the exhaust air from one end will not oppose that from the other in the duct. The stator winding is securely clamped to enable it to withstand the locomotive vibrations and also the magnetic shocks incident to starting the converter, the bouncing of the trolley and peak starting loads on the main motors.

The rotor, like the stator, is in two halves built up separate and mounted on the shaft with proper slot alignment. The simple squirrel-cage winding of induction motors is used, the rotor bars being electrically brazed to the short-circuit end rings. The converter bearings have oil-ring lubrication, and they are of the split type, so that it is possible to remove them without disturbing any other part of the apparatus. It is evident that the rotor is of the simplest and most rugged design possible.

To check the air-gap, maximum and minimum air-gap gages are used. A cored hole is made in the frame at the proper radius and at the bottom. The gage is here inserted, a maximum gage for new bearings, and a minimum gage to indicate when bearings should be removed.

The starting motor is of the straight-series, commutator type so arranged that its brush-holder bracket, armature or stator can each be removed independently of any other part.


NORFOLK & WESTERN LOCOMOTIVES—VIEWS OF PHASE CONVERTER STATOR CORE, ONE HALF OF ROTOR CORE AND COMPLETE WOUND STATOR

Dangers of Utility Regulation

Theodore N. Vail Points Out Menance of Commissions Usurping Functions of Management—Advocates Control of Wages by Commissions

PURSUING his usual policy of discussing some public utility problem in the annual report of the American Telephone & Telegraph Company, President Theodore N. Vail, in the report for 1915, has turned his attention to the subject of control and regulation. In his opinion, control and regulation have done much to clear away the dangers of arbitrary action and unreasonable demands, both on the side of the public and on the side of utilities, but the experiences of the past reveal dangers that menace the success of the regulatory system.

There are dangers of too many independent boards having jurisdiction over the same questions, and of legislative bodies reassuming delegated jurisdiction, but the dangers which Mr. Vail discusses at most length are the possibilities that commissions may usurp the functions of management and that the multitudinous questions of detail, trivial and negligible, may crowd out the more important questions coming before regulatory bodies.

Deliberate consideration is impossible in an overworked body. Even the unsatisfactory practice of allotting questions to individual members for consideration and report, to be adopted as the opinion of the whole body, will not properly take care of the work. The inevitable tendency is that opinions and decisions are strongly influenced by, if not made by, minor officials and the clerical force. Mr. Vail states that many questions coming before commissions are of such notoriety and are surrounded by so much sensational assertion and misleading information that it is difficult for one not to be influenced in the formation of his opinion by a partial and often distorted presentation of the facts. In the settlement of such cases it is most important, therefore, that there should be abundant opportunity to get at the facts, and ample time for deliberate consideration.

The sole purpose of the creation of regulatory commissions, to Mr. Vail's mind, was to control and regulate, under the legislative power delegated to them. Their operation, therefore, should be strictly confined to control and regulation, and they should never invade the province of management. Management is inherent in ownership and is inseparable from the responsibility of ownership. The boundary line between management and regulation in many cases may be hard to define, but in a large majority of cases it can be determined with definiteness and precision.

Taking up the subject of wages, Mr. Vail says that the revenue of public utilities must be sufficient for all costs of operation, these including wages, maintenance, depreciation, reconstruction and capital charges. While each factor of cost is, in fact, as important as any other, and upon the whole expenditure depends the ability of public utilities to perform their functions, wages are directly personal and to them attaches a superior importance. Wages and conditions of employment should be such as will command the very best service at all times and should be so adjusted that there could be no dispute in respect to them that could not be settled without disturbance of the service. The only excuse for using the power and force of combination to obtain increase of pay, recognition of rights or bettering of conditions, was when increased net profits, due to low wages, all went to the employers.

Mr. Vail avers that where earnings are controlled, where surplus operating revenue after a reasonable return on capital goes back to the public in reduction of charges, in construction of plant for which no capital securities are issued, in improvements in quality or quantity of service, wages also should be controlled. Under existing practice the question of wages is a matter of internal arrangement, or in extreme cases a matter of arbitrary power or of reference to the arbitration of temporary bodies. When regulatory bodies consider costs and sources of revenue, they consider wages not primarily as to their sufficiency or equity, but in an inclusive way with other expenses to assure themselves that costs are not excessive. If these bodies were authorized to intervene in disputes where wages and working conditions were concerned, they would consider them concretely, as to both sufficiency and equity and as a dominant factor in adjusting revenues.

To gain objects or to enforce demands by combination and arbitrary action causing partial or total suspension of service, to the great inconvenience of the public, should not be possible. Such action on the part of utility employees, asserts Mr. Vail, is as unjustifiable and unpardonable as would be an arbitrary suspension of service by the utility. It is an exercise of arbitrary power, a disregard of the interests of the public, which should not be allowed in these days. Public service employees, nominally the employees or servers of the corporation, are the employees or servers of the public. The employees are by tradition regarded as part of the organization and subject to its discipline and control, but to a certain degree this has in some cases been nullified by combination. If this combination or the possibility of it is to be admitted, then so far as is necessary to preserve the right of the public to a continuous and dependable service, it should be under the same control and regulation by the same bodies that the corporation itself is under.

Mr. Vail states, of course, that if employees are to be controlled they should also be protected. In the past boards of arbitration have been the resort for protection when matters have come to an *impasse*, but special and independent arbitration bodies are temporary, do not possess and cannot appreciate all the factors, and, which is more important, have no responsibility for the effects of their decision on other interests. To adjust properly any question involving expenditure for any part, every factor in connection with the whole business should be considered—the revenues, costs or charges, and everything that affects these. This can be done properly only by one and the same body, which must have jurisdiction over all factors involved. Therefore Mr. Vail feels that the only logical body to regulate and protect public service employees is that which regulates the utility itself and has the responsibility to the public for this regulation.

On the other hand, Mr. Vail states, it is both unreasonable and impossible to expect employees to admit or appreciate the foregoing facts unless at the same time the public recognizes and observes its obligations or duties toward these employees. Courtesy on the part of the public is too often overlooked or forgotten, and too often the public fails to recognize in its bearing and action toward the employees any direct relation or any of those obligations that all employers should have toward those who serve them, and toward those who are, at least for the moment, in a subordinate position. Too often the attitude of the public toward utility employees is in unreasonable and undignified contrast to that which they should give and that which they do give to the employees of their immediate personal establishments.

Other Wisconsin Association Papers

Utility Legislation in Wisconsin and Outdoor Substations Were Among the Topics Discussed at the Milwaukee Meeting of the Wisconsin Electrical Association

THE proceedings of the meeting of the Wisconsin Electrical Association held in Milwaukee on March 16 and 17, together with abstracts of most of the papers, were given in the issues of the ELECTRIC RAILWAY JOURNAL for March 18 and 25. Abstracts of two more of the papers are given below.

Outdoor Substations

BY H. W. YOUNG
President Delta-Star Electric Company, Chicago, Ill.

The ability to serve large areas with electric power at a profit is now largely dependent upon the use of outdoor substations which tap existing transmission lines of power companies or interurban railways. There are hundreds of instances where substations of as small a capacity as 50 kw. are giving satisfactory service at a profit. Such service would be impossible from an economic point of view if it were necessary to construct buildings and use the type of equipment generally considered necessary five years ago. Practically every district traversed by a transmission line or interurban railway has possibilities for electrical development.

The outdoor substation usually comprises a wooden or steel supporting structure, a transformer bank and a simple set of switching, fusing and lightning arrester equipment. The load-break switches are so designed that all phases are simultaneously opened or closed by means of a common handle, which can be locked in either position. By means of arcing horns the main contacts are protected from burning at time of opening.

It is essential that the high-tension fuse be of such a type that it will instantly open or clear the circuit under short-circuit conditions, thus localizing a disturbance and preventing communication to the main line. That such fuse operation is possible has been demonstrated in hundreds of installations, a typical case being as follows: In a large 22,000-volt installation equipped with 60-amp. fuses, a direct short-circuit burned off two No. 4 copper lines and the fuses cleared this heavy disturbance without opening the main line oil switch set at two seconds. This is the class of protection secured with modern high tension fuses, and their use on outdoor substations absolutely insures localization of disturbances.

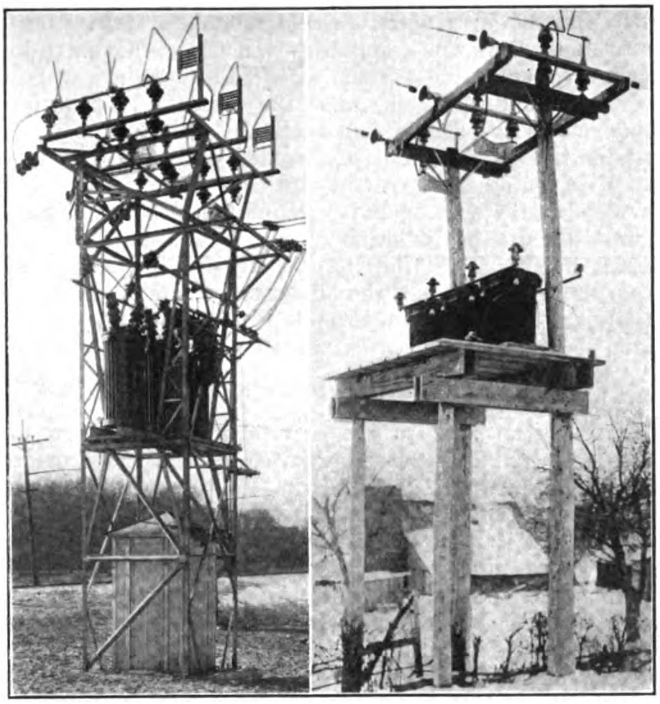
Every transmission line and the equipment connected to it should be safeguarded from lightning disturbance to a point where the increased cost of protective equipment would not be compensated for by the increased amount of protection secured. The small size and limited revenue of outdoor substations dictate the use of relatively simple and inexpensive arresters requiring minimum attendance and up-keep. These conditions, as a rule, result in the use of horn gap equipment.

The simple horn gap without resistance has a wide application and is giving very satisfactory results. Under abnormal conditions the use of this arrester, owing to its practically unlimited discharge capacity, may result in interruptions to service, although the disturbance can be localized by means of a fuse. On small capacity substations, however, an occasional interruption of local service is not serious and cannot be considered a criticism of the general service.

Where a limiting resistance is deemed desirable or necessary it can be easily installed and will limit dynamic current to ground. It should be so constructed that failure of a single resistance element will not open the ground circuit or disconnect the arrester from the line.

A type which has met with success is one in which the resistance is built up in steps, so arranged that it is successively cut in as the arc rises on the horns. Under light static disturbances the resistance is all in series with the discharge horns, but heavy disturbances can break to ground at the point where no resistance is in circuit.

That arresters should have a high discharge capacity and be equipped with more than one relief point to discharge excess pressures can be illustrated as follows: Assume that a boiler of a capacity requiring a 4-in. safety valve is equipped with but a 1-in. valve. When the pressure reaches a certain point the 1-in. valve discharges and blows off a certain amount of excess steam. However, if the generation of steam is continued at a greater rate than can be blown off by the 1-in. valve, the pressure will continue to rise until some other outlet is found. This point is demonstrated in lightning arresters having a limited discharge capacity, such as types with a straight series resistance to ground. While the horn gap type of arrester has certain limitations, it has high capacity and at the present time offers the best commercial solution of protecting the majority of outdoor substation installations.


TYPICAL OUTDOOR SUBSTATION ON STEEL AND WOOD STRUCTURES RESPECTIVELY

Both wooden pole and steel tower substation structures have certain advantages. Wood will continue to be used in many localities where it is easily secured and low in cost, or where the lowest possible cost must be secured. Steel tower stations are more permanent, have a better appearance and, under normal conditions, are but little more expensive than wood. When considering steel tower substations care should be taken to select a type which is so designed that the transformers can be quickly handled. This feature is now secured by the use of jib cranes and transfer tables on the platforms. It is now generally conceded that all steel or malleable iron elements of both towers and control equipment should be hot galvanized.

The following points regarding outdoor substations can be emphasized: They must be low in cost, be capable of increasing capacity by simply changing transformers and fuses and be so designed that local disturbances will not spread to the main lines, and they must give good commercial service.

Utility Legislation in Wisconsin

BY JOHN B. SANBORN
Attorney, Madison, Wis.

Not many laws were enacted by the Wisconsin Legislature of 1915 of importance to public service corporations. Perhaps the most important was the act to regulate jitneys. None of the legislation was apparently enacted in a spirit hostile to public service corporations. Both the companies and the public have to a very considerable extent accepted the principles of commission regulation, and the modern legislative tendency in Wisconsin has been to leave to the commission the working out of detailed problems of regulation of public service corporations. Such objections as were manifested to the principle of the commission regulation did not come from the public service companies but from certain municipally-owned plants and from the Socialists and the advocates of municipal ownership, many of whom seem to desire that the principle of commission regulation be discredited.

REGULATION OF JITNEYS

One of the new problems relating to the use of streets by public service corporations that confronted the Legislature of 1915 was that of the jitney. Most of the people of Wisconsin had never heard of a jitney in 1913, but by the middle of the session of 1915 the problem presented by this method of transportation had become acute. Not only were the jitneys crowding the other vehicles off the streets, but they were usually light and unsubstantial cars, operated by persons of no responsibility, and they were a constant menace not only to those who traveled in them but also to others who were using the streets. The public demanded regulation. The problem was, however, a difficult one. Many desired to leave this regulation with the cities, while others were fearful that the regulation would be too strict and that many jitneys would be forced out of business. Finally, Chapter 546 was enacted to take effect on Sept. 1, 1915.†

FINANCIAL LEGISLATION

Many of the public service corporations of Wisconsin are forced to look outside of the State for the financial assistance necessary for their promotion. The law relating to the status of foreign banks and trust companies operating in Wisconsin was somewhat confused prior to the last Legislature. It might have been asserted that they were required to comply with Section 1770b of the Wisconsin statutes relating to foreign corporations generally, but there were other provisions in the statutes which made it impossible for them to comply with that section if they so desired. The situation was cleared up by Chapter 26, which allows foreign banks or trust companies to do business in the State without being licensed, to loan money therein and to take, hold and enforce notes, bonds, mortgages or trust deeds given to secure money so loaned. The only requirement is that the bank or trust company must file a statement with the Secretary of State, constituting him its attorney for the service of process.

Prior to 1915 bonds of public utilities and street railways were not legal investments for trust funds in Wisconsin unless such investment was expressly authorized by the instrument creating the trust. Chapter 536 now allows the investment of trust funds in such bonds under various restrictions as to the size of the city where the utility is located, the earnings of the utilities and the maturity of the bonds. This act is not of great importance to the public service corporations, but it is a proper recognition of the financial strength of the securities issued by these corporations in the State of Wisconsin.

FRANCHISES AND HOME RULE

In spite of the theory of the indeterminate permit, the Wisconsin statutes prior to 1915 contained provisions for competitive bidding for municipal franchises by corporations to be based upon a proportion of the receipts of the utilities. These were, of course, entirely out of harmony with the public utility law, and they were very properly repealed by Chapter 254.

The fundamental principle of the public utility law that contracts between the public and the public utility corporations should not be for fixed terms, but should be indeterminate, so that the capital cost should not all be charged against the public during a comparatively brief term, was recognized by Chapter 490. This allows contracts for street and public lighting and heating for an indeterminate term if the prices for the services are subject to adjustment at intervals of not more than five years.

Chapter 366 exempts municipally-owned utilities in cities of less than 5000 from reporting to the commission in the detail required of utilities generally. This apparently unimportant act was the result of a great deal of agitation. Early in the session bills began to appear which exempted, more or less completely, municipally-owned utilities from the control of the commission. At first blush it would seem that such bills were of no interest to privately owned utilities. It was soon apparent, however, that they were of very vital concern. In the first place, a weakening of the control of the commission over municipalities would mean the unscientific operation of their plants with a false showing of profits or service furnished at less than cost. This would give opportunities for misleading comparisons between the privately and publicly-owned utilities. Then it was evident that these efforts of certain municipalities to escape commission control were parts of a so-called "home rule" movement which aimed also to attack the commission control of privately-owned utilities. The efforts to encroach upon the powers of the commission were unavailing and only resulted in the enactment of Chapter 366, above referred to.

Of more direct importance to the public service corporations were the so-called Vint bills. One of these (250A) was a repeal of nearly all of the public utility law, and the other (630A) was a repeal of that law as far as it applied to Milwaukee. Much of the support which they received was socialistic or from those who favor municipal ownership. It was asserted that regulation, by either a commission or a commission council, is yet to be proved a success. One of the principal objections to commission regulation was that commissions feel bound to allow a return high enough to induce investments in utilities.

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†The author's summary of the law is omitted because of the digest published in the ELECTRIC RAILWAY JOURNAL of Aug. 28, 1915, page 378.

But these bills also commanded some support from those who favor "home rule." That rather indefinite doctrine has many virtues, but like any good principle it can be carried to an extreme. As applied to utilities it means either the discarded idea of franchise bargaining or regulation by common councils. The old fixed-term franchise, with fixed rates and its permission to the utility to make all it could during the franchise period, had certain advantages to the utility, but I am sure that association members would not care to return to it. Regulation by common councils is not efficient, economical, unprejudiced or practical. The politician, not the public or the utility, benefits by it.

The Vint bills were reported adversely by the Assembly committee and were decisively beaten, but I feel that the thing that the public service corporations must face in the future is the fight between State and local control. The plea for "home rule" brings to the support of local control some well-meaning persons. The local politician can make much of the decisions of a commission in favor of the corporations, entirely ignoring those against them. He can tell how much lower rates and what better service he could obtain. A commission that tries to be fair to the utilities is constantly subjected to the charge that it is favoring them. The only practical method of regulation so far devised is a central board or commission. The public service corporations must understand this and must do what they can to see that the commissions get the same fair treatment which I know the Wisconsin commission at least tries to extend to both the corporations and the public.

Central Committees Appointed

List Given from "Brown Book" of Central Electric Railway Association Just Issued

THE annual Brown Book of the Central Electric Railway Association has just been published. It gives the officers of the association elected at the annual meeting on Feb. 24-25 and already published in this paper. It also contains a list of member companies, the new officers elected, the report of the secretary-treasurer, copies of bulletins No. 71 on charges for interchange of equipment and No. 84 on charges for repairs to foreign equipment, the annual report of the chairman of the Traffic Association, a list of the committee membership of each association and other matter of interest to members of the associations. The personnel of the committees follows:

Auditing Committee (Standing)—Walter Shroyer, chairman, auditor Union Traction Company of Indiana; L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company; E. L. Kasemeier, auditor Ohio Electric Railway; Irwin Fullerton, auditor Detroit United Railway; H. H. Bullitt, auditor Louisville & Interurban Railroad.

Advertising and Publicity—W. A. Carson, chairman, general manager Evansville Railways; A. D. B. Van Zandt, publicity agent Detroit United Railways; J. H. Drew, president Drew Electric & Manufacturing Company; R. A. Crume, general manager Dayton & Troy Electric Railway; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway.

Annual Transportation—H. A. Nicholl, chairman, general manager Union Traction Company of Indiana; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; C. P. Wilson, president Interstate Public Service Company; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway; C. O. Sullivan, traffic manager Western Ohio Railway.

Bureau of Standards—Adolph Schlessinger, chairman, superintendent transmission and substations Terre Haute, Indianapolis & Eastern Traction Company; G. H. Kelsay, superintendent of power Union Traction Company of Indiana; J. J. Brennan, superintendent of transportation Fort Wayne & Northern Indiana Traction Company; M. J. Kehoe, electrical engineer Ohio Electric Railway; E. J. Burdick, superintendent of power Detroit United Railway.

Constitution and By-Laws—A. W. Brady, chairman, Union Traction Company of Indiana; C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway; E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway; J. F. Collins, general manager Michigan Railways Company; G. O. Nagle, general manager Wheeling Traction Company.

Finance Committee—F. D. Carpenter, chairman, general manager Western Ohio Railway; W. H. Forse, secretary Union Traction Company of Indiana; T. J. Minary, president Louisville & Interurban Railroad; H. E. Vodermark, auditor Fort Wayne & Northern Indiana Traction Company; T. A. Ferneding, general manager Dayton, Springfield & Xenia Southern Railway.

Hotel and Arrangement Committee—L. J. Drake, chairman, Galena Signal Oil Company; S. D. Hutchins, Westinghouse Traction Brake Company; W. H. Bloss, Ohio Brass Company; L. G. Parker, Cleveland Frog & Crossing Company; T. H. Henkle, Electric Service Supply Company; J. G. McMichael, Atlas Railway Supply Company.

Joint Folder Committee—E. B. Peck, chairman, vice-president Terre Haute, Indianapolis & Eastern Traction Company; C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway; F. W. Coen, vice-president and general manager Lake Shore Electric Railway; W. S. Whitney, general passenger agent Ohio Electric Railway; J. F. Keys, general passenger agent Detroit United Railway.

Meeting Registration Committee—W. D. Hamer, chairman, Electric Service Supplies Company; H. C. DeCamp, Westinghouse Electric & Manufacturing Company; J. H. Drew, Drew Electric & Manufacturing Company; W. A. Carson, general manager Evansville Railways; T. J. Brennan, general superintendent Dayton, Covington & Piqua Traction Company.

Program Committee—E. B. Peck, chairman, vice-president Terre Haute, Indianapolis & Eastern Traction Company; J. J. Stanley, president Cleveland Railway; C. L. Henry, president Indianapolis & Cincinnati Traction Company; E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway; F. D. Carpenter, general manager Western Ohio Railway; W. H. Bloss, Ohio Brass Company; W. S. Whitney, general passenger and freight agent Ohio Electric Railway.

Publicity Committee—L. E. Gould, chairman, Western manager ELECTRIC RAILWAY JOURNAL; H. F. Kenfield, president *Electric Traction;* E. H. Farr, A. H. Pugh Printing Company.

Rules Governing the Interchange of Equipment—H. A. Nicholl, chairman, general manager Union Traction Company of Indiana; C. D. Emmons, general manager Chicago, South Bend & Northern Indiana Railway; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; E. L. Kasemeier, auditor Ohio Electric Railway.

Standardization Committee—L. M. Clark, chairman, master mechanic Terre Haute, Indianapolis & Eastern Traction Company; H. H. Buchman, master mechanic Louisville & Northern Railway & Lighting Company;

F. J. Foote, master mechanic Ohio Electric Railway; Charles Sigler, superintendent of motive power Winona Interurban Railway; J. R. Fairchild, master mechanic Western Ohio Railway; P. J. Woods, master mechanic Northern Ohio Traction & Light Company; A. F. Ralston, superintendent of motive power Columbus, Delaware & Marion Railway; S. Potter, master mechanic Detroit United Railway.

Supply Men's Committee—S. D. Hutchins, chairman, Westinghouse Traction Brake Company; L. G. Parker, Cleveland Frog & Crossing Company; John F. Ohmer, Ohmer Fare Register Company; L. J. Drake, Galena Signal Oil Company; W. H. Bloss, Ohio Brass Company; J. H. Drew, Drew Electric & Manufacturing Company; John Benham, International Register Company; H. C. DeCamp, Westinghouse Electric & Manufacturing Company; G. F. Allen, Railway Materials Company; A. G. Olberding, American Brake Shoe & Foundry Company; W. H. Sigourney, General Electric Company; W. D. Hamer, Electric Service Supplies Company.

Transportation Committee—G. K. Jeffries, chairman, general superintendent Terre Haute, Indianapolis & Eastern Traction Company; H. C. Warren, general manager Toledo & Indiana Railroad; E. Smith, general manager Toledo, Fostoria & Findlay Railway; Frank Smith, vice-president Interstate Public Service Company; H. G. Gilpin, assistant general manager Ohio Electric Railway; C. E. Morgan, general superintendent Michigan Railway; J. F. Keys, general passenger agent Detroit United Railway; C. F. Franklin, general superintendent Winona Interurban Railway; J. H. Lahrmer, superintendent Columbus, Delaware & Marion Railway.

Track and Roadway Committee—T. R. H. Daniel, chairman, chief engineer Terre Haute, Indianapolis & Eastern Traction Company; T. H. Sundmaker, chief engineer Ohio Electric Railway; W. A. Carson, general manager Evansville Railway; E. Smith, general manager Toledo, Fostoria & Findlay Railway; L. A. Mitchell, superintendent track and rolling stock Union Traction Company of Indiana; Chas. H. Clark, engineer maintenance of way Cleveland Railway; H. D. Sanderson, chief engineer Michigan Railway.

Committee on Uniform Charges for Interchanged Equipment—S. W. Greenland, chairman, general manager Fort Wayne & Northern Indiana Traction Company; H. B. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway; S. R. Dunbar, purchasing agent Union Traction Company of Indiana.

Vigilance and Membership Committee—F. R. Coates, chairman, president Toledo & Western Railroad; B. J. Jones, general manager Steubenville & East Liverpool Railway & Light Company; F. J. Green, general manager Springfield, Troy & Piqua Railway; R. A. Crume, general manager Dayton & Troy Electric Railway; T. F. Grover, general manager Terre Haute, Indianapolis & Eastern Traction Company; J. N. Tabb, treasurer Kanawha Traction & Electric Company; Samuel Riddle, superintendent of transportation, Louisville & Interurban Railroad; E. C. Price, secretary Indianapolis Switch & Frog Company; E. M. Haas, ELECTRIC RAILWAY JOURNAL.

COMMITTEES OF CENTRAL ELECTRIC TRAFFIC ASSOCIATION

Auditing Committee—Walter Shroyer, chairman, auditor Union Traction Company of Indiana; L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company; E. L. Kasemeier, auditor Ohio Electric Railway; Irwin Fullerton, auditor Detroit United Railway; H. H. Bullitt, auditor receipts Louisville & Interurban Railroad.

Booster Committee—F. D. Norveil, chairman, general passenger and freight agent Union Traction Company of Indiana; C. O. Sullivan, traffic manager Western Ohio Railway; J. H. Crall, general passenger and freight agent Terre Haute, Indianapolis & Eastern Traction Company; O. H. Murlin, general passenger and freight agent Dayton & Troy Electric Railway; J. H. Pound, general passenger and freight agent Benton Harbor-St. Joe Railway & Light Company.

Conference Committee—F. D. Norveil, chairman, general passenger and freight agent Union Traction Company of Indiana; C. O. Sullivan, traffic manager Western Ohio Railway; J. A. Greenland, general passenger and freight agent Fort Wayne & Northern Indiana Traction Company.

Constitution and By-Laws—C. J. Laney, chairman, traffic manager Cleveland, Southwestern & Columbus Railway; Bert Weedon, general passenger and freight agent Interstate Public Service Company; E. Hamprecht, general passenger and freight agent Toledo, Bowling Green & Southern Traction Company; B. E. Parker, general superintendent Public Utilities Company; J. F. Keys, general passenger agent Detroit United Railway.

Interchangeable Mileage Ticket.—F. D. Norveil, chairman, general passenger and freight agent Union Traction Company of Indiana; W. S. Whitney, general passenger and freight agent Ohio Electric Railway; O. H. Murlin, general passenger and freight agent Dayton & Troy Electric Railway.

Interline Baggage—O. H. Murlin, chairman, general passenger and freight agent Dayton & Troy Electric Railway; C. O. Sullivan, traffic manager Western Ohio Railway; J. A. Greenland, general passenger and freight agent Fort Wayne & Northern Indiana Traction Company.

Joint Passenger Tariffs—W. S. Whitney, chairman, general freight and passenger agent Ohio Electric Railway; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway.

Joint Freight Tariffs—J. H. Pound, chairman, general freight and passenger agent Benton-Harbor-St. Joe Railway & Light Company; L. W. Henry, chief clerk Indianapolis & Cincinnati Traction Company; C. B. Kleinhans, auditor Toledo & Indiana Railroad; W. D. Stansifer, general freight and passenger agent Winona Interurban Railway; J. O. Bradfield, general freight agent Scioto Valley Traction Company.

Official Interurban Map—G. M. Patterson, chairman, traffic manager Fort Wayne & Northwestern Railway; J. H. Crall, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company; O. H. Murlin, general freight and passenger agent Dayton & Troy Electric Railway; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; J. H. Pound, general freight and passenger agent Benton Harbor-St. Joe Railway & Light Company.

Official Interurban Guide—C. O. Sullivan, chairman, traffic manager Western Ohio Railway; J. M. Brick, general freight and passenger agent Springfield, Troy & Piqua Railway; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; J. F. Starkey, general passenger agent Lake Shore Electric Railway; J. A. Greenland, general freight and passenger agent Fort Wayne & Northern Indiana Traction Company.

Joint Exception Sheet—C. O. Sullivan, chairman, traffic manager Western Ohio Railway; J. H. Crall, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company; H. R. Biery, assistant to general manager Indianapolis & Louisville Traction Railway; G. M. Patterson, traffic manager Fort Wayne & Northwestern Railway; J. H. Pound, general passenger agent Benton Harbor-St. Joe Railway & Light Company; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana.

Rules Governing Settlement of Freight Claims—F. D. Norveil, chairman, general freight and passenger agent Union Traction Company of Indiana; F. I. Hardy, superintendent of transportation Chicago, South Bend & Northern Indiana Railway; J. S. Clark, auditor Marion & Bluffton Traction Company; C. B. Kleinhaus, auditor Toledo & Indiana Railway; C. O. Sullivan, traffic manager Western Ohio Railway.

Joint Weight and Inspection Bureau—J. H. Crall, chairman, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; F. I. Hardy, superintendent of transportation Chicago, South Bend & Northern Indiana Railway; O. H. Murlin, general freight and passenger agent Dayton & Troy Electric Railway.

Massachusetts Regulation Discussed

In Connection with Question of Consolidating Commissions Chairman McLeod of Public Service Body Explains Scope and Difficulties of Work

FREDERICK J. McLEOD, chairman Massachusetts Public Service Commission, appeared recently before a special legislative committee to present information relative to the work of the commission, its problems and administrative costs. The committee was one appointed to consider Governor McCall's message, of which an important feature has been a proposal to consolidate various commissions in Massachusetts. In Mr. McLeod's opinion the best results would be attained by having a commission operating wholly within a certain definite field and dealing with related problems.

Replying to a question as to the volume of work now handled, Mr. McLeod stated that at present the board has jurisdiction over 185 different companies, that the capital represented by these corporations exceeds $2,000,000,000 and that the annual income is more than $400,000,000. No commissioners that might be appointed, no matter how able, energetic or wise, would find the supervision of this field not sufficient to call forth every power and energy. One of the incidents of the change from the Railroad Commission act to the Public Service Commission statute was an increase in the salary total and also a change from three members to five. This increase in membership was caused only in a very small degree by the fact that the jurisdiction over telephone companies was vested in the new commission.

In reality, the whole scope of the work of the commission was enlarged fully tenfold. This came as the natural result of imposing on the board the authority over the fixing of rates, which is the most important power that the Public Service Commission possesses. The old Railroad Commission had no such power. The fact that the commission received authority to fix rates established a different standard in every department. The accounting department and the engineering department existed before, but only for the purpose of checking up new issues of securities. At the present time this function is only incidental to the much larger function performed by these departments in connection with the elaborate investigations which the commission is obliged to make in the large number of rate cases coming before it.

FORMER RATE-FIXING METHODS GONE INTO DISCARD

Mr. McLeod said that the members of the former Railroad Commission exercised their functions under the law with the greatest industry, intelligence and public spirit, and that any limitation in their action was caused by a limitation of law more than by any defect on the part of the commission. The old system was for the commissioners to hear the parties upon some controversy in regard to rates or other matters; the case would be presented in an extremely sketchy way by both parties, and the board would then consider the available evidence in the light of its general knowledge of existing conditions, reach a conclusion that on the whole a certain thing should or should not be done, and made a recommendation accordingly. But this system, remarked Mr. McLeod, has all gone into the discard. The public will not in the future accept the fiat of any two, three or five men that a certain rate shall prevail. The public has a right to know the facts upon which every decision of every public tribunal is based, and the commission as now constituted under the law endeavors to make a complete and searching analysis of all the facts in each case.

When these facts have been found, the commission, under the law, is bound to follow them to their inexorable results. The functions of the commission are in many respects analagous to those of a court, but in the magnitude of the interests involved they are in many ways more important. The duties are also in many ways more onerous. Before a court the case is decided only upon the record, but the commission is obliged not only to consider the facts presented in evidence by the parties but also to make an independent investigation of the case, and to reach a decision which is justified by all existing facts and conditions.

DIFFICULTIES OF THE COMMISSION'S POSITION

The commission, stated Mr. McLeod, is placed in a very difficult position from the fact that it is between the upper and the nether millstone of two tremendous contending forces. On the one hand, certain representatives of public service companies believe that if they can show that they need the money or, in other words, have not enough money at the present time to pay all the dividends they think the company ought to pay, this fact ought to be conclusive in determining the case. They assert that the utilities have been created by private capital, but must necessarily be supported by the public, and if the revenues are not sufficient to pay a proper dividend, the Public Service Commission must raise the rates to permit additional revenue. In the judgment of such representatives the question as to whether present conditions are due to mismanagement and causes within the control of the company, is one which is an entirely superfluous matter for the commission to consider.

On the other hand, according to Mr. McLeod, some persons are inclined to believe that the board is betraying the public if it looks into the entirely irrelevant matter of finance. In their view, the only function of the companies is to give service to the people, and the question as to whether the company is getting any return on its investment is of no consequence. It is under trying conditions such as these that the commission has to perform its public functions. Any commission, concludes Mr. McLeod, which meets these problems and deals with them with consistency and courage, is likely to meet some opposition, not from one side or the other but from both sides, but such criticism is incidental to any form of public service.

Boston Elevated Reports on Safety

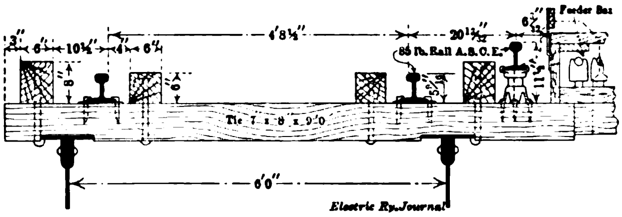
Company Explains to Public Service Commission the Impracticability of Relocating or Covering Third-Rail and Outlines Feasibilty of Various Suggested Precautions Against Fire Hazard in Subways and Tunnels

THAT it is entirely out of the question practically either to cover or relocate the third-rail on the Boston Elevated Railway is affirmed in a comprehensive report to the Massachusetts Public Service Commission signed by President Bancroft in response to a safety investigation conducted several months ago by Prof. William L. Puffer of Boston, consulting electrical engineer of the board. Neither does the company favor transferring the control of feeder and third-rail switches to adjacent station platforms, in view of the present satisfactory responsibilities of the load dispatcher in this connection. In many other respects, however, the company is in substantial accord with Professor Puffer's recommendations, notably in relation to the provision of fireproof cars in future purchases for subway and tunnel service, the separation of wire services, distant control of ventilating fans, use of emergency exit markers, and care of combustible materials.

THIRD-RAIL PROTECTION

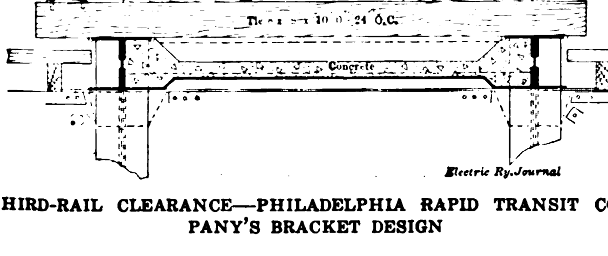
With regard to covered third-rails, the company investigated the use of such equipment throughout the world, finding that in no case is there a covered third-rail system in operation where the distance from the inside gage line of the running rail nearest the third-rail to the center of the latter is less than 26 in. The corresponding distance on the Boston Elevated is 20⅝ in. This distance of 26 in. on other systems is required by the mechanical construction of the beam which carries the third-rail contactor and which is attached directly to the journal boxes. The company has been unable to design a covered third-rail for a spacing of less than 26 in. If an attempt were made to cover the rail in its present position, this cover, extending up and across above the contactor beam and third-rail shoe, would strike the truss rods or steel car sills. These extend under the side for nearly the full length of the car, the bottom being about 12½ in. down from the car body, or 12½ in. above the third-rail, the distance varying with the load and sway. The distance from the top of the third-rail to the top of the beam construction which carries the third-rail contactor is 13 in. Thus there is an overlapping condition which makes it impossible to place a third-rail cover over the present rail that would extend over the top of the beam and still clear the bottom of the truss rods or steel car sills.

The suggestion was made that it might be feasible to so lower the third-rail as to permit lowering the contactor beam, which in turn would give room for the third-rail covering between the bottom of the truss rod and the top of the beam. It was found, however, to be absolutely necessary in order to allow for third-rail wear and provide proper tension in the contactor spring, not to exceed 2 in. in the relative heights between the running and third-rails. To lower the third-rail a sufficient distance to permit this provision of 2 in. and to permit of the contactor beam being low enough in its attachment to the truck frame to permit of the cover being over it and still be in the clear for the truss rod, would leave the top of the third-rail substantially flush with the top of the running rail. Operation under this condition would be impossible, for at points where special work occurs in the track the contactor would strike the special work at crossings and frogs. The alternative of moving the third-rail a few inches farther away from the running rail is equally undesirable, as the portion of the truck which carries the contactor would extend 4 in. beyond the edge of the car body and endanger workmen on the structure, in subways or in yards, who would be justified in assuming that if they were in the clear of the car body they would be in the clear of other car obstructions. Such a plan would also involve radical and expensive changes on the elevated structure and at stations.

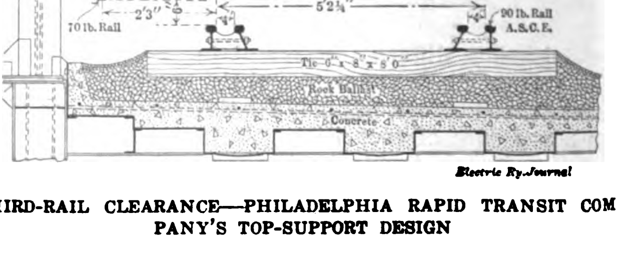


THIRD-RAIL CLEARANCE—DESIGN ADOPTED IN BOSTON IN 1901

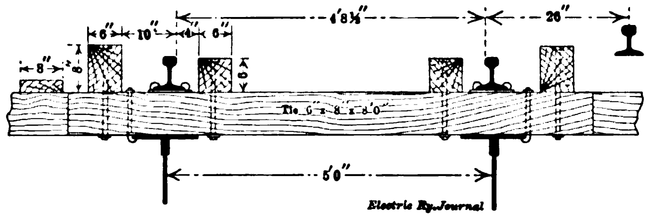
The third-rail location on the Boston system was developed at a time when little or no inverted or covered third-rail was in use and was restricted by the conditions in the Tremont Street subway, temporarily used for train service. The present wooden guard was instituted for the safety of employees in the belief that the third-rail when visible was less dangerous than when hidden. It is impossible to place the third-rail at Boston between the running rails on account of lack of clearance, and even if clearance existed there would then be no opportunity to cover the third-rail. It is also impossible to make contact with the third-rail on the side instead of on top, due to the variation in the lateral



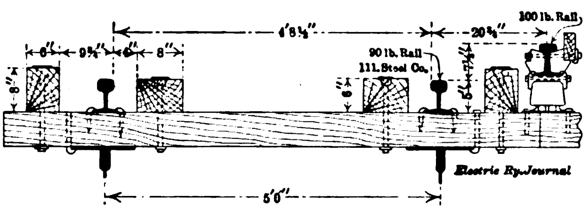
THIRD-RAIL CLEARANCE—PHILADELPHIA RAPID TRANSIT COMPANY'S BRACKET DESIGN



THIRD-RAIL CLEARANCE—PHILADELPHIA RAPID TRANSIT COMPANY'S TOP-SUPPORT DESIGN



THIRD-RAIL CLEARANCE—LOCATION DIAGRAM FOR NEW YORK RAPID TRANSIT PROJECTS



THIRD-RAIL CLEARANCE—MANHATTAN ELEVATED RAILWAY DESIGN, 1902

motion of the truck frame, which amounts to as much as 1⅞ in.

The present method of protection, as approved by the Railroad Commission originally, consists of a strip of board about 4½ in. wide fastened to uprights parallel to and 6 in. outside the third-rail, which, in connection with the footwalk and guard timber, has served its purpose well. From early operation in 1901 to April 20, 1915, there were but fifteen serious accidents relating to third-rail service, nine of these being fatalities. In seven of the fatalities the victims were employees, and in five of the nine cases it is probable that the deceased was struck by a train before coming in contact with the third-rail. Two of the cases injured were trespassers. The total passengers carried from the opening day of service was 1,368,068,223, or 91,204,548 passengers per serious third-rail accident. It is the company's intention to continue to study the problem.

CONTROL OF POWER SWITCHES

The control of heavy power circuits from adjacent station platforms appears unwise to the company because of the confusion and possibility of dangerous conditions resulting from taking the control of these away from the load dispatcher at the South Boston station, and again, because the third-rail sections controlled by these switches are so arranged that in case a section should be killed by a station master, there is a considerable possibility that a moving train would pass from a live to a dead section, causing the blowing of shoe fuses on cars, with heavy flashes, smoke and possibly arcing. This would be apt to cause panic among passengers, and the passing of a train from a live to a dead section would energize the latter, an extremely dangerous practice.

The present feeder system is under the control of the load dispatcher, who is the one man on the road who knows from minute to minute the exact arrangement of the system. No change is made in the feeder system except by his orders. He is the only man who has at all times the information necessary to issue correct orders in case it is necessary to cut the power off any section. The present method of communication with him has proved satisfactory, but under some conditions might be too slow. To improve this, it is proposed to install a signal-box system connected with the load dispatcher's and chief train dispatcher's offices, with boxes on every station platform and between stations. An alarm rung in from any of these boxes will sound the corresponding number on tappers and record its number on tape, and immediately upon receiving such alarm the load dispatcher will have all power cut off from the section or sections involved.

MISCELLANEOUS SAFEGUARDS

The company intends to equip all emergency exits and telephone stations with a significantly shaped globe of a blue color, and to install additional fire extinguishers at such stations in subways and tunnels. The company also intends to equip all ventilating fans for operation from two independent sources of power controllable from station platforms, with automatic transfer of feed in case of the failure of either. The company does not feel warranted in changing the general direction of air movement in subways and tunnels, since the original construction by the Boston Transit Commission provided a specific manner in which ventilation should be carried out. The company also plans to fireproof the Boylston Street subway lighting switchboard room by installing a reinforced concrete floor and steel furniture, and, by isolating the local Edison transformers, will provide outside ventilation. The removal of return feeders from conduits containing power cables, separation of telephone, signal and lighting cables from power cables, and other improvements are under way or immediately in hand.

It is the intention to purchase wholly fireproof cars in the future for underground service, but the company does not consider it possible to replace the present wooden floors of the wood or semi-wooden cars used in the Washington Street tunnel with fireproof floors. This could only be done at the prohibitive cost of replacing the existing car bodies by steel bodies. It is felt that the floors are now protected where fire is likely to occur, and taking into consideration the fact that during the fourteen years in which these cars have been in operation there has never been a case where such additional fireproofing would have been of value, the expense of further protecting the car floors is not warranted.

The installation of a new signal system for the East Boston tunnel and its extension had been authorized previously to the receipt of Professor Puffer's report, and installation was about to begin at the writing of the reply. The company has been unable to find any automatic stop suitable for high-speed surface cars used in subways and tunnels, but the signal companies as well as the Boston Elevated organization are still actively at work on the problem.

Arrangements have been made for the collection and removal of rubbish from subways and tunnels three times a week. It is considered unnecessary to remove from underground routes all combustible equipment such as wooden column shields, seats, shelves at newsstands, switch boxes, sand boxes, turnstile drums, fences, etc. In most instances this would be slow-burning material and would cause little damage. To prevent fires from spontaneous combustion of dust on the wooden trolley trough of the Tremont Street subway, frequent cleaning is proposed, together with a coat of fireproof paint every two years.

Wooden switch boxes are now lined with asbestos. It is more important that switch-box material should be non-conducting than non-combustible. Such boxes are located either on the ground or in wall niches, and offer little opportunity for serious fire troubles. Care will also be exercised in the location of wooden tool boxes, permanent boxes being of fireproof material. Considerable blocking is kept in subways, but it is necessary for use in case of accident and offers little fire risk. Fireproof receptacles for sawdust, asbestos sheathing for sign operators' towers, and metal lockers are to be provided.

COMMUNICATIONS

Tripping of Circuit Breakers with Cars Descending Grades

[NOTE.—A correspondent recently inquired regarding the causes of the opening of circuit breakers when cars are descending steep grades with power on. As F. E. Wynne of the Westinghouse Electric & Manufacturing Company had made a special study of this phenomenon he was asked to give our readers the benefit of the result of this study. He has done so in the following letter.—EDS.]

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA., March 14, 1916.

To the Editors:

Regarding your inquiry on this subject I would say that I have frequently noticed opening of the circuit breakers on cars descending steep grades at high speeds.

I think that this circuit-breaker tripping is due to excessive currents resulting from a momentary interruption of current which is followed by the restoration of full voltage. Such a condition may be produced by the trolley wheel jumping on the wire, by brushes jumping on the commutator or similar causes. In case the trolley wheel jumps, the interval before power is restored may be sufficient to let the motor field die out so that the restoration of power may produce sufficient current to trip the circuit breaker even though the motors do not flash.

Either jumping trolley wheels or brushes may produce a flash which, of course, would account for the circuit breakers opening. Practically all cases which I have noted have been of motors of the non-commutating pole type. With motors of this type it is also probable that a sudden rise in voltage at the car, due to power being thrown off other cars, while not in itself producing sufficient current to trip the breaker, might yet cause a flash with the resulting excessive draft of power.

F. E. WYNNE,
Engineer Railway Section
General Engineering Division.

Car Operation Efficiency

L. B. STILLWELL, CONSULTING ENGINEERS
NEW YORK, March 20, 1916.

To the Editors:

I have read with interest Mr. Chappelle's analysis of the "Fundamental Principles of Car Operation Efficiency," as based upon the coasting element in the speed-time curve, which was published in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1916. The theory of the coasting element of the speed-time curve, as measured by the coasting clock, was discussed in a paper on "Power Economy in Electric Railway Operation—Coasting Tests on the Manhattan Railway, New York," presented by me before the American Institute of Electrical Engineers on June 28, 1910.

The analysis now made by Mr. Chappelle reaches the same conclusions as were then presented, excepting that Mr. Chappelle has extended his analysis to include a general solution of the problem, and includes also a study of the relation between platform expense and the most economical schedule speed for any given equipment and condition of operation. This is a very interesting addition to the subject and should be of value to operating companies.

The useful energy absorbed in moving a train or car from one point to another depends only upon the train resistance, which, of course, includes the resistance due to grades and curves. The wasted energy appears as rheostat losses in acceleration, motor losses and energy absorbed in braking. Where the equipment for a road is already installed the useful energy required for a run over a given portion of the road is practically constant. As has been frequently pointed out, any method of operation that results in the application of the brakes at a lower speed tends to produce a saving in the energy used. Any method of operation that increases the amount of coasting decreases the speed at which the brakes are applied and tends to reduce the amount of energy wasted in braking, and hence also tends to reduce the amount of energy required for the operation of the train. In railway equipments as usually installed the relationship seems to be that an increase of 1 per cent in the amount of coasting results in a saving of approximately 1 per cent in the total amount of energy used.

It has been called to my attention that in my paper above mentioned the paragraph referring to a momentary pause on the series point during acceleration and the effect of such a pause on the amount of energy used shows a result inconsistent with the general principle as set forth above. The general principle, however, is controlling in this case also, the discrepancy being caused by factors resulting from the use of the starting resistance.

The pausing on series position of the controller for a few seconds should not be confused with such operation as occurs in short runs encountered in congested districts of a surface line route, or in approaching curves and switches where series operation only is a special and unavoidable condition, with an equipment selected for normal multiple operation in reference to the average conditions encountered in service.

The result of a pause on the series point in acceleration is a reduction in the average rate of acceleration, and this results in a decrease in the amount of coasting, an increase in the speed at which braking is begun, and therefore an increase in the energy wasted in braking. There would then be a corresponding increase in the energy actually used in the operation of the train, unless it is offset by the reduction in the energy absorbed in the rheostat, due to the elimination of a part of the rheostat losses in the multiple position. The energy absorbed in the rheostat is not actually used in the movement of the train, but is absorbed in the rheostat before it reaches the motors. If the reduced voltage on the motors could be obtained in some other way, the general principle would hold true in this case as in all others. In the case where rheostat control is used, however, a slight pause on the series position in acceleration results in cutting out a material portion of the rheostat losses in the multiple position, because of the increase that has occurred in the speed of the train. This reduction in rheostat losses tends to offset the additional energy required because of the lower average rate of acceleration. For a very short pause on series, in acceleration, amounting to from one to three or four seconds, depending on the maximum speed of the equipment used and the rate of initial acceleration, the reduction in the energy losses in the rheostat may equal or exceed the increase in the actual energy input to the motors caused by the resulting lower average rate of acceleration. Under such circumstances there will be but little or no increase in the total energy taken by the equipment, or it may even decrease.

As the rheostat is in circuit in the multiple position for from, say, four to fifteen* seconds only, depending upon the maximum speed of the equipment and the initial rate of acceleration used, the possible pause that can produce this effect must, of course, be of short duration. As the saving in energy, if any, resulting from this method of operation increases the wear on brake-shoes and wheels and endangers the maintenance of the schedule, motormen should be instructed against pausing on the series point during acceleration. The best all-round results are obtained by getting up to speed as rapidly as practicable.

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*This long period is found in heavy electric traction.

The disadvantages of rheostatic control have been long recognized, but the rheostat is the most practical device available for d.c. motor control. Where it is possible to obtain voltage control directly, as in alternating-current operation or by field regulation in direct-current operation, then the general principle is of universal application. It can be stated generally, therefore, that any method of operation that increases the amount of coasting decreases the amount of energy required for the operation of the train.

H. S. PUTNAM.

American Association News

Chicago Section Hears Lucid and Instructive Lecture on Multiple-Unit Equipment—New Haven Section Recently Summed Up the Winter's Experience on Snow Fighting

Chicago Elevated Section

One hundred and twenty-five men attended the March 21 meeting of the Chicago Elevated Railroad Company section. The secretary reported a total of 217 applications for membership with 183 members paid up. Copies of the constitution and by-laws were distributed in the form of a neat paper-covered booklet. The president was instructed to appoint a librarian to preserve section copies of publications. The section approved the design for the company section badge.

The speaker of the evening was Henry Cordell, general foreman, Northwestern shops, his topic being "Multiple-Unit Train Control." By starting with the fundamental principles and leading his listeners on step by step he was able, with the aid of excellent lantern slides, to make a somewhat intricate subject quite clear.

In addition to the technical explanations Mr. Cordell gave some interesting historical information regarding the multiple-unit equipment on the local lines. He directed attention to the fact that when electric equipment replaced steam locomotives on the South Side Elevated Railroad, the first multiple-unit apparatus ever built was installed on that road. He said that the same apparatus which was installed in 1898 is upon the cars at the present time and is satisfactorily operating under present-day service requirements, which are so much more exacting than the service which was in the mind of Frank J. Sprague when he developed the apparatus. He said further that no type of multiple-unit equipment has ever been removed from the cars on account of being replaced with modern apparatus, as all of the various forms have been maintained and are in successful everyday operation.

Snow-Fighting Discussion at New Haven

At a recent meeting of the Connecticut Company section the paper on snow fighting presented at an earlier meeting by Harold Bates was discussed by W. P. Bristol, manager Hartford; M. E. Stark, roadmaster Bridgeport; W. F. McCoy, master mechanic Bridgeport; F. P. McKaig, roadmaster Hartford. This discussion is appropriate in summing up the experience of the past winter while the experiences are fresh in mind.

Mr. Bristol said that there is no railway work other than snow fighting where there is practically no time to make preparation. Even at the beginning of a storm it is impossible to tell what to expect. There is little opportunity to break in men for this class of work, as they must be trained by working with experienced crews or individuals. In Hartford the cost of hauling snow by team is 30 cents per yard, and for hauling by motor car and flats, 11 cents per yard. The latter cost could be reduced by increasing the numbers of trains and men used. Mr. Bristol recommended the placing of noses or shares, possibly with removable blades, on cars suitable for handling heavy materials in season. Thus for the price of one car a company would have practically two.

Mr. Stark referred to the difference of opinion among railway men as to the relative merits of sweepers and plows. He believed that too much dependence should not be placed on either alone. The sweeper is useful in city streets, especially on hills, while the plows can keep suburban and interurban lines open, buck drifts and help out the sweepers in heavy snow. The equipping of express and other work cars with plows is worthy of attention. One advantage of using regular equipment, equipped with plows and scrapers, is that this is usually on the road when a storm starts and can be put to work promptly. Mr. Stark also advocated the use of both permanent and portable fences to prevent snow from drifting on the track. He had had excellent success with these.

Mr. McCoy told of his experience in Bridgeport with steel brooms for rotary sweepers. The cost of equipping a sweeper with them is $40 as against $26 for rattan. The cost of threading with steel is $2 more so that the total difference in cost is $16. The steel is practically indestructible. The sweepers with steel brooms must be stored in a dry place in off seasons to prevent rusting. On the division of the system with which Mr. McCoy is connected all snow-fighting equipment is in the fall sent out on the road for testing. This discloses defects and allows time for repairs before winter sets in.

Mr. McKaig emphasized the importance of systematic preparation for snow and of apportioning duties of snow fighters. About the end of October the company's track department cleans ditches, culverts and catch basins and provides good track drainage. Snow fences are placed, where necessary, 25 ft. to 50 ft. to the windward of the track. Some property owners require a small rental where fences are placed on their premises. As the track forces are continually changing a snow drill is given every fall. Each foreman takes his men over their routes and instructs them in the performance of their duties. The foremen familiarize themselves with the men's home surroundings so as to be able to locate them promptly when needed. In salting grooved rail in Hartford in order to keep the groove from clogging two work cars equipped with spouts are used.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Reclaiming Oxidized Babbitt

BY DANIEL DURIE
Master Mechanic, West Penn Railways, Connellsville, Pa.

Oxidized babbitt, which is always present on the surface of a melting pot, may be almost entirely reclaimed. In the shops of the West Penn Railways, all oxidized babbitt is carefully skimmed from the melting pot, and after a sufficient quantity has been collected it is reheated in the pot after mixing with sal ammoniac, which acts as a deoxidizer. The mixture is composed of 1 lb. of sal ammoniac and 100 lb. of oxidized babbitt. After this rendering the residue remaining is spread over a steel plate with a trough at one side which leads to a mold. The sal ammoniac crystals are sprinkled over the babbitt oxide and mixed with it, after which heat is applied beneath the plate and the molten babbitt flows off into the mold. After the second rendering a certain amount of residue is left, and this is sold to a babbitt manufacturing concern which reclaims the remainder of the babbitt. The average price obtained for this residue is about 25 per cent less than the cost of new babbitt.

In the shops of the West Penn Railways approximately 300 lb. of dross is collected every three months. The first rendering of this babbitt oxide reclaims approximately 100 lb. of good babbitt, and the second rendering reclaims approximately 46 lb., making a total of 146 lb. of babbitt recovered in all. The remaining 154 lb. is sold to a local babbitt dealer. Whenever babbitt is melted charcoal is sprinkled over the surface to reduce to a minimum the amount oxidized. Regardless of this precaution, however, the above-mentioned 300 lb. of dross is collected during the rebabbitting of approximately 250 bearings.

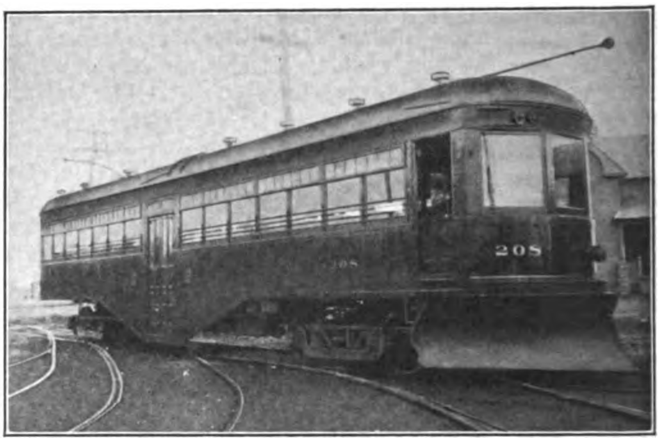
Light-Weight Interurban Cars

BY R. W. PALMER
Manager Cleveland & Erie Railway, Girard, Pa.

The Cleveland & Erie Railway has recently placed in service two center-entrance steel cars which were built by the Niles Car Company and which have proved to be very satisfactory and popular with the traveling public. In their design a departure from the usual practice has been made in that the smoking compartment has been placed in the rear, which arrangement, in the writer's opinion, has several advantages. One reason for this belief is that all roads at times handle passengers who have been drinking more or less, and who are objectionable to other patrons, especially women or children, on account of their actions or talk. The conductor, however, is not always justified in ejecting them. This class of people usually ride in the smoking compartment, and with the smoking compartment in the rear they do not come in contact with those occupying the forward compartment nor are they in view. In other words, it is practically the same as though the smoker was a separate car.

In addition the rear smoking compartment permits the location of the cab in the main compartment, and the passengers there are less liable to try and enter into conversation with the motorman or otherwise attempt to distract his attention from his duties or interfere with him in the proper operation of his car. By locating the motorman's cab on one side, instead of using the full width of the car, space is gained for two additional seats. This arrangement also permits an unobstructed view of a large percentage of the passengers in this compartment, which feature has proven quite popular, as evidenced by the fact that the seats toward the front are usually filled first, and as the front and rear portions of the car are most attractive, passengers move away from the entrance, relieving the congestion at this point.

The motorman's cab in the new Cleveland & Erie cars occupies the space of one seat and is made of steel, having space cut out on the back and aisle sides, which openings are inclosed with sash so as to allow the motorman a clear view on all sides. These openings are covered with roller shades on the inside of the cab so that the motorman can cut off the light from the car at night. The cab is just large enough to accommodate comfortably the necessary apparatus and one man, but not large enough to accommodate two men. This arrangement prevents the objectionable feature of passengers or employees and officials riding with and talking to the motorman, distracting his attention from his duties, a practice, no matter how strict the rules, that is quite common on practically all interurban roads where there is unnecessary room on the front platform.

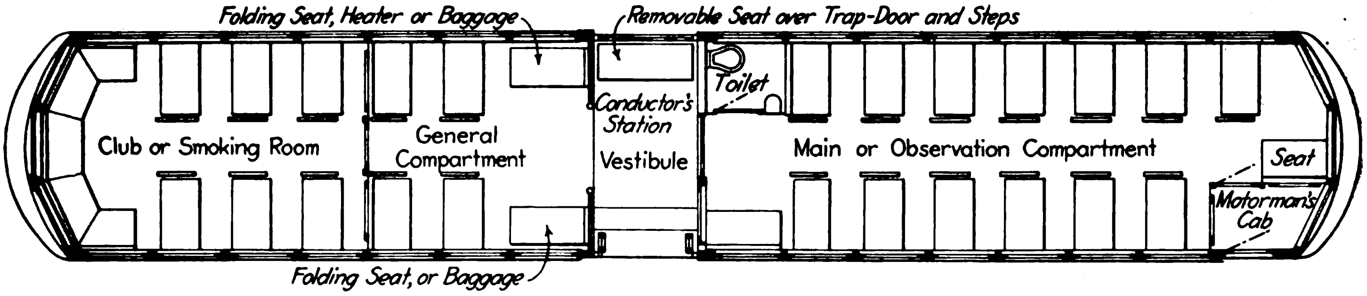


CLEVELAND & ERIE CENTER-ENTRANCE INTERURBAN CAR—IN WINTER TRIM

Inasmuch as it was not considered practical to reserve half the car for smokers, a bulkhead was built, dividing the smoker from the center compartment; this space acts as an overflow in case the other two compartments are filled. The two longitudinal seats in the center compartment next to the wall are arranged so that they may be folded up to admit of carrying light baggage when necessary.

All seats in the car, with the exception of the longitudinal seats, face forward, each seat having ample knee room in front for comfort. The seats are Hale & Kilburn No. 11, C. E. non-reversible type, upholstered in green plush in the main compartment and Fabrikoid imitation leather in the other compartments.

The interior finish is mahogany with Agasote head-



CLEVELAND & ERIE CENTER-ENTRANCE INTERURBAN CAR—SEATING PLAN

lining painted buff color so as to reflect the light, which is supplied from the 40-watt Mazda lamps with Alba shades placed in a row over the aisle in the center of the ceiling. A separate circuit of five 40-watt lamps is used in connection with classification signals, toilet room and tail lights, the lamps for the tail lights being located on brackets over the circular seat in the rear in such a manner as to afford both light for the inside of the car end and at the same time furnish ample illumination for the red bull's-eyes located in the letterboard above the rear windows. Two extra lamps located over the steps on either side of the center platform are wired in on this auxiliary circuit and are used for supplying additional light at the center entrance openings when current is not required for classification signals. In addition to the two electric tail lights an Adams & Westlake No. 15 oil lamp with 8-in. red lens is suspended from a bracket in the center of the rear panel below the window.

The windows are equipped with Edwards fixtures and pantasote curtains on Rex spring rollers. Ventilation is provided by fourteen Globe ventilators, and the Peter Smith hot-water system is used for heating, one folding seat being removed in the winter to accommodate the stove. The center-entrance openings are equipped with four 9-in. folding doors operated by an air engine under control of the motorman on the cab side of the car and manual control operated by the conductor on the opposite side, it being the intention to load and discharge most of the passengers through the doors that are operated by the motorman.

The construction of the cars, which are steel throughout, consists of a light, strong underframe made of 6-in. continuous channels extending under the center-entrance openings, to which are riveted continuous "T" posts running from one side of the car to the other, forming roof supports. The posts are covered on top with galvanized steel roofing riveted to each post or carline, and this steel roof in turn is covered with 1 in. of compressed cork and canvas. The sides under the windows are covered with steel riveted to each post and lined with 1 in. of cork and paneled with ¼-in. Agasote. All bulkheads and the toilet room are of steel, being built in so as to add strength to the car.

The electric equipment consists of single-end H L control and four Westinghouse 306-V motors on one car and four GE-57 remodeled and semi-ventilated two-turn motors on the other, the gear ratio being 26-29.

Air-brake apparatus consists of S. M. E. Westinghouse equipment and National BB-2 compressors. In addition to the motorman's valve a conductor's emergency valve was installed with cord running to the rear, so that the car can be stopped by the conductor instantly in case of necessity when the car is being backed around the wyes at terminals or at other points. This cord is also within easy reach of the conductor from the center platform for use in emergency cases.

The cars are mounted on Baldwin trucks bushed throughout with case-hardened bushings. There are case-hardened bolts in the brake work, and these have spring washers, castellated nuts and cotter keys tending to produce high brake efficiency. On one car the trucks are equipped with the "One-Ball" center bearing, which is a universal joint, the whole weight on each center plate coming direct on the truck bolster on a frictionless, case-hardened ball which rotates in a bell-metal bearing, thus producing high efficiency on curves and flange economy. The front trucks are equipped with air-operated Root spring scrapers, and in the winter the regular wood pilot is replaced with a steel nose for handling snow.

In the design and selection of these cars it was the desire of the management to secure an attractive, easy-riding, strong, light-weight car, which would comfortably seat a large number of passengers and, on account of frequent stops, admit of loading and unloading quickly as well as prevent the accidents caused by passengers boarding and leaving the car while in motion. In actual practice, up to date, the cars have met their requirements very nicely.

DIMENSIONS AND WEIGHTS

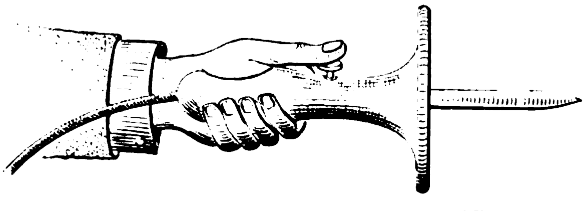
Length over bumpers	51 ft. 0 in.
Extreme width	8 ft. 8 in.
Seating capacity without stove	61
Width of aisle	23¾ in.
Width of seats	38 in.
Height on trucks from rail to top of trolley board	12 ft. 10 in.
Weight of car body complete	28,618 lb.
Weight of trucks completely equipped	27,520 lb.
Total weight of car complete on track	56,138 lb.
Weight per seated passenger	920 lb.

As the tendency at the present time is toward lighter equipment, the car described above, seating sixty-one passengers comfortably, weighing complete 28 tons, offers a good example of equipment that is as light as practical consistent with strength. As it is capable of attaining a speed of 50 miles per hour with its 50-hp. motors it appears to be a car which might be operated especially profitably in connection with suburban or interurban service.

Safe Test Lead Contact Handle

BY BERNARD DOYLE
New York Railways

The accompanying illustration shows a test lead contact handle which insures safety to the operator. It consists of a wooden handle turned with a large flange on the end. A sharp-pointed steel terminal is screwed into the wood, and a flexible insulated wire, led through



SAFE TEST LEAD CONTACT HANDLE

a hole drilled in the rounded end of the handle, ends in a spring switch inside the handle. This spring is operated by a push button which must be depressed before the wire is electrically connected with the contact point. The essential feature of this device is the push-button switch, which makes it necessary for the operator to keep his hands on the wooden handles, thereby eliminating any chance of him touching live parts.

Emergency Snow-Fighting Equipment

BY W. G. MURRIN
General Superintendent British Columbia Electric Railway, Ltd.

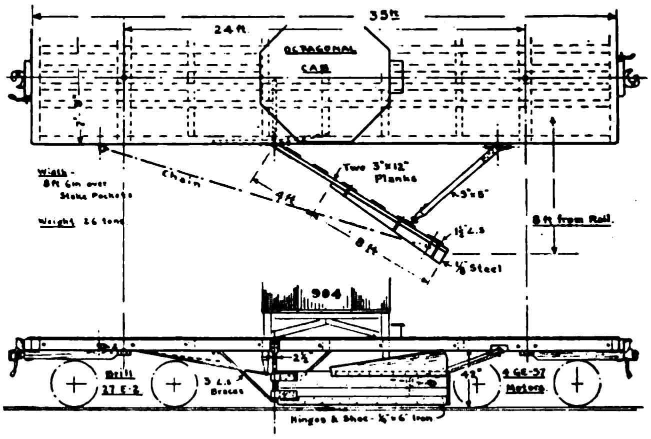
Mention was made in a recent issue of the ELECTRIC RAILWAY JOURNAL of the record snowfall during the first week in February in the British Columbia coast cities. Nevertheless the policy of "preparedness" of the British Columbia Electric Railway enabled it to maintain practically a full service throughout the whole ten days beginning Jan. 30, during which time more than 3 ft. of snow fell, following a series of lighter storms during the month of January, the total fall of snow being more than 5 ft.

Although the climate on the Pacific slope during the winter is usually mild, with considerable rainfall, snow is not unknown, particularly close to the mountain ranges, and previous experience led the British Columbia Electric Railway to provide for such an emergency. On its interurban system, which extends eastward between the Fraser River and the international boundary for a distance of 76 miles from Vancouver, snow falls more frequently as the distance from salt water increases, and to provide against this two 50-ton locomotives were equipped with steel plows. For the short lines around Vancouver, and between that city and New Westminster, on the banks of the Fraser, one of the lighter engines was converted into a shear plow, with flangers.

With this equipment the interurban lines were able to operate without any interruption more serious than a slight disorganization of schedules on Feb. 2, when about 18 in. of snow fell followed by a high wind which caused some drifts to form. In this connection it is interesting to note the advantage gained with multiple-unit trains, in which the rear cars running on rails cleared by the leading car are able to push it ahead, when a single car would be likely to become stalled. The trains over the Fraser Valley line arrived less than half an hour late, while both the Great Northern and Canadian Northern Pacific steam lines had their trains either several hours late or stalled completely.

To keep the city lines open the company had four rotary, long-broom sweepers in Vancouver and one in New Westminster. When the big storm set in these sweepers had already been doing considerable work with the result that their brooms were more or less worn, and great difficulty had been experienced in obtaining proper material to renew them. However, the sweepers were able to keep all lines open, the only result being occasional bunching of cars on some of the longer routes, but as the snow became deeper all vehicle traffic took to the tracks, getting in the way of cars and tramping the snow back into the rail grooves again as fast as the sweepers took it out. Motor trucks frequently became stalled and had to be helped out of the way, causing still more aggravation and heartaches to the traffic officials.

VIEW ON GRANVILLE STREET, LOOKING NORTH FROM GEORGIA STREET



IMPROVISED WING PLOW

At the end of the first day's battle it was seen that to get rid of this trouble caused by other vehicles, some means must be had to clear the snow farther from the tracks. For this purpose one of the work cars was hastily requisitioned and equipped with a heavy wingboard. Work was started the second morning of the storm, and by 10 o'clock that night the machine had a trial on one of the worst streets. Banks of snow more than 5 ft. in height were easily thrust back 8 ft. from the rails, and by the time regular service began the next day more than 50 miles of track had been gone over, the sweepers first cleaning the tracks. After this the service was maintained through almost continuous snowfalls for the following week, till the last storm of wet snow got the better of the now partially-disabled brooms, and the packing of snow on the pavements raised a new difficulty. This was promptly met by devising a sort of harrow, attached to another work car, which broke up the icy mass between the rails sufficiently to enable the sweepers to remove the worst of it. Only three unimportant lines were tied up by this storm, and in one case traffic was diverted to a near-by street so that the patrons were not seriously inconvenienced.

The accompanying sketch shows how the wingboard was rigged up, at a total cost of about $40. Another shunter was similarly fitted up but, as the storm had ended, this was not required.

In addition to the foregoing equipment, a large force of men was employed in cleaning out switches and curves, using large quantities of salt which was distributed to convenient points on a special car. The total amount of salt used was approximately 40 tons, and the total extra cost of keeping the 250 miles of city and interurban lines open during the ten days was about $14,000.

Some compensation for all this work was realized in the increase in both passenger and freight traffic. After the first day the jitneys, which had averaged about seventy-five in Vancouver, and twenty to thirty over the paved highway between Vancouver and New Westminster, gave up completely. Owners of private cars put them away and used the street cars. Motor delivery vehicles confined their operation to streets which were opened by the electric railway or local service, leaving a large quantity of suburban freight to be handled by the interurban express trains, so that in addition to the difficulties arising from the snow, schedules were rendered more difficult by heavy loads. In spite of all these handicaps a continuous service was maintained, and for the time the traveling public cheerfully accepted the situation, thankful that at least one means of getting around town was to be depended upon. Many letters of appreciation were received by the electric railway officials, including a resolution from the Board of Trade, and the daily press not only pointed out how absolutely dependent the city was upon the street cars, but called attention to the miserable failure of the jitneys to assume any responsibility to the public as common carriers. Nevertheless, when the storm was over and the railway had cleared the streets for them, they crawled out of cover and found a good many people had forgotten who had saved them from being snowbound.

An Automatically Operated Track Cleaner

BY E. C. SHERWOOD
Superintendent of Equipment Manhattan & Queens Traction Corporation, Long Island City, N. Y.

This company has recently completed a satisfactory test with a patented track cleaner which is arranged to clean out the grooves of the grooved rail, and at the same time brushes away the dirt from the rail by means of a steel brush. The cleaner rides over crossovers, frogs, etc., without any trouble, and can be raised when not in use free and clear of the rail. As considerable trouble is experienced by many railways which use grooved rails, owing to the chipping of cast-iron wheels by obstructions in the grooves, which may also cause derailments, particularly in cities where considerable construction work is going on or where streets are being repaired, such a device seems to have a good field. A number of drawings of the device are reproduced herewith, and the construction can be followed by means of the key given with them. The drawings are diagrammatic only, several different scales being employed as best served the purpose for which each sketch was shown.

Essentially the device consists of a flexibly-mounted vertical rod which carries at its lower end the cleaning devices, and which is carried by a supporting and guide frame mounted on a bracket attached to the truck frame.

As shown in Figs. 1, 2 and 6, the frame is of inverted U-form, and it is provided with guide strips designed to hold the vertical rod in a central position, but capable of some movement in the plane of the frame. Flexibility of the rod in a vertical direction is provided by a spring on the top, and in a horizontal direction by means of two springs which in their normal position hold the rod centrally. The upper end of the rod is threaded to accommodate a pair of nuts for adjusting the vertical play, while the lower end is of square cross-section to prevent rotation.

The lower end of the rod carries a blunt-pointed steel pin which acts as a groove cleaner, and also a plate on one end of which is a plow and on the other a steel brush.

From this description and the drawings it is evident that the plow and brush, while constrained by the springs, have sufficient freedom of movement in two directions to enable them to pass over or around obstructions.

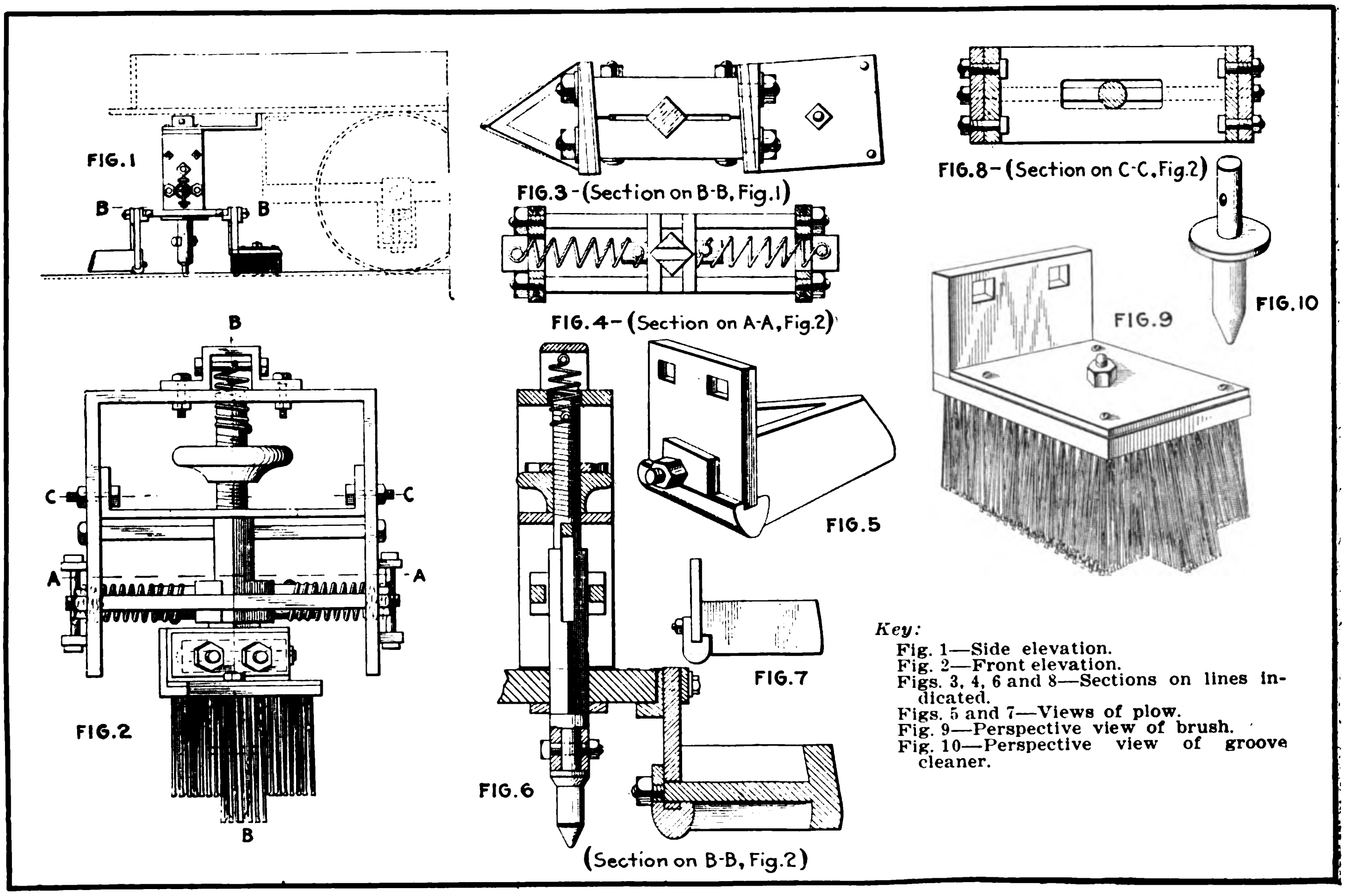


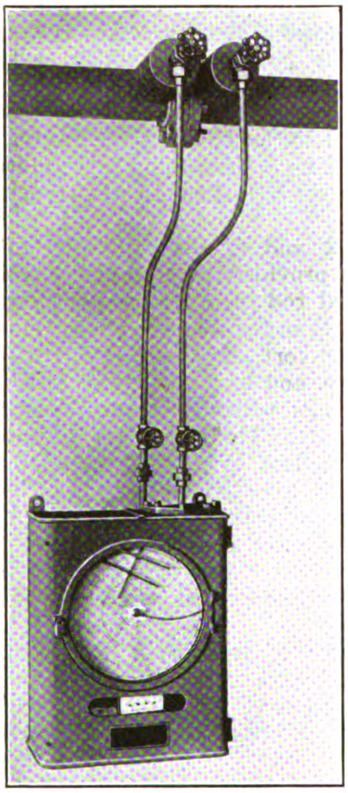
FIG.1
B
B
FIG.3-(Section on B-B, Fig.1)
FIG.4-(Section on A-A, Fig.2)
FIG.8-(Section on C-C, Fig.2)
FIG.9
FIG.10
B
C
C
A
A
FIG.2
B
FIG.5
FIG.7
FIG.6
(Section on B-B, Fig.2)

Key:
Fig. 1—Side elevation.
Fig. 2—Front elevation.
Figs. 3, 4, 6 and 8—Sections on lines indicated.
Figs. 5 and 7—Views of plow.
Fig. 9—Perspective view of brush.
Fig. 10—Perspective view of groove cleaner.

DETAILS OF AUTOMATICALLY OPERATED TRACK CLEANER

New Form of Flow Meter

A meter designed for the measurement of the flow of steam, water and gases in pipes has recently been placed on the market by the Bailey Meter Company, Boston, Mass., and it contains a number of valuable features that are distinctly novel. The operation depends upon the measurement (by a mercury float-gage) of the difference in pressure on the two sides of an orifice plate that is introduced into the pipe line containing the fluid that is to be measured, the orifice being in the form of a segment of a circle. The pressure loss thus caused is never more than about 1 lb., less than the loss caused by an ordinary elbow, globe valve or non-return valve with present-day velocities. The integration of the pressure differences is effected by a clock-driven disk and a follower that is connected to the float-gage.



NEW FORM OF FLOW METER

The orifice plate is made of 1/32-in. Monel metal, and is corrugated near its outer edge so that it can be introduced between a pair of flanges, forming its own gasket without any other packing. Test plates have been taken out from high velocity steam lines after more than one year's constant service, and it is said that they show absolutely no wear, the square edges being just as sharp as when they were put in.

Two pipes connect the meter to the steam main, one being placed on either side of the orifice, and these are kept full of condensed steam or water. To assure this condition condensers consisting of short lengths of copper tube with a number of washers, or fins, are introduced between the main and the connecting pipes, serving to keep the water level constant, and maintaining substantially equal temperatures in the connecting pipes.

The meter provides, in addition to the integration, a recording chart. There are but two moving parts in the latter part of the meter, and these are not subjected to the direct action of the steam, hot gases or other fluid that is being metered. The pressure difference, which is transmitted through the connecting pipes, is applied to opposite sides of a specially-shaped bell which is sealed in mercury, and this acts like a frictionless piston, using the buoyant action of the mercury on the walls of the bell to balance the force due to the pressure difference. The bell has a variable cross-section, so that the recorder gives a reading that varies in direct proportion to the rate of flow. Consequently, charts with uniform graduations are used and the records can be easily read or totaled with a radiimeter. There are no springs, diaphragms, flexible connectors, magnets, cams, or other complicated mechanisms involved in the construction.

Another valuable feature is an automatic shut-off, which prevents blowing out of the mercury, or other damage, when the pressure in either connecting pipe is excessive because of an abnormally high rate of flow, improper opening of valves, or even the breaking of one of the pipes. This shut-off is effected by soft gaskets at the top and bottom of the bell, which close either opening at which the pressure may be abnormally reduced, and this prevents the escape of the mercury in the bell.

The meter may be provided with either or both pressure and temperature-recording pens in addition to the flow-recording pen, these recording near the center of the same chart on which the flow is marked. They are operated by the well-known Bristol or Foxboro helical tubes connected respectively to the arm of the bell casing and to a thermometer bulb located in the steam line.

Manually-Operated Door and Step Control

The Buffalo & Lake Erie Traction Company has recently purchased ten sets of manually-operated door and step control furnished by the National Pneumatic Company, Chicago and New York. The cars equipped with this control are in city service. It was believed by the management that the desired speed in door and step operation for its service conditions could be obtained with the type of manual control adopted.

The National Pneumatic Company's well-known interlocking safety door control will also go on these cars. This signal control speeds up schedules, besides furthering safety, for the controller is on the first notch at the moment the closing of the doors flashes the light signal to the motorman. This is the system also installed on the Springfield and Worcester cars changed from open to prepayment type, as described in the ELECTRIC RAILWAY JOURNAL for March 25.

A description of the manual door and step control follows:

DOOR PARTS

As in the case of this maker's pneumatic control, advantage is taken of oxy-acetylene welding wherever possible. As an example, the crosshead for the door-connecting rod is welded instead of being held by pins or set screws. Thus, sliding of the crosshead is impossible.

Turn-bolts fitted with cotter keys are used on the cross-head and all terminals.

The threads on the ends of the connecting rods are cut in a geometric die. This die opens automatically in such a way that the threaded rod can be withdrawn without permitting the threads to be torn by the chips cut off the rod. For the convenience of the user, every connecting rod is marked to show exactly where it is to go on the car, thereby preventing a shopman from picking up the wrong rod and shortening it to suit his purpose.

The three clips with which the door shaft is rotated are made of pressed steel with dies to insure an accurate fit. These clips are put on with tapered pins, the holes for which are jig-drilled, not only to get good spacing but to keep the clips in line; otherwise the shaft, which is stiffer than the door, could pull the door out of line. Each shaft is stamped with the position and car number, as CV 125, for conductor's vestibule of car No. 125.

At the foot of the door shaft is a lever attached by means of a taper to permit the lever to be set in any position desired and then to be tightened with a nut. This is the lever connected to the control shaft of the motorman and conductor. It acts through an angle of about 90 deg.

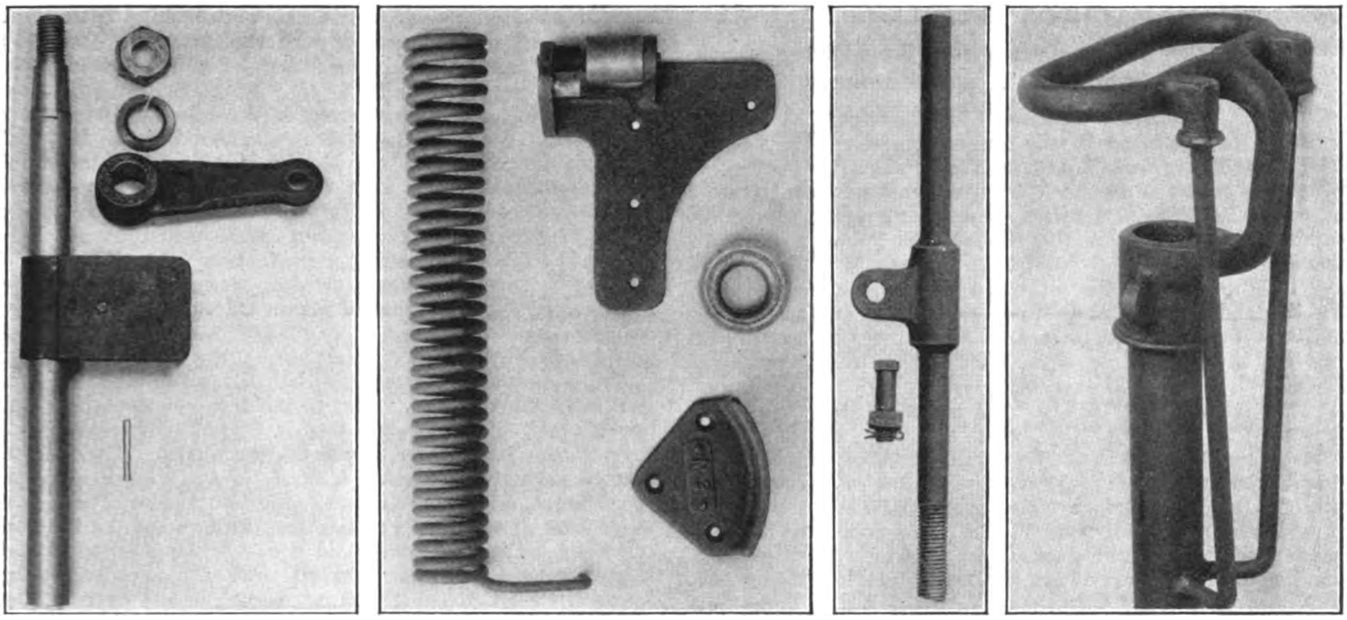


FIG. 1—DOOR SHAFT WITH PRESSED STEEL CLIP, SHAFT LEVER, ETC.; FIG. 2—BOTTOM DOOR GUIDE AND CATCH, STEP COUNTERBALANCE SPRING, DOOR SHOE AND BALL BEARING; FIG. 3—WELDED CROSSHEAD FOR DOOR CONNECTING ROD; FIG. 4—CONTROL STAND

By using ball bearings at both ends of the door shaft, three objects are attained: Easy running, flexible adjustment to platform sag (whereas a straight bearing would bind) and eventual renewal of the ball bearing alone without cutting the shaft or retainer.

In ordinary construction, if a door warps it is allowed to drag along and make hard work for the operator. In this construction the bottom door guide and catch is furnished with a roller which gives an easy bearing along the edge of the platform. The top of each door is held securely against the header by means of a door shoe which gives a weathertight joint. The bottom of each door is held securely against the platform by means of locking pins. Instead of using wood, the door tracks are of angle iron to insure a satisfactory guide.

CONTROL STANDS

The manufacturer's practice of drilling from jigs is well illustrated in the spreader casting for the lower bearing of the motorman's control stand. This spreader, which is bolted under the crown plate of the car, holds the lower bearing of the motorman's control stand at the proper height. The spreader varies in length from ½ in. to 4 in., as may be required for the proper position of the rods underneath the car.

The conductor's control stand is made of 2-in. pipe to be rigid enough to bear the brunt of passenger contact. The top casting, which serves as a crown, is welded onto the pipe. In some installations, braces have been welded between the crown and the pipe to serve as hand-holds for children. However, the type of farebox installed by the Buffalo & Lake Erie Traction Company did not permit the use of such braces.

The top casting placed on the 2-in. pipe just below the crown is drilled and countersunk for the hanging of barrier chains to block the aisle on either side of the car, as may be desired. A boss is also provided on this casting for a barrier of enameled pipe. The wiring and conduit for the conductor's signal to the motorman is carried up through the 2-in. pipe to a push-button pad which is located on the top casting previously mentioned.

Both the top and bottom castings on this pipe are fitted with ball bearings. Adjusting screws are installed on the bottom casting whereby the conductor can throw the locking lever about 5 deg. past center.

Owing to variations in car types and consequent variations in centering, the bottom casting is fastened with a set screw instead of being welded.

STEP MECHANISM

In designing the step mechanism substantial steel members were used to meet the abuse that a step receives in fouling paving or other obstructions and from the free-hearted leaps of athletic passengers. Furthermore, the manufacturer appreciated the fact that proper allowance must be made for the weight of the step and its tread. Hence the use of a counterbalance spring to take up variations in step weight. One end of this spring is fixed, adjustment being secured by transferring the other end from one notch to another in the ratchet of the left-hand step shaft bearing.

The thrust of the step is taken by bolt heads on the projection of the step shaft bearing. The addition of washers under the bolt heads will bring the lowered step to any desired angle. Lock washers are used under the nuts.

The step hanger castings run on ball bearings. Square holes are made in the step hangers to insure that any type of bolts used by the railway will hold. The step shaft bearings can be replaced without affecting the rest of the step equipment. It may be added that the jaw on the step-connecting rod is interchangeable with that of the door-connecting rod.

A plan, which has been prepared by the Swedish State Railway Department for railway construction up to and including the year 1923, contains a program for the electrification of a number of state railways. According to this plan, the sections which ought to be electrified first are as follows: Kiruna-Lulea; Stockholm-Upsala-Krylbo; Stockholm-Gothenburg; Katrineholm-Norrköping; Järna-Nyköping; Malmö-Trelleborg; and Gothenburg-Malmö. The cost of the electrification of these lines is calculated at £2,650,000, which figure, however, only covers the cost of the necessary lines and transformer stations, but not the cost of power stations and electric locomotives.

LONDON LETTER

Effect of War on London Bus Service—Brief Review of Subjects Discussed at Annual Meetings

(From Our Regular Correspondent)

Statistics published in the annual report of the London traffic branch of the Board of Trade show the extent to which the metropolitan omnibus services have been reduced by the withdrawal of vehicles for military purposes and the calling of employees to the colors. The number of motor omnibuses licensed fell from 3522 in 1913 to 3057 in 1914, and by June 15 last the total had further declined to 2602. By the end of 1914 more than 4000 workers had left for military duty. Nevertheless, the number of passengers carried in that year was 756,591,000, an increase of 22,660,000. Cabs also have been largely reduced in number. At the end of June, 1914, a total of 9953 motor cabs were licensed. A year later the figure was 6638, a reduction of 3315. This decrease is attributed directly to the war, many drivers having either rejoined the colors or enlisted. Of the 3315 cabs withdrawn from service 1100 were owned by companies and 2215 by individuals. It is estimated that the aggregate number of passengers carried by tramways, omnibuses and local railways in Greater London during 1914 was approximately 2,064,612,000, or 276.5 journeys per head of the population. So recently as 1903 the total of these passengers was put at 972,465,000, equivalent to 144.9 journeys per head.

The results that have been achieved in working the London County Council Tramways during the first four months of the financial year 1914-1915 showed some improvement, but the war has thrown many additional burdens on the tramways and the outlook for the year 1915-1916 is far from satisfactory. It is anticipated that the strike of motormen and conductors which occurred on the tramways in May will result in a loss of about £100,000; increased wages owing to the war bonus to men receiving up to 40s. a week, and other unavoidable expenditures, will tend to swell the total abnormally. The number of fatal accidents during 1914 attributed to omnibuses was 124, or 0.051 per vehicle, calculated on the average number of vehicles working. Fatal accidents per million miles run were 1.17, and per mile of route operated 0.23.

An exceptionally good report is presented by the Bristol Tramways & Carriage Company for the past year. The total number of passengers increased from 58,301,600 to 60,272,400, and the gross receipts from £454,800 to £512,400. The greatest advance has occurred in the motor-bus section, which now earns more than the tramway department, the gain in this branch alone last year being £49,000, or at the rate of 23 per cent. Working expenses increased, but the net revenue was £98,900, an increase of £16,300.

The Birmingham tramways committee was asked a short time ago to consider the desirability of using trailers on account of the shortage of drivers. London and Grimsby are the only towns in England where trailers have been adopted. After the experience of the metropolis has been ascertained the subject will be considered by the committee.

The Halifax Town Council has authorized the application by the tramways committee to the minister of munitions for the tramways and electricity departments of the corporation to be taken over as controlled establishments.

It is said that half of the staff of the Edinburgh tramways has enlisted—514 men out of a total of 1100, including 122 drivers, seventy-seven men in the engineering departments and twenty-seven cleaners. This large withdrawal of men and the employment in their places of substitutes unfamiliar with the working of the cable system, which is in use in that city, has resulted in frequent suspensions of service recently.

The Liverpool Overhead Railway reports an increase of 1,720,558 passengers carried over the previous year. This is a new record for the company. The increase was equivalent to 16 per cent in the first-class traffic, 12 per cent in the third class and 16 per cent in workmen. This was attributable to the abnormal conditions prevailing in the port of Liverpool, whose docks had never at any time been so fully occupied. It was announced that the Great Central Railway had acquired the land for the Seaforth & Sefton Railway, and that the construction of the line would be commenced as soon as circumstances permitted. When that new railway was connected with the Liverpool Overhead Railway at Seaforth the interchange of traffic should prove beneficial.

At the recent annual meeting of the London, Brighton & South Coast Railway, the chairman referred to the fact that the war necessitated a suspension of part of the work of equipping the suburban lines for electric traction, but stated that it was now being steadily proceeded with. The existing electrical services are working most satisfactorily and showing excellent results. Last year the number of passengers carried by these services was nearly 70 per cent in excess of the last years of steam traction, and since their inauguration five years ago 40,000,000 more passengers had been carried by them.

At the annual meeting of the North London Railway Lord Rathmore stated that, owing to adverse circumstances, the hopes which had been expressed in regard to the electrification of the line had not yet been realized. The scheme formed part of the greater scheme for the electrification of the London & North-Western suburban lines. They were at present unable to fix a date for through service by electric train between Watford and Broad Street. It was hoped, however, by September next to work the present service between Broad Street and Kew and Richmond by means of electric trains.

At the annual meeting of the London & North-Western Railway it was stated that of the total amount expended on capital account £651,625 was in connection with the Euston & Watford Electric Railway. The further amount estimated to be expended this year was £928,000, of which £630,000 is in connection with that railway. The extension of the Bakerloo tube to Queen's Park was opened in February of last year, and, pending the opening of the through route to Watford, arrangements were made whereby certain of the tube trains had since May last run through from Queen's Park to Willesden, where connection was made with main-line and local London & North-Western trains. In conjunction with the North London Railway, it is hoped to work the present services between Broad Street and Kew and Richmond by electric trains as from September next. It is still impossible to say when the electric service to Watford will be opened.

Reference was made to the electrification of suburban portions of the London & South-Western Railway at the annual meeting of the company. Up to the end of last year the company had spent £970,000 on electrification work. Two months ago it opened the circular service via Richmond and Kingston and the Shepperton line, and the service to and from Hounslow has been commenced. It was stated that the delay in the completion of the power house had caused the company to conduct its work under very serious difficulties. One result was that overcrowding occurred in the electric trains on the circular service during the morning and evening rush hours. Comparing the week just prior to the opening of the circular electric service with the second week after the service was begun, there was an increase of 16 per cent in the bookings.

As mentioned in the preceding paragraph, electric trains are running on the Hounslow loop line of the London & South-Western Railway, and a new station has been opened at Barnes Bridge. The service of electric trains between Hounslow, Isleworth, Brentford, Kew Bridge, Chiswick, Barnes Bridge and Waterloo is half-hourly on week days, with extra steam trains at business hours. Hounslow trains complete the loop via Richmond, thus giving two extra trains both ways each hour between Twickenham, Richmond, Barnes, Putney and Waterloo.

Between seventy and eighty women conductors are on duty on the buses run by the London General Omnibus Company, and this number will be gradually increased as the needs of the situation demand. The women will be paid at exactly the same rates, on a mileage basis, as the male conductors, and will have the same duties and hours. Special arrangements have been made to train them at the company's school at Chelsea. They are employed under an agreement between the company and the Licensed Vehicle Workers' Union which confines their term of service to the period of the war, or until such time as the male conductors return.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

STRIKE FIZZLE IN NEWARK

Efforts of organizers of the Amalgamated Association of Street & Electric Railway Employees of America to foment discord among the employees of the Public Service Railway in Newark and other cities of New Jersey have so far proved unavailing. A special effort was made on the night of Saturday, March 25, to call a strike for Sunday. That it was unsuccessful is indicated by the company's receipts on that day, which were 6 per cent greater than on the corresponding Sunday of 1915. No reasons for calling the strike have been advanced.

The Saturday night meeting comprised not more than fifteen Public Service men, delegations of union men from Yonkers, N. Y., and Trenton, N. J., and local union men of other crafts to make up a total of about 200. It was the outcome of efforts begun last November and followed by the arrival of the organizers about two weeks ago. The apparent plan has been to enlist the support of organized labor outside the electric railway ranks. At the meeting the chairman moved that a strike be called, and after an affirmative vote he distributed printed cards announcing that local No. 531 had declared a strike of railway employees.

After the meeting those in attendance went in jitneys at midnight to the Sixteenth Avenue carhouse in an endeavor to interest the men in the strike. The plan was to repeat this performance at other carhouses. The net result was that up to Monday night thirty-five men out of 1500 in the affected division failed to report, and the ranks were filled from the extra list without difficulty. The company was in no way embarrassed. There was little rowdyism. By Wednesday conditions had become entirely normal.

As an evidence of the attitude of the men 164 motormen and conductors attached to the Montgomery Street carhouse on Tuesday signed a communication addressed to N. W. Bolen, superintendent of transportation, pledging loyalty and expressing appreciation of the fact that he had stood by them for thirteen years. Similar assurances were received from the Hoboken, West Hoboken, West New York, Greenville, Fredonia and Hudson carhouses in the Hudson division. While the main efforts of the organizers were concentrated in the Essex division, in which Newark is located, the railway men in the Hudson division learned that the plans included them. In fact a delegation made an attempt to bring them in line on Wednesday night. They accordingly stated their position to Mr. Bolen.

George Keenan of Rochester, N. Y., a member of the executive committee of the Amalgamated Association, who was on the ground, expressed disappointment at the failure of the men to respond to the effort to organize them, but said that this would not prevent the continuation of the work.

FIGHT ON CANADIAN FRANCHISE RENEWAL

Representatives from all parts of the Niagara district attended the annual meeting of the Niagara District Hydro-Radial Railway Association held in St. Catharines recently. Resolutions were unanimously adopted opposing any renewal or extension of lapsing railway charters to this district and expressing the view that any such extension would seriously interfere with the proposed system of hydro-railways desired by the municipalities of this territory and for which surveys have already been made. The St. Catharines board of trade on the same date took an opposite stand and voted down the same resolution.

The meeting was called to consider the application of the Niagara, St. Catharines & Toronto Railway for a renewal of the franchise to build a trunk line from Toronto to the Niagara frontier through St. Catharines under the name of the Toronto, Niagara & Western Railway. A resolution was also passed declaring strongly in favor of the hydro-radial movement, but welcoming any trunk line, and an amendment by Mayor Burgoyne to insert the word "steam" was voted down. The mover of the amendment declared that the Hydro-radial Association was not opposed to the company operating a steam road, but was opposed to electricity as motive power. The meeting decided that it would be unfair to restrict the road to steam as the tendency is toward electricity.

The bill was before the Commons railway committee on March 2. It was finally laid over for a week to give the conflicting interests a chance to effect a settlement. There was strong opposition from the Hydro-Electric Union, the Ontario government, the city of Toronto and a number of municipalities. Those who have followed the discussion have little idea that a settlement will be effected, unless it be on the lines of concession of running rights to the hydro-radials. The bill will come up again on March 9.

Frank Cochrane, Minister of Railways and Canals for the Dominion, is reported to have expressed his intention to vote for the extension. He is reported to have said:

"Railways or lines held by the Canadian Northern Railway are partly the property of the people, who are interested in the company to the extent of 40 per cent. A vote against its application for an extension of its time limit to acquire the Niagara, St. Catharines & Toronto line is a vote against the interests of the people.

BRIBE STORY BEFORE THOMPSON COMMITTEE

The work of the Thompson legislative committee the latter part of the week ended March 25 and early in the week just ended was marked by two important developments. One was the admission on March 25 by Timothy S. Williams, president of the Brooklyn Rapid Transit Company, that the suggestion had been made to him that a city official, now dead, in consideration of the payment of $500,000 would vote in the Board of Estimate in favor of the Brooklyn Rapid Transit Company obtaining the dual subway contracts. The other development of importance was the presentation by the committee of a report recommending changes in the rapid transit law and the introduction at Albany of five bills embodying preliminary recommendations of the committee. Colonel Williams refused to give the name of either the emissary who had come to him or the city official who was represented as sending him. He rejected the suggestion. Colonel Williams denied that Charles H. Hyde, who was City Chamberlain under Mayor Gaynor, was in any way connected with the incident.

On March 27 both Colonel Williams and William R. Willcox, former chairman of the Public Service Commission, were called to the witness stand. Colonel Williams continued to refuse to name the individual, asserting that as he was now dead no good end would be served by making his name public. Mr. Willcox denied that he had said Colonel Williams had told him that "Mayor Gaynor was in the market if opportunity arose and somebody had the money." The committee took an adjournment until March 31.

On March 27 the five bills embodying the preliminary recommendations of the Thompson committee were introduced at Albany. The measures would take from the first district commission authority over subway construction and vest it in a rapid transit commission of seven members to be appointed by the Mayor of New York. The Mayor and City Comptroller would be two of the members. It also would be provided that the Mayor and Comptroller shall be directors in railroad corporations which lease subways from the city. The salaries of the five members are to be fixed by the Board of Estimate, and they shall hold office at the pleasure of the Mayor. The salaries of the legal, engineering and clerical force of the new commission are to be fixed by the Board of Estimate and Apportionment and the expenses of the commission are to be a city and not a State charge. Each of the five boroughs would have a representative among the five appointive members. The present New York City Public Service Commission is continued for other than subway construction work.

FRANCHISE BURDENS IN OAKLAND

G. K. Weeks, president of the San Francisco-Oakland Terminal Railways, Oakland, Cal., has written a letter to the secretary of the Downtown Property Owners' Association, in Oakland, explaining why the company is not anxious to build an extension to its city lines, suggested by that association, even when the association offered to lend its "assistance in financing the construction of the line." Mr. Weeks points out that for some years past the company has not been able to obtain new money for capital expenditures, and if the proposed financial assistance was simply a loan to the company such action would merely add to the difficulties under which the company is now suffering. The letter then points out the principal reasons why the only kind of franchises which can now be obtained under the Oakland city charter do not attract the investment of capital. One is that the maximum life is only thirty-five years, with no provision as to what may become of the property at the end of that time. Another is that electric railway companies have to pay from 2 per cent to 5 per cent of their gross earnings to the city, as well as 5¼ per cent to the State. They also have to do a large amount of paving and repaving, which, in some cases, takes as much as 10 per cent of the gross receipts, and perhaps averages 5 per cent. This means that some 15 per cent of the gross earnings of the electric railway are absorbed for taxes, licenses and compulsory contributions for public works. But even if these taxes were less, the situation would not be solved unless there were some provision by which the investment made by the company in its property would be safeguarded.

STRIKE DECLARED IN TOLEDO

Objection by Company to Union Button Used as Pretext to Tie Up System

About 800 of the motormen and conductors of the Toledo Railways & Light Company, Toledo, Ohio, struck on March 28 because the company refused to allow them to wear union buttons while operating their cars. The badges of membership were distributed in the forenoon. The men had been informed previously, however, that the company would not permit buttons to be worn. President F. R. Coates of the company pleaded with the men to defer the time of putting on the buttons until the arrival of Henry L. Doherty, chairman of the board, who was expected in Toledo by 10 o'clock on March 30.

The first men to wear the buttons were those who went on duty at 3 o'clock in the afternoon. Inspectors warned the men to remove the buttons, but, instead of heeding the warning they ran the cars into the carhouses. Other men congregated about the houses. By 4 o'clock operation of the road was at a standstill. No cars, excepting the interurbans, were run, and they did a heavy business for the remainder of the afternoon and evening.

Mr. Coates talked over the telephone with Mr. Doherty in New York and the latter approved the stand that the company officials had taken. The men were told that Mr. Doherty would be in the city to discuss matters with them if they would continue to operate the cars until the morning of March 30 without the buttons, but they decided at a meeting not to comply with his wish. The company made the following statement:

"The company deeply regrets the inconvenience to which Toledo is being placed by the general tie-up of its street railway system. The company has made no effort whatever to prevent the organization of its men. No stone was placed in the path of the union organizers. Our only request was that the use of buttons be deferred, as it placed the men not members of the organization in a very embarrassing position before the public using their cars. During this present situation it is not our intention to import any men to man our cars."

The local branch of the union published the following statement:

"We issue this statement so that the public may fully understand that we are not responsible for the present existing conditions. Our men exercising their right as American citizens reported for work on Tuesday at noon with the emblem of their union on the lapel of their coat. They were informed by the officers of the company that they would not be allowed to operate their cars unless this emblem was removed. This the men refused to do and the company then ordered the cars to the carhouses. We would further request the locked-out carmen and their sympathizers so to conduct themselves as to merit the confidence and respect of the public at large."

The men had made no demand whatever of the company and had not met with any interference on the part of the company officials in the formation of the new organization. Officers of the union now say that the men will not return to work on consent of the company to wearing the buttons, but will insist on the reinstatement of two men recently discharged and a contract fixing a new scale of wages.

The strike has caused much inconvenience in Toledo, especially among the large manufacturing concerns, such as the Willys-Overland Company, which employs more than 15,000 men. Every kind of conveyance was pressed into use, and jitneys, which had been housed over winter, have come out in large numbers. The interurban cars that pass through the city in different directions have been a great aid to many.

CHANGES IN KANSAS CITY RAILWAYS

Many changes are being made in the designation of officers of the Kansas City (Mo.) Railways, and in the assignment of duties. All the officials involved, however, are men of long service with the various companies that preceded the Kansas City Railways, and all the appointments are in effect promotions. The appointments became effective on April 1.

James E. Gibson, formerly general superintendent, has been made general manager. W. C. Harrington, formerly assistant general superintendent, becomes superintendent of transportation, in active charge of transportation matters. S. H. James, formerly assistant general superintendent, will be assistant superintendent of transportation. D. L. Fennell, formerly secretary to Mr. Gibson, will be in charge of the building at Fifteenth Street and Grand Avenue. Julien E. Harvey, formerly a division superintendent, is made the head of a new department, with the title of superintendent of efficiency with headquarters at Fifteenth Street and Grand Avenue. A. E. Harvey, chief engineer, has been named as superintendent of way and structures. G. J. Smith, master mechanic, will be superintendent of rolling stock and shops. C. E. Fritts, formerly electrical engineer, has been made superintendent of power and electrical distribution. Chester C. Smith, who entered the service of the Kansas City companies with P. J. Kealy and has been an assistant to the board of control, has been appointed assistant to President Kealy.

Division superintendents will hereafter be known as division supervisors; track supervisors will be roadmasters. Dispatchers in the transportation department will be on three shifts of eight hours, instead of two shifts of twelve hours.

The creation of a traffic division is announced, a head to be named later. The incumbent of this office will report to the superintendent of transportation and will have charge of the preparation of all schedules and the checking of all traffic. Schedules will be made by W. J. Moberly, supervisor of schedules. Outside inspecting and checking will be in charge of D. F. Hatfield, now chief dispatcher. It is announced that division supervisors must have served three to five years in the transportation department, either in the traffic division or the train service.

AGREEMENT REACHED ON CLEVELAND CHARGES

At a conference between the street railway committee of the City Council and the officers of the Cleveland (Ohio) Railway on March 24 an agreement was reached whereby the company is to be allowed to take from its earnings each month a sum which will reduce the deficit of $564,000 in the maintenance, renewal and depreciation account and finally wipe it out. The company, however, agrees that this sum shall not be so large as to allow the interest fund to fall below $300,000 and thus necessitate an increase of the fare. The city agrees to hasten the charging off of the old deficit of $956,572. It is probable that part of the interest fund will be applied to the deficits instead of the car-mile allowance being increased as was suggested to the Council by the company.

The operating report for February, made to the board of directors on March 25, showed that the income for the month was $720,972, or $109,670 more than that for the same month last year. The increase in the number of fares collected was 3,655,683. The interest fund received $58,712, making it now $653,496. It is believed that the March report will result in an increase in the interest fund to $700,000, where the fare would be reduced automatically by dropping the transfer charge. This reduction in fare would not follow, however, if an amount be taken from the fund to reduce the deficits.

East Cleveland will shortly advertise for bids for a new street railway line on Noble Road, between Euclid Avenue and Mayfield Road.

Fielder Sanders, street railway commissioner, has arranged to check the East Cleveland business of the Cleveland Railway to see whether the company is losing money at the 3-cent fare to that city. The claim has been made that there is a great deal of short-haul business within the limits of East Cleveland, on which there is a profit.

The injunction suit brought by East Cleveland to compel the Cleveland Railway to pave between its tracks on Euclid Avenue in that city has been dismissed in Common Pleas Court. The court said that the suit was premature and that the officials of that town should have waited until the paving work was begun and then, if the company did not do its part, bring suit to compel it to do so.

Vote on Municipal Ownership in Massachusetts.—The committee on street railways of the Massachusetts Legislature voted on March 23 to report a bill for a referendum vote next November on the question of state ownership of street railways.

Service Into Mexico Stopped.—The street cars of the El Paso & Juarez Traction Company, controlled by the El Paso (Tex.) Electric Company and operated between El Paso, Tex., and Juarez, Mex., have been ordered stopped in Juarez on the recommendation of the military authorities.

Annual English Tramway Congress.—It has been decided to hold a one-day congress of the Tramway & Light Railway's Association in London, England, on June 30. The papers and lecture will be presented at 2.30 p. m. An informal dinner will be held at 7.30 p. m. There will be no official guests at this congress and no musical entertainment will be provided.

Two Hundred and Ten Permanent Men Replace Wilkes-Barre Strikers.—At the present time the Wilkes-Barre (Pa.) Railway has 210 permanent employees in the place of the men who went on strike some time ago. These new employees are all residents of the vicinity. All of them have been broken in and they are courteous, efficient and courageous employees. The riding is increasing despite the occasional outbreaks of lawlessness and the attempts of strikers to intimidate the people. The temporary injunction secured by the company against its former employees is still in force, and within a week or so it is expected that there will be an argument on the matter of making that injunction permanent.

Bridge Collapse at Johnstown.—The steel bridge spanning the Conemaugh River at Maple Avenue, Johnstown, Pa., collapsed on March 21 at 5.30 p. m., under the combined weight of six trolley cars and a crowd of about 500 workmen from the local plant of the Atlantic Refining Company. Over a score were injured, none seriously. According to reports the failure was gradual. The bridge dropped suddenly a foot or more and then fell to the bottom of the river, a distance of 12 to 15 ft. The depth of the water at this point was not over 3 ft. at the time. The cars remained upright and the trusses, though bent out of line, did not fall on the cars or pedestrians. The cars were standing close together, and when the bridge went down were wedged into the shape of a broad V, the position in which the bridge remained after it fell.

Extension Order of Missouri Commission Upheld.—The St. Louis Circuit Court has refused to grant the petition of the United Railways to set aside an order made by the Public Service Commission directing the company to apply to the Board of Aldermen and the Mayor for permits to construct certain extensions. The action of the court upholds the Public Service Commission's order made last May. This order specified that the permits be obtained within a month. The company obtained a suspension to enable it to apply to court for cancellation of the order. The extensions included some downtown loops and a switch on Lindell Avenue between Grand Avenue and Olive Street for a loop to be used during rush hours.

Special Agent Appointed to Investigate South American Markets.—Stanley H. Rose, commercial agent in charge of the New York office of the Bureau of Foreign and Domestic Commerce, announces that Philip S. Smith has been appointed special agent of the bureau to investigate and report on the present conditions as well as the future prospects in the South American market for electrical goods of all character. Mr. Smith proposes to be at Room 409 in the Custom House in New York from April 24 to April 27 and will be very glad to meet American manufacturers and exporters of electrical apparatus and supplies. Appointments may be made with Mr. Smith, by addressing Stanley H. Rose, commercial agent in charge, Bureau of Foreign and Domestic Commerce, 409 Custom House, New York.

Short Strike in Mexico City.—A newspaper dispatch from Mexico City, Mex., dated March 28 stated that energetic measures taken by General Pablo Gonzalez promptly stopped a threatened general strike of employees and laborers of the Mexico City Tramway. The demonstration that threatened to suspend traffic was instigated by agitators of the Mexican branch of the Industrial Workers of the World. The laborers at the electric plant of the company went on strike, demanding a 60 per cent wage increase. These strikers urged the conductors and motormen to join them, and many of the latter, fearing difficulties, returned their cars to the barns. General Gonzalez dispatched troops and gendarmes to protect the electric plants and to force the strikers to resume work, promising an increase in pay in the near future. The agitators were arrested and traffic was resumed later.

"Dawn of the Electrical Era in Railroading."—Under the caption "Dawn of the Electrical Era in Railroading" the Chicago, Milwaukee & St. Paul Railway is running in the principal daily newspapers of the United States an advertisement 8½ in. wide by 11 in. high which it concludes as follows: "Electrification, added to its other advantages, makes the 'St. Paul' more than ever the road of efficiency, comfort and charm. Remember this fact when planning your next trip to the Pacific Northwest." The paragraph headings are as follows: "440 Miles Electrified," "Giant Locomotives," "Power From Mountain Streams," "Regenerative Braking" and "Increased Efficiency." The company says that it "has inaugurated this great epoch by accomplishing the longest extent of main line electrification in the world, through a region demanding the utmost of energy and efficiency in locomotives." A striking line cut shows one of the electric locomotives hauling a train over the mountains. In the company's passenger office in Chicago a handsome plaque is on exhibition, announcing the inauguration of the service.

President Wilson Urges Action About Transportation.—President Wilson wrote to the Democratic leader of the House, Mr. Kitchin, on March 28, urging consideration of the shipping bill and the resolution for the investigation of conditions of railway transportation and legislation. The letter to Mr. Kitchin follows in part: "I write to express the hope that the Senate joint resolution No. 60 for the investigation of the condition of transportation by railway, may find an early opening in the business of the House for its consideration. The railways of the country are becoming more and more the key to its successful industry, and it seems to me of capital importance that we should lay a new groundwork of actual facts for the necessary future regulation. I know that we all want to be fair to the railroads, and the proposed investigation is the first step toward the fulfillment of that desire. I hope that this important matter can be disposed of without putting anything in the spokes of the wheels that we are now trying to make go around in the matter of legislation."

Financial and Corporate

ANNUAL REPORTS

United Railways of St. Louis

The comparative statement of income, profit and loss of the United Railways of St. Louis, St. Louis, Mo., for the years ended Dec. 31, 1914 and 1915, and comparative traffic statistics follow:

	1915	1914
Revenue from transportation	$11,589,488	$12,359,219
Revenue from operations other than transportation	91,712	91,706
Total operating revenues	$11,681,200	$12,450,925
Operating expenses (including depreciation)	8,176,356	8,644,736
Net operating revenues	$3,504,844	$3,806,189
Taxes	749,833	767,794
Income from operation	$2,755,011	$3,038,395
Income from other sources	98,484	87,901
Gross income	$2,853,495	$3,126,296
Deductions from income	2,587,968	2,618,255
Net income	$265,527	$508,041
Dividends on preferred stock	....	....
Surplus	$265,527	$508,041
Revenue passengers	232,771,390	248,040,033
Transfers	124,043,205	127,444,829
Total passengers	356,814,595	375,484,862
Percentage of passengers using transfers	53.29	51.38
Average fare per passenger (cents)	3.23	3.27

The passenger revenue for 1915 was less by $764,715, or 6.23 per cent, than that of the preceding year. During the first six months of the year the passenger revenue decreased $550,797, or 8.85 per cent, while during the second six months the decrease was only $213,918, or 3.53 per cent. The decrease in passenger revenue was brought about by the fact that the number of revenue passengers for 5 cents decreased 15,319,957, or 6.3 per cent, while the revenue passengers for 2.5 cents increased 51,314, or 1.5 per cent. The decreased traffic was caused by the industrial business depression rather than by jitney competition. It is said that although the jitneys in the downtown section at times seemed to be numerous the total of their business was insignificant and had no effect on the railway's showing for the year.

The number of transfer passengers in 1915 decreased only 3,401,624, or 2.6 per cent, so that the percentage of revenue passengers using transfers during the year was 53.29, as compared to 51.38 in 1914, an increase of 1.91 per cent. These figures indicate the hauling of a greater percentage of free transfer passengers in the last year. The percentage seems to be constantly increasing, it now being almost 8.5 per cent above the 44.85 per cent figure for 1909. This increase in transfer passengers has had the effect of diminishing the average fare for passengers from 3.40 cents in 1909 to only 3.23 cents in 1915.

Other revenue from transportation decreased $5,016 on account of the cancellation on Nov. 1 of the contract with the United States Government for carrying mail. The revenue from operations other than transportation showed a nominal increase, but miscellaneous income from other sources increased $10,583, or 12.04 per cent, so that the gross revenues and other income together showed a decrease of $759,141, or 6 per cent. This total decrease in earnings, however, was not entirely reflected in net income, which showed a loss of only $242,514 on account of economies in operation, lower taxes and less fixed charges.

The total operating expenses, including depreciation, decreased $468,380, or 5.42 per cent. The total depreciation was $1,337,309. The amount of money paid out in wages was $4,096,294, or 35.07 per cent of the gross revenue, as compared to $4,304,408 and 34.57 per cent of the gross revenues in 1914. The tax payments decreased $17,961, or 2.3 per cent, but the company still maintains its position as the largest taxpayer in the State. The deductions from income showed a decrease of $30,287, or 1.1 per cent. During 1915 the company expended and charged to capital account for added property the sum of $53,540. During the year 0.52 mile of track were added and 1.17 miles removed, making the trackage on Dec. 31, 1915, 457.54 miles. The total track reconstruction, renewal and extension for 1915 was 28.05 miles.

The average cost to the company of all purchased power during 1915 was 0.714 cent per kilowatt-hour. The average cost of power generated in the company's plant was 1.02 cents per kilowatt-hour, without making a charge for interest on investment, taxes, insurance or depreciation. It is said that in comparing the relative costs of purchased and generated power at least 0.5 cent should be charged against generated power for fixed charges, which would make the total cost of generated power during the year something more than 1.5 cents per kilowatt-hour. The average cost of all power during the year was 0.743 cent per kilowatt-hour. The average distribution of power on a kilowatt-hour basis during the year was as follows: The Electric Company of Missouri, 59.5 per cent; Union Electric Light & Power Company, 32.2 per cent, and United Railways plants, 8.3 per cent. The plants of the railway company were operated only as peak plants, and the peak load was distributed in the following manner: Electric Company of Missouri, 41.7 per cent; Union Electric Light & Power Company, 27.4 per cent, and the United Railways' plants, 30.9 per cent. The average week-day peak load was 52,800 kw., and the total kilowatt-hours used during the year were 179,660,620, a decrease of 2.4 per cent as compared to 1914. The average total load factor decreased from 40.5 per cent to 39.8 per cent. Two new substations were built and put into operation during the year, but in order to take care of anticipated traffic increases, future provision, it is said, should be made for additional power of a least 3000 kw.

Cleveland, Painesville & Eastern Railroad

The railway operating revenues and the non-operating income of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, were $407,029 for the year 1915, a loss for the first time since 1902. The decrease for the year amounted to $1,462 or 0.36 per cent, this being a drop from the largest preceding increase of $34,296 in 1910. Of the decrease for 1915, $1,021 arose mostly in connection with the income from funded securities, while $441 came from railway operating revenue. The loss in railway operating revenue was occasioned by the following decreases and increases: decreases—passenger, $6,816; express, $920; milk, $93, and rent of tracks and terminals, $193; increases—special car, $674; milk, $27; rent of equipment, $55; rent of buildings, $259; power, $6,542, and miscellaneous, $25.

The loss in earnings was more than met by a decrease of $2,846 in the $192,037 of operating expenses. Thus despite a rise of $704 in taxes the operating income at $185,541 showed an increase of $1,701 and the gross income at $188,519 an increase of $679. The decrease in operating expenses resulted from decreases of $5,119 for conducting transportation and $7,641 for power expenses, and increases of $82 for maintenance of way and structures, $5,804 for maintenance of equipment, $495 for traffic expense and $3,524 for general and miscellaneous expenses.

Interest on funded debt increased $4,222 and miscellaneous debits $1,292, while interest on unfunded debt dropped $4,534, so that the deductions from gross income showed a net increase of $979. The surplus at the end of the year, amounting to $55,267, was $300 less than at the end of the preceding year. The company's operating revenue per mile was $10,544, a decrease of $11, while the operating expenses per mile were $5,001, a decrease of $74, giving an increase of $63 in the net operating revenue per mile of $5,533. The ratio of operating expenses to operating revenues was 47.52, a decrease of 0.70 per cent, and the ratio of operating expenses and taxes to operating revenue was 54.07, a decrease of 0.48 per cent. The total expenditures for additions and betterments for the year were $28,554. During the year three 42-ft. old-type Brill cars were entirely rebuilt and converted into 48-ft. semi-steel cars, and a number of other cars were remodeled and practically rebuilt.

Dominion Power & Transmission Company, Ltd.

The statement of income, profit and loss of the Dominion Power & Transmission Company, Ltd., Hamilton, Ont., for the year ended Dec. 31, 1915, follows:

Gross earnings	$2,353,956
Operating expenses	1,352,001
Net earnings	$1,001,955
Transfer to maintenance and renewal account	109,640
Balance	$892,315
Bond and other interest	384,772
Surplus earnings	$507,543
Balance from 1914	1,020,405
Total	$1,527,948
Dividends declared	386,613
Bad debts, etc., written off	2,076
Reserve account	500,000
Balance for 1915	$639,259

The gross earnings of the company suffered a decrease of $42,011, or 1.7 per cent during 1915, while the operating expenses also decreased by $38,846, or 2.8 per cent, so that the net earnings lost only $3,165, or 0.3 per cent. The unexpended allowance transferred to the maintenance and renewal reserve, however, increased $8,617, or 8.5 per cent, and the amount for interest payments $7,666, or 200 per cent, with the result that the surplus earnings for the year decreased $19,448, or 3.6 per cent. During the year the company continued its policy of setting aside an allowance of 20 per cent of the gross earnings for maintenance and renewals.

The depression and unfavorable business conditions of 1914 continued during the first six months of the year and even through August, 1915, and during this period the decline in the earnings continued. The falling off was somewhat emphasized during June, July and August on account of jitney competition, and up to the end of August the gross earnings had declined $128,438, as compared with the same period in 1914. During the remainder of the year, however, the showing was reversed, so that the net decrease was only $42,011, as before stated. The largest part of the recovery took place in November and December, which seems to augur well for 1916. Of the company's employees eighty-three have joined the military forces of the empire.

Toronto Railway

The statement of income, profit and loss of the Toronto (Ont.) Railway for the year ended Dec. 31, 1915, follows:

Gross earnings	$5,694,136
Operating, maintenance charges, etc	3,250,612
Net earnings	$2,443,524
Interest on bonds	$167,357
Percentage on earnings	868,254
Pavements, taxes, etc	215,424
Total	$1,251,035
Surplus earnings	$1,192,489
Balance from last year	4,792,370
Total	$5,984,859
Dividends, four of 2 per cent	957,952
Surplus carried forward	$5,026,907

During 1915 the company showed a loss of $432,690 or 7 per cent in gross earnings, but in view of the abnormal traffic conditions brought about by the continuation of the European war, and in view of the showings for the period made by other Canadian companies, it is believed that the company on the whole made a better showing than might have been expected. The operating, maintenance charges, etc., were less by $278,934 or 7.9 per cent than in 1914, so that the net earnings made a better showing, the decrease for the year being $154,026 or 5.9 per cent. Reductions in bond interest of $15,142 or 8.3 per cent, and in civic tax requirements of $58,842 or 5.2 per cent, made a further improvement in the amount available for dividends, which in view of the existing conditions were earned by a satisfactory margin.

The surplus earnings on the company's capital stock were at the rate of 9.93 per cent, which compares with 10.56 per cent in 1914 and 14.85 per cent in 1913. It should be noted that while there was an improvement in operating expenses, the operating ratio for 1915 being 57.9 per cent as compared to 58.4 per cent in 1914, the rate is still higher than that in any year from 1905 to 1913, inclusive, some preceding low figures being 51.4 per cent in 1909, 51.6 per cent in 1910 and 52.2 per cent in 1913. The passenger earnings in 1915, amounting to $5,611,297, suffered a decrease of $432,216 as compared to the 1914 results. This was brought about by a decrease of 10,904,895 in the total of passengers carried, the traffic for the year being 142,061,258 passengers. There were 62,398,638 transfers, a decrease of 3,379,384.

Bay State Street Railway, Boston, Mass.—The Massachusetts Public Service Commission has concluded the hearing on the application of the Bay State Street Railway to the commission for permission to issue 7357 additional shares of first preferred stock to be offered to stockholders at par; $400,000 of first mortgage bonds of the Boston & Northern Street Railway and $300,000 of like bonds of the Old Colony Street Railway.

Birmingham, Ensley & Bessemer Railway, Birmingham, Ala.—Counsel for the bondholders of the Birmingham, Ensley & Bessemer Railway, which was bought in by the reorganization committee for the bondholders at receivers' sale, are reported to have said that the Birmingham Railway, Light & Power Company has signified its willingness to take over the property for $1,500,000, which is much less than the original cost of the system. It is stated that the bondholders of the Birmingham, Ensley & Bessemer Railway are not in position to refinance the company and that it is proposed to sell the property to the Birmingham Railway, Light & Power Company, with an option to the city to be permitted to take over the lines at some future time if it desires to do so and it can be done legally.

Brooklyn (N. Y.) Rapid Transit Company.—The New York Public Service Commission, First District, has ordered that a public hearing be held on April 3 on the application of the New York Municipal Railway Corporation for permission to issue $697,500 of additional capital stock. The authorized capital of the company is $2,000,000, of which $100,000 was approved by the commission in January, 1913, and issued; an additional $100,000 was approved by the commission in August, 1913, and issued, making $200,000 outstanding at the present time. The new issue of $697,500 is wanted to pay commissions for the sale of $60,000,000 of six-year 5 per cent notes of the Brooklyn Rapid Transit Company, issued toward the purchase of a like amount of first mortgage 5 per cent gold bonds, to enable the company to finance immediate obligations under the dual system contracts, and counsel fees in the same matter.

Freeport Railway & Light Company, Freeport, Ill.—Application has been made to the State Public Utilities Commission of Illinois for permission to merge the Tri-County Light & Power Company, with head offices at Aledo, Ill., and the Freeport Railway & Light Company, Freeport, Ill., with the Illinois Northern Utilities Company, with head offices at Dixon, Ill.

Fresno (Cal.) Interurban Railway.—The Fresno Interurban Railway has filed with the Railroad Commission of California an application for authority to issue $150,000 of bonds and $60,000 of stock to cover the cost of construction of its main line to the Centerville Citrus District, and to issue $150,000 of certificates of indebtedness at 6 per cent, for not more than fifteen years, for which subscriptions are to be obtained from property owners along the line of a proposed railway extension. The company proposes to amend its articles of incorporation for the changes in its line, and to give a new deed of trust to provide $180,000 to redeem the bonds already issued and to be issued under the new deed, and $175,000 of bonds for the planned Centerville extension. This series will be respectively A and B.

Galveston-Houston Electric Company, Galveston, Tex.—The 1915 annual report of the Galveston-Houston Electric Company filed with the city of Houston is said to show a small return on the investment. The net earnings for reserves, depreciation and dividends was a deficit of $141,437 on an investment of $2,944,000 in bonds and $1,650,000 in stock. The gross earnings totaled $433,916, while operating expenses (not including depreciation) amounted to $198,006, taxes to $17,754, interest charges to $166,835, and bond sinking-fund charges to $29,465. The poor showing made by the company is attributed mostly to the damage and loss of traffic caused by the storm during last August. The expenditures for storm damage repairs totaled $163,293.

Hagerstown & Frederick Railway, Frederick, Md.—The Hagerstown & Frederick Railway has asked permission of the Maryland Public Service Commission to issue $200,000 of first and refunding bonds to retire $200,000 of first mortgage 6 per cent bonds falling due on May 1.

Houston (Tex.) Electric Company.—According to the annual report for 1915 filed with the city officials, the Houston Electric Company on its outstanding stock of $5,000,000 and bonded indebtedness of $2,500,000 secured net earnings for reserves, depreciation and dividends of only $46,805. The gross earnings amounted to $1,002,088, while operating expenses (not including depreciation) were $697,880. Taxes amounted to $79,036, interest charges to $135,470, and bond sinking-fund charges to $37,500. Repairs necessitated by the damages from the storm last August cost the company $5,396. The small earnings of the Houston company are considered to have been caused by jitney competition. Since the beginning of 1916, however, reports show that the loss from this source is rapidly growing less. Many of the jitney operators are going out of business, stating that the steadily increasing cost of gasoline, lubricants and tires renders their business unprofitable.

Louisville (Ky.) Traction Company.—Churchill Humphrey, son of Judge Alex P. Humphrey, counsel for the Louisville Traction Company, has been elected a member of the board of directors. He succeeds J. R. Turner, Jersey City, N. J., who was chosen under the New Jersey resident director law. All the old officers of the company were re-elected at the meeting of the board in Louisville.

Philadelphia (Pa.) Rapid Transit Company.—The Philadelphia Stock Exchange has been notified that the proposed plan for the extension of the Philadelphia Rapid Transit Company voting trust agreement to Feb. 20, 1921, has been declared operative and that until further notice voting trust certificates will be received for stamping of the extension and certificates of stock of the company received for deposit under the agreement. The plan for the extension of the agreement was noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, page 333.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—Although the San Francisco, Napa & Calistoga Railway had heavy damage suits to meet as the result of a wreck in June, 1913, it came through the year 1915 with a deficit of only $10,325. This made a total deficit of $84,913, a deficit of $74,588 having been incurred in 1914. The total operating receipts for the last calendar year were $227,749, while the operating expenses, including injury claims, damages, etc., amounted to $147,901, making the net operating income $79,843. From this was deducted interest on funded debt, taxes, rents, etc., to the extent of $90,168, leaving a deficit of $10,325. The company has 44.697 miles of main tracks, sidings and turnouts. The foregoing figures are taken from the yearly statement made to the State Board of Equalization.

Steubenville (Ohio) Railway.—The Steubenville Railway, controlled by the Virginia & Ohio Securities Corporation, has been authorized by the Ohio Public Utilities Commission to issue car trust certificates in the sum of $12,600. The notes are to be in favor of the J. G. Brill Company, Philadelphia, Pa., in the sum of $3,150 each, payable in twelve, twenty-four, thirty-six and forty-eight months from date and are to bear interest at 6 per cent. The certificates are to be issued as evidence of deferred payments for three cars purchased from the Brill Company.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio.—The Toledo, Bowling Green & Southern Traction Company has applied to the Ohio Public Utilities Commission for permission to sell $141,500 of its first mortgage bonds to reimburse the company for improvements already made and to provide funds for improvements in contemplation.

Toronto (Ont.) Civic Railway.—The operation of the Toronto Civic Railway at a 2-cent fare or six tickets for 10 cents has resulted in a deficit of $380,000 since the lines were placed in service three and a half years ago. The revenue increased from $166,994 in 1914 to $199,300 in 1915. Works Commissioner R. C. Harris, who is general manager of the lines, has always wanted a 3-cent fare, but the City Council decided against that rate. The newly-appointed Transportation Commission will have to deal with the civic car deficit as one of its most pressing questions.

Trans-St. Mary's Traction Company, Sault Ste. Marie, Mich.—The Lake Superior Corporation through the subsidiary Algoma Steel Corporation has arranged for the sale to the Great Lakes Power Company, Ltd., of its water-power interests and its street railway and ferry business at Sault Ste. Marie, Ont., controlled by the Trans-St. Mary's Traction Company and the International Transit Company. The purchaser, a new $2,600,000 corporation, pays a large sum in cash to the Algoma Steel Corporation, which the latter will use in the development of its steel plants. The Great Lakes Power Company, Ltd., will spend about $2,000,000 in power and industrial development at the "Soo." Some 15,000 additional electrical horsepower will be developed at the rapids, making 30,000 in all on the Canadian side. With this deal the Algoma Steel Corporation withdraws from the power, street railway and ferry business and will give its sole attention to the steel plant.

United Gas & Electric Corporation, New York, N. Y.—In connection with the declaration of a dividend of 1¾ per cent on the $9,453,000 of first preferred stock of the United Gas & Electric Corporation, payable on April 1 to stock of record of March 23, it was announced that hereafter dividends on this stock would be paid quarterly beginning April 1 instead of half-yearly as heretofore.

United Railways Investment Company, San Francisco, Cal.—It is reported that refinancing plans are under discussion by the United Railways Investment Company, the holding company of the United Railroads of San Francisco. The purpose of the board is said to be to work out an adjustment which will enable the company to retire or fund its outstanding preferred dividend scrip and make cash disbursements on its cumulative 5 per cent preferred stock. The preferred dividend scrip contains a provision that so long as any of it is outstanding no cash dividends can be paid. On May 1, 1906, a dividend of 4.75 per cent was paid on the preferred stock in full for accumulated dividends to Sept. 30, 1905. This payment was made in interest-bearing scrip instead of cash, owing to the earthquake and fire in San Francisco. In July, 1906, and January, 1907, additional scrip dividends of 2.5 per cent each were paid, but none has been paid since that time.

DIVIDENDS DECLARED

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent., preferred.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred; quarterly, 1½ per cent, common.

Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1 per cent, prior preferred.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred.

Greene & Coates Streets Passenger Railway, Philadelphia, Pa., quarterly, $1.50.

Harrisburg (Pa.) Railways, 1½ per cent, preferred.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

International Traction Company, Buffalo, N. Y., quarterly, 1¾ per cent, 7 per cent first preferred; quarterly, 1 per cent, 4 per cent preferred.

Iowa Railway & Light Company, Cedar Rapids, Iowa, quarterly, 1¾ per cent, preferred.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Mohawk Valley Company, New York, N. Y., quarterly, 1½ per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Philadelphia Company, Pittsburgh, Pa., 6 per cent, preferred.

Philadelphia & Western Railway, Upper Darby, Pa., quarterly, 1¼ per cent, preferred.

Porto Rico Railways, Ltd., Ponce, Porto Rico, quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly 1¾ per cent.

Republic Railway & Light Company, Youngstown, Ohio, quarterly, 1½ per cent, preferred.

South Carolina Light, Power & Railways Company, Spartanburg, S. C., quarterly, 1½ per cent, preferred.

Tidewater Power Company, Wilmington, N. C., 3½ per cent, common.

United Gas & Electric Corporation, New York, N. Y., quarterly, 1¾ per cent, first preferred.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Washington Water Power Company, Spokane, Wash., quarterly, 1¼ per cent.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE ELECTRIC RAILWAY, SANFORD, ME.						
1m., Feb.,	'16	$21,081	*$19,004	$2,077	....	....
1 " "	'15	20,960	*19,977	983	....	....
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.						
1m., Feb.,	'16	$144,233	$93,455	$50,778	$45,503	$5,275
1 " "	'15	130,652	88,772	41,880	41,922	†42
8 " "	'16	1,317,415	840,499	476,916	361,193	115,723
8 " "	'15	1,372,173	870,131	502,042	345,980	156,062
CITIES SERVICE COMPANY, NEW YORK, N. Y.						
1m., Feb.,	'16	$673,406	$18,357	$655,049	$44,186	$610,863
1 " "	'15	388,164	13,047	375,117	40,833	334,284
12 " "	'16	5,002,685	183,453	4,819,232	495,485	4,323,747
12 " "	'15	3,942,499	130,266	3,812,233	443,333	3,368,900
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.						
1m., Jan.,	'16	$213,184	*$133,393	$79,791	$65,851	$13,940
1 " "	'15	194,212	*120,141	74,071	62,568	11,503
12 " "	'16	2,655,336	*1,519,039	1,136,297	795,697	340,600
12 " "	'15	2,523,323	*1,457,429	1,065,894	757,851	308,043
DALLAS (TEX.) ELECTRIC COMPANY						
1m., Jan.,	'16	$173,132	*$101,619	$71,513	$36,812	‡$36,700
1 " "	'15	179,353	*105,019	74,334	33,417	40,917
12 " "	'16	1,822,267	*1,116,775	705,492	407,958	‡300,735
12 " "	'15	2,187,161	*1,264,280	922,881	377,599	545,282
EL PASO (TEX.) ELECTRIC COMPANY						
1m., Jan.,	16	$105,282	*$48,568	$56,714	$4,672	$52,042
1 " "	'15	92,402	*43,996	48,406	4,185	44,221
12 " "	'16	994,769	*525,632	469,137	50,855	418,282
12 " "	'15	1,041,481	*569,919	471,562	51,258	420,304
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.						
1m., Jan.,	'16	$24,835	*$17,041	$7,794	$5,522	$2,272
1 " "	'15	20,015	*16,026	3,989	5,604	†1,615
12 " "	'16	281,480	*158,552	122,929	66,435	56,494
12 " "	'15	274,511	*179,686	94,825	67,058	27,767
INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.						
1m., Feb.,	'16	$3,036,983	$1,197,042	$1,839,941	$1,167,939	‡$709,234
1 " "	'15	2,707,690	1,035,026	1,672,664	1,077,932	‡644,687
8 " "	'16	23,053,762	9,085,816	13,967,946	8,977,633	‡5,364,771
8 " "	'15	21,857,127	8,547,437	13,309,690	8,669,525	‡5,020,996
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY						
1m., Feb.,	'16	$2,036,166	$1,150,743	$885,423	$816,738	$68,685
1 " "	'15	1,833,777	1,090,922	742,855	812,145	†69,290
8 " "	'16	16,607,058	9,311,215	7,295,843	6,529,309	766,534
8 " "	'15	15,777,296	9,163,401	6,613,895	6,472,515	141,380
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m., Jan.,	'16	$669,593	*$431,271	$238,322	$182,650	$55,672
1 " "	'15	670,885	*421,650	249,235	178,139	71,096
12 " "	'16	7,558,290	*4,764,384	2,793,906	2,186,496	609,410
12 " "	'15	8,367,824	*4,994,023	3,373,801	2,123,097	1,250,704
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Feb.,	'16	$810,420	$523,051	$287,369	$136,345	$151,024
1 " "	'15	717,749	493,881	223,868	129,893	93,975
2 " "	'16	1,640,703	1,066,250	574,453	282,296	292,157
2 " "	'15	1,489,794	1,025,421	464,373	273,849	190,524

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

STEUBENVILLE RATES UNREASONABLE

Conclusions of Interstate Commerce Commission in Steubenville-Follansbee Case

In the case of the city of Steubenville, Ohio, against the Tri-State Railway & Electric Company the Interstate Commerce Commission has decided that the commutation passenger fare of $8, for 100 rides between Steubenville, Ohio, and Follansbee, W. Va., is unjust and unreasonable, and has prescribed a maximum fare of $3.70 for fifty-two rides for the future. In concluding its decision the commission said:

"While the facts and figures relative to the cost, earnings, and operating expenses of the Steubenville company are interesting as showing that the company has suffered from its relations with affiliated companies and that it is in position to make better arrangements with respect to the matters specifically referred to, they do not furnish the sole standard from which to determine what are just and reasonable fares between Steubenville and Follansbee. Complainant submits comparisons with other fares between points on defendant's line and with the fare between Steubenville and Follansbee via the Pittsburgh, Cincinnati, Chicago & St. Louis Railway to show that the present fares charged by defendant are unjust and unreasonable.

"The 30 cents per car-mile which defendant pays for the use of the 1600 ft. of track in Market Street amounts to approximately one-fourth of a cent per passenger, which, added to 2.5 cents per passenger for the use of the bridge, makes a total deduction of 2.75 cents per passenger. In the following table this amount has been deducted from the Steubenville-Follansbee and Steubenville-Weirton fares in order to compare the net earnings per passenger.

	Miles	Net Earnings per Passenger	Net Passenger Mile Earnings
Steubenville-Follansbee:			
Single fare—			
Present	2.9	$0.0725	$0.025
If bridge toll and track rental reduced 40 per cent........	2.9	.0835	.029
Commutation fare—			
Present	2.9	.0525	.018
If bridge toll and track rental reduced 40 per cent........	2.9	.0635	.022
Proposed: $1 book of fourteen tickets with present deductions	2.9	.0439	.015
If bridge toll and track rental reduced 40 per cent........	2.9	.0549	.019
Steubenville-Weirton:			
Single fare—			
Present	5.7	.0725	.013
If bridge toll and track rental reduced 40 per cent........	5.7	.0835	.015
Commutation fare—			
Present	5.7	.0525	.009
If bridge toll and track rental reduced 40 per cent........	5.7	.0635	.011
Wellsburg-Follansbee: Single fare...	4.4	.05	.011

"It will be noted from the above table that the net earnings per passenger for the 2.9 miles between Steubenville and Follansbee are the same as for the 5.7 miles between Steubenville and Weirton, and greater than for the 4.4 miles between Follansbee and Wellsburg. It will be further noted that the net earnings from a $1 ticket for fourteen rides between Steubenville and Follansbee would not compare unfavorably with the net earnings between the other points shown.

"The Pittsburgh, Cincinnati, Chicago & St. Louis Railway has a branch line running between Steubenville and Follansbee. The distance via this line is 4.4 miles, and it sells monthly fifty-four-ride commutation tickets for $3.25, or a net one-way fare of about 6 cents. The train schedules of this line, however, are such that the employees of the industrial plants at Follansbee cannot use the service.

"Upon consideration of all the facts of record it is the finding and conclusion of the commission that defendant's charge of $8 for 100 rides between Steubenville and Follansbee is unjust and unreasonable, and that a reasonable maximum charge for the commutation service between said points would not exceed $3.70 for fifty-two rides. The record does not warrant a finding that the one-way or round-trip fares are unreasonable."

WHAT IS GOOD SERVICE?

The *Electrogram*, published by the Puget Sound Traction, Light & Power Company, Seattle, Wash., contained in its issue of March 23 under the caption "What is Good Service?" the following:

"The basis of many a criticism of the street railway business, in general and in particular, is the statement that the street car company is not giving 'good service.' This seems to be the cause for much public dissatisfaction. The individual is inconvenienced just once by some wait, delay or discomfort, and decides forthwith and for all time that the service is bad.

"Before condemning the street car company for not giving good service, it is only fair to determine in your own mind what good service is. Just what do you expect from the street car service? What is the longest time that you think a person should ever be obliged to wait for a car? Do you think a person should ever be obliged to wait for a car? Do you expect to find a car waiting for you every time you are ready to go anywhere? Do you grow impatient when the car stops at other corners before arriving at your corner?

"In other words, do you expect taxicab service from the street cars? And if so, aren't you looking for a dollar's worth of service at the price of 5 cents?

"Street car service is not perfect. It is not 'individual service' such as you get at a high-class hotel. Rather it is a general service made to fit the general need, and at a very low price. But being a general service, sometimes the individual is obliged to accommodate himself to the service, because it cannot accommodate his personal wish. Thus he may find it necessary to take a car leaving a few minutes sooner than he cares to leave, because the majority of patrons want to leave at the earlier time, and there is not traffic enough to operate another car at his leaving time.

"It would be ridiculous to claim that our service is 'perfect.' We are selling transportation 'in bulk,' and we cannot give the same attention to each individual 5-cent sale which the taxicab company gives to each individual $1 or $2 sale. We believe we give every comfort, facility, protection we know how, under the conditions.

"In considering street car service you may compare it with 'perfect' service, or you may compare it with no service at all. Of course, neither comparison is fair. But they are about equally extreme.

"Before you determine, even in your own mind, that the street cars are not giving 'good service,' stop long enough to consider just what you expect, what you think it is fair to expect, and then see if the service is not 'good service,' everything considered."

ANOTHER COMPANY PUBLICATION DISCUSSES WOMEN AS MATERIAL FOR TRAIN CREWS

W. P. Strandborg, editor of *Watts Watt*, published by the Portland Railway, Light & Power Company, Portland, Ore., dedicated the issue of March 24 principally to the fair sex. Mr. Strandborg has been thinking about the employment of women on the cars in Europe. In projecting himself into the future he rambled on in this entertaining fashion:

"Several days ago as we were on our way over to Verdun to ask the Crown Prince to stop picking on Joffre and the rest of the boys, an old friend of ours remarked that in London and Glasgow the women folks were serving as conductors on the trams and were making a go of it.

"'Why doesn't the old Reliable Service Company try it?' he asked.

"Whereupon we thought out loud as follows and to wit:

"'They oughta make better motormen or motorines or whatever the feminine gender might be in a case like that.'

"'And why?' says he.

"'Oh, they'd be so handy with the switches; need only a hairpin or a buttonhook or something like that and in the winter time they could hang them in front of the radiator and they wouldn't need to bed 'em down with rock salt to thaw 'em out.'

"'But, you couldn't use 'em on the Broadway line,' he argued.

"'And, for why?' we came back.

"'Too many theaters and matinees and candy shops and things,' retorted he.

"'All right, put blinders on 'em, or else turn them loose on the Twenty-third Street line, where there are a lot of streets named after men, and it's Leap Year, at that and—'

"'Of course,' interrupted our friend, 'it wouldn't ever do to try the fair sisters on any of the East Side lines. It would take them all afternoon for each bridge, but, anyhow, I can see a good many advantages if we did have women running our street cars in spite of the bridge stuff and other such things to interfere with schedules. If you had a sweet and charming little miss a-hold of the controller in the front vestibule and a large round matron of sixty punching the transfers, yuh'd never have to tell the boys twice to "step forrud in the aisle, please!"'

"'Yes, but there's a rule against talking to the motorman, or the motoress, as it would be in this case.'

"'But, there's no law against looking and smiling and casting a cheerful and pleasant influence all around the vestibule, is there?'"

MODIFICATION OF BROOKLYN "CAR FULL" ORDER PROPOSED

Haven Emerson, health commissioner of New York, has appealed to the Public Service Commission to supply him with the data necessary for a modification of his "car full" order so that it can be extended to cover all the transit lines in Brooklyn. In his letter to Chairman Oscar S. Straus, Commissioner Emerson states that "it is apparent that universal compliance would be impracticable if the order already issued by the Department of Health to some of the lines was extended to all the lines in Brooklyn."

In his letter Commissioner Emerson said:

"Modification of the department's order might be considered under that following four headings:

"1—A modification demanded by the physical limitations of track, equipment and switching facilities.

"2—A modification during certain hours of the day, to be specified precisely for each particular line.

"3—A modification, according to weather conditions, on certain lines; discretionary power to be vested in the operating company, subject to report to and control by the Department of Health.

"4—A modification according to the type of car used on each particular line, some cars being so constructed as to permit standees, with safety to health, to a number exceeding 50 per cent of the seating capacity, whereas, with certain types of cars, notably the cross-seat cars, the allowance of 50 per cent standees, in addition to the seating capacity of the car, would be impracticable and dangerous to health.

"May I request consideration, by your commission, of this matter, so that the Department of Health may co-operate effectively with the Public Service Commission, to obtain traffic conditions which will not continue to menace the health of the community, as the present conditions do, and to accomplish this without increasing unduly the burdens of the operating companies or inconveniencing the traveling public more than is necessary, in their own interest?"

GOVERNOR SIGNS NEW JERSEY JITNEY BILL

The Governor of New Jersey has signed the bill passed by the Senate and the General Assembly concerning auto buses, commonly called jitneys, and their operation in cities. The words "auto bus," as used in the bill, are intended to include any automobile or motor bus commonly called a jitney, which indiscriminately accepts and discharges persons who offer themselves for transportation. No auto bus as defined in the bill is to be operated along any street in any city until the owner has obtained consent to operate from the board or body having control of public streets in the city. Moreover, no consent of any city for the operation of such a vehicle is to become effective until the owner has filed with the city an insurance policy in the sum of $5,000 secured from a company duly licensed to transact business under the insurance laws of New Jersey, to provide against loss from the liability imposed by law upon the auto owner for damages on account of bodily injury or death to any person as a result of an accident. Consent to operate an auto may be revoked by the governing body of a city after notice and hearing whenever it appears that the person to whom the consent was granted has failed to furnish and keep the insurance in force, or to comply with any terms or conditions imposed by the board which granted the license to operate.

On or before the tenth day of each calendar month every person included in the terms of the bill must file with the city treasurer of the city in which he operates a statement verified under oath showing the gross receipts from the business of the auto during the preceding calendar month and must pay to the treasurer of the city at that time 5 per cent of the gross receipts as a monthly franchise tax for the use of the city streets. If the route over which the auto is operated extends beyond the limits of the city, the operator must include in the statement made to the city the length of the route over which the auto is operated, both within and without the city, and pay as a franchise tax to the city 5 per cent of such proportion of the gross receipts as the length of the route in the city bears to the length of the whole route. The sum paid to the city in accordance with this requirement is to be in lieu of all other franchise taxes and municipal license fees. A fine of $100 for each offense is fixed in the case of all failures to meet this requirement. Any person operating an auto bus in any of the streets of any city in New Jersey at any time after sixty days of the date when the act becomes effective without having complied with the provisions of the act is to be deemed guilty of a misdemeanor and subject to the penalties provided by law.

TRAFFIC RULES FOR SAN FRANCISCO JITNEYS

Prominent business firms on Market Street, San Francisco, Cal., various improvement and other clubs and the United Railroads framed and filed a petition with the Board of Supervisors asking that the jitneys be prohibited from traversing Market Street eastward of Sixth Street. Charles N. Black, vice-president of the United Railroads, also filed with the Supervisors a separate statement in which it was set forth that so destructive have the jitneys become to the business of the company that unless relief is extended to the company it will have to curtail the service to the outlying districts.

On March 16 the Board of Supervisors decided to leave with the police department the regulation of jitneys on Market and Fillmore Streets as requested by the business men of these thoroughfares. The department took up the matter of regulating jitney traffic. As a result Police Sergeant Charles Goff, head of the traffic squad, promulgated the following rules, which went into effect on March 22:

Motor cars to run in two lines outside of the street car tracks on Market Street from the ferry to Sixth Street.

Jitneys to run in the line next to the curbs and privately owned vehicles on the inside.

Stopping places for jitneys near sidewalk fireplugs to be mapped out.

Jitneys prohibited from passing one another unless the car ahead is either stopped or disabled, and from cutting across the line of private automobiles.

Violations result in a trip to police headquarters, and in the event of a second offense the culprit's license will be revoked.

Increase in Freight Rates Asked.—The Birmingham Railway, Light & Power Company, Birmingham, Ala., has applied to the Public Service Commission of Alabama for permission to increase its freight tariffs 25 per cent.

Head Rests Provided on Interurban Cars.—The Illinois Traction System, Peoria, Ill., has decided to provide head rests for the backs of seats in interurban cars. These head rests will be maintained in a sanitary manner and are said to be the first of the kind ever provided by an electric line in the United States.

Selling Waste Paper.—The Kansas City (Mo.) Railways has made a contract for the sale of its waste paper at 20 cents per 100 lb. to a local waste paper company, which will furnish sacks and collect the waste. It is estimated that there will be about 10 tons a month. The company has been burning its waste.

Kentucky "Jim Crow" Bill Killed.—The "Jim Crow" bill, which had passed the Senate of the Kentucky Legislature, died in the House during the rush hours of the closing days of the session. It was not called for by the rules committee. Mayor John H. Buschemeyer, Louisville, has suggested an organized effort to establish a custom of voluntary segregation.

Suit for Reduction of Fare Discontinued.—The City Council of Belleville, Ill., has instructed the city attorney to dismiss the fare suit of the city against the East St. Louis & Suburban Railway, East St. Louis, Ill. This suit is now pending before the Illinois Public Utilities Commission. The city sought a reduction in fare between Belleville and East St. Louis.

Portland Jitney Test Case Dismissed.—On the ground that no points had been cited not already passed upon by the State Supreme Court when it held the law constitutional, Federal Judge Bean at Portland, Ore., has dismissed the complaint in the suit filed by Louis Mertz to test the Portland jitney ordinance. Mr. Mertz, a jitney driver, brought the case against Mayor Albee in person.

2,485,700 Passengers Handled in a Day on 213 Miles of Line.—On March 20 the Interborough Rapid Transit Company, New York, N. Y., carried the largest number of passengers of any single day in the history of the company, the number being 2,485,700, from which revenues amounting to $124,285 were derived. The company operates 85 miles of subway and 118 miles of elevated line.

Toronto Seeking Drastic Car Act.—Notice is given by the city of Toronto, Ont., that an application will be made by the city to the Legislative Assembly of Ontario for an act to compel the Toronto Railway to build, equip and operate upon its system 200 additional cars, or pay to the city a penalty of $500 a day for every breach of the act after the lapse of a period of three months from the passing of the act by the Assembly.

Jersey Accident Faker Gets Nine Months.—Maurice Abrams, the accident faker apprehended by the Public Service Railway, Newark, N. J., an account of whose arrest was published in the ELECTRIC RAILWAY JOURNAL of March 18, 1916, page 583, was sentenced on March 22 by Judge Seufert of the Special Sessions Court of Bergen County to serve a term of nine months in the Bergen County jail.

Decrease of 18 Per Cent in Accidents in St. Louis.—The pamphlet report of the United Railways, St. Louis, Mo., for the year ended Dec. 31, 1915, shows that the total number of accidents during 1915 as compared to those during 1914 decreased 18 per cent. The boarding and lighting accidents, which constituted the most numerous class, decreased 38 per cent. All classes of accidents showed a large decrease with the exception of collisions with automobiles, which showed an increase.

New Transfers in Use in Hartford.—It was announced that starting on April 1 the Connecticut Company would issue a new kind of transfer. The order announcing the change was posted recently and described the transfer as one that would have the day and date stamped across the face of the ticket. The transfer is to be in two parts. The center will be so arranged as to allow half of the ticket to be torn off for the morning, and in the afternoon, when a transfer is issued, it will not be good for any point, but will be punched from car to car.

Des Moines Rerouting Plans Made.—A change in street car routes and schedules proposed by the Des Moines (Iowa) City Railway will affect every line in the city except University, Fourth Street and Scott Street. Cross-town service will be instituted and two lines, one from East Des Moines and one from West Des Moines, will loop practically the entire shopping district between Ninth and Second Streets. The purpose of the long loops in the business district is to provide through service downtown and to cater to more short-haul business. It is expected that the crosstown service will speed up the cars.

Oakland Jitneys Bow to Ordinance Excluding Them from Business Zone.—The jitney drivers in Oakland, Cal., were inclined at first to ignore the ordinance passed recently fixing a district in downtown Oakland from which the machines were barred. The police were prompt to act and in a few days 165 cases involving disobedience of the ordinances were cluttering the police courts. The operators evidently thought better of the matter, however, for a compromise was reached with the prosecuting authority under which the cases were dismissed, a pledge being exacted that there will be no further violations by the original offenders.

Maryland Bus Company Suspends—The Maryland Motor Transportation Company, with offices in Baltimore and Laurel, Md., has applied to the Public Service Commission of Maryland for permission to abandon its franchise. In its petition the company states that it has been operating for the last ten months, but that the revenues were just sufficient to meet expenses, with gasoline at the former price. With the increase in the price of fuel, the company says, it would be impossible to continue service without entailing a loss. The petition states that all creditors will be paid in full but that the stockholders will probably lose their original investment.

Jitney Franchise Ordinances Before Memphis Council.—Three jitney franchise ordinances have passed their second readings before the Board of City Commissioners of Memphis, Tenn., over the protest of the Memphis Street Railway, which urged amendments out of justice to the company. Lovic P. Miles, attorney for the railway, protested on the ground that there was no necessity for additional transportation facilities, that the operations of jitneys would make it difficult, if not impossible, for the railway to comply with ordinances under which it is operating, and that the routes set down for the jitneys cover 69 per cent of the mileage already occupied by the company. Mr. Miles suggested amendments to provide a privilege tax on each car and indemnifying bonds to protect the city.

Commission Issues Statement on Scranton Jitney Case.—The Public Service Commission of Pennsylvania on March 21 issued the following statement regarding its decision in the Scranton jitney cases: "The decision of the commission on the complaints of the Scranton Railway vs. M. J. Walsh and others, in relation to the operation of autobuses, applies only to those particular cases and to the conditions there prevailing. These autobuses ran upon fixed routes, upon regular schedules, charged uniform fares and carried everyone who demanded their service. These the commission held to come within the provisions of the public service law. The Public Service Commission has made no decision where passenger buses or jitneys are operated under other conditions." The decision of the commission in this case was reviewed in this paper for March 25, page 627.

An Object Lesson.—The Rochester *Democrat and Chronicle* said in part in an editorial in its issue of March 17: "The plucky battle with the storm carried on by the New York State Railways, Rochester Lines, was so successful that all city lines were kept open, in spite of high winds, heavy drifts and the most difficult traffic conditions. The matter deserves some emphasis because of the efforts made last summer to bankrupt the street railroad system and substitute for it several hundred jitney buses. If the street cars had been taken off last summer, when the jitney fever was at its height, and the streets permanently turned over to their competitors, what would have been the plight of the workingmen and women of Rochester in the season of stormy weather and heavy snow? They would have had to walk, when walking was most difficult and conditions were most disagreeable, or else remain at home. Only a great organization could emerge triumphant from such a battle with the elements as had to be waged for three consecutive days this week. Persons who are prone to jump to the conclusion that operating a street railroad is like shoveling money out of the mint have had another set of facts impressed upon their minds. The street railway system does not suspend business when conditions of operation become difficult, and leave its patrons to flounder through snow drifts."

Personal Mention

Mr. W. R. Hall has resigned as general manager of the North Alabama Traction Company, New Decatur, Ala., to become connected with the Muscle Shoals power development.

Mr. John Catherman has resigned as assistant engineer of the maintenance of way department of the Illinois Traction System, with headquarters in Springfield, Ill., to become connected with the sales department of the Buda Manufacturing Company, Chicago.

Mr. Pakenham W. Beatty has resigned as chief engineer of the Lacroze Tramway Company, Buenos Aires, which position he has occupied since June, 1913. He will take the post of chief engineer of the Buenos Aires underground railway, belonging to the Anglo-Argentine Tramway Company, Buenos Aires.

Mr. D. I. Clough has resigned as master mechanic of the United Railways, Portland, Ore., and the Oregon Electric Railway and as superintendent of shops of the Spokane & Inland Empire Railroad, Spokane, Wash., to become master mechanic of the East St. Louis & Suburban Railway, East St. Louis, Ill.

Mr. Marion G. Charles has been appointed master mechanic of the United Railways, Portland, Ore., and the Oregon Electric Railway and superintendent of shops of the Spokane & Inland Empire Railroad, Spokane, Wash., to succeed Mr. D. I. Clough, whose appointment to the East St. Louis & Suburban Railway is noted elsewhere in this column.

Mr. Julien H. Harvey, recently appointed superintendent of efficiency of the Kansas City (Mo.) Railways, entered the service of the former Metropolitan Street Railway as a timekeeper. He served also as secretary to Bernard Corrigan, former president, before being made a division superintendent. He is not related to Mr. A. E. Harvey, superintendent of way and structures of the company.

Mr. W. R. Speer has been appointed general manager of the North Alabama Traction Company, New Decatur, Ala., to succeed Mr. W. R. Hall, resigned. Mr. Speer has been connected with the company for a number of years. Some time ago he was promoted to the position of superintendent. Before that he was electrical engineer and superintendent of overhead construction of the company.

Mr. W. J. Curle, Toronto, Ont., has been appointed general manager of the Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont., to succeed the late William Norris, who died a short time ago. Mr. Curle was formerly connected with the Canadian Pacific Railway and the Canadian Northern Railway, the latter road having control of the Chatham, Wallaceburg & Lake Erie Railway.

Mr. James B. Walker, assistant secretary of the Public Service Commission for the First District of New York, on March 20 was elected secretary of the commission, to succeed Mr. Travis H. Whitney, who became, by appointment of the Governor and confirmation by the Senate, a member of the commission. Mr. Whitney had been secretary of this commission from July, 1907, up to the time he was promoted to a commissionership. Mr. Walker has been assistant secretary since January, 1908, and has acted as secretary during the absence of Mr. Whitney.

Mr. William C. Harrington, who on April 1 became superintendent of transportation of the Kansas City (Mo.) Railways, was born on Aug. 31, 1872, in County Tipperary, Ireland. He came to the United States in 1882 and went to work for the Corrigan Consolidated Railway, Kansas City, in 1888, as stable boy at Fourth and Wyandotte Streets. He was successively promoted to driver, gripman, cable splicer, motorman and division superintendent. In August, 1909, he became connected with the general offices as assistant general superintendent under President Bernard Corrigan of the Metropolitan Street Railway.

Mr. James E. Gibson, who was appointed general manager of the Kansas City (Mo.) Railways, effective April 1, was born on Aug. 20, 1881, at Kansas City. He is the son of Mr. James S. Gibson, formerly judge of the circuit court. He was educated in the Kansas City public schools and was graduated from the University of Missouri in 1902. He acted as secretary to Congressman Cowherd in 1902-1904. He entered the service of the Metropolitan Street Railway on Dec. 1, 1904, and in June, 1905, was appointed secretary to Bernard Corrigan, then president. Mr. Gibson was made a division superintendent of the company in March, 1909, and was appointed general superintendent in June, 1910, serving in this capacity through the receivership of the Metropolitan and the reorganization of the company as the Kansas City Railways.

Mr. Alonson E. Stewart has resigned as roadmaster of the New York & Stamford Railway, the Westchester Street Railway and the Stamford and Norwalk divisions of the Connecticut Company to become connected with the Hartford Sand & Stone Company as vice-president and superintendent with offices at Hartford, Conn. Mr. Stewart was graduated from the Sheffield Scientific School, Yale University, in June, 1912. He entered business at once with the New Haven division of the Connecticut Company as a draftsman in the engineering department. Later he was connected with the track department and was made a sub-foreman and afterward a foreman. In December, 1913, he was promoted to roadmaster with headquarters at Port Chester, N. Y. Mr. Stewart is a member of the Connecticut section of the American Electric Railway Association, the Connecticut Society of Civil Engineers and the Yale Engineering Association.

Mr. A. S. Baldwin, chief engineer of the Illinois Central and the Yazoo & Mississippi Valley Railroads, and first vice-president of the American Railway Association, was elected president of that organization at the annual convention in Chicago during the week ended March 25. Mr. Baldwin was born at Winchester, Va., in 1861. He was educated in private schools, and after teaching school one year, entered railroad service in 1880. From 1884 to 1886 he was in the employ of the Baltimore & Ohio Railroad on the construction of its Philadelphia extension. He then went to the Chicago, Milwaukee & St. Paul Railway as principal assistant engineer on the construction of its bridge across the Missouri River at Kansas City. Following this, after a short period on the construction of what is now the Louisville, Henderson & St. Louis Railway, he entered the service of the Louisville & Nashville Railroad, where he remained from 1887 to 1901, serving successively as assistant engineer, assistant to chief engineer, and roadmaster. In the fall of the latter year he came to the Illinois Central Railroad as principal assistant engineer. In May, 1903, he was made engineer of construction, and in March, 1905, was appointed to the office of chief engineer, which position he now holds.

Mr. E. H. Le Tourneau, whose appointment as efficiency engineer of the Portland Railway, Light & Power Company, Portland, Ore., was noted in the ELECTRIC RAILWAY JOURNAL of March 18, was graduated from the University of Minnesota in the class of 1905 as an electrical engineer. He spent the summers during his university course with the Chicago Edison Company, as relief operator, and immediately upon graduation spent fourteen months in the testing department of the General Electric Company, at Schenectady, N. Y. Mr. Le Tourneau was next employed for approximately four years, beginning in July, 1906, by the New York Central & Hudson River Railroad, in the electric power division in New York City, and acted at various times as operator, load dispatcher, tester, inspector and office assistant under Mr. W. G. Carlton, superintendent of power. During the summer of 1910 Mr. Le Tourneau was employed as superintendent of the Exchequer Power & Mining Company, in charge of a small hydroelectric installation on the Merced River in California. In the autumn of 1910 he entered the employ of the Portland Railway, Light & Power Company as draughtsman, and worked on the design of hydroelectric and steam plans and substations. He was appointed superintendent of an hydroelectric plant of the company at Oregon City, Ore., and later was made assistant engineer under Mr. O. B. Coldwell, general superintendent of the company.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Highland Park & Royal Oak Railroad, Detroit, Mich.**—Incorporated to construct a line between Highland Park and Royal Oak. Incorporators: Burnette F. Stephenson, Robert E. Barber, John L. Austin, Charles S. Davidson, Carl G. Trebein, John B. Chaddock and Henry Wineman, Jr., all of Detroit and Highland Park.

FRANCHISES

San Pedro, Cal.—The Pacific Electric Railway has filed with the Railroad Commission of the State of California a petition for authority to abandon portions of its line in San Pedro, known as the "narrow-gage line," and also for authority to reconstruct instead a connecting track at grade between the Gardena-Dominguez main lines.

Henderson, Ky.—The Henderson Council has completed preparation of its new street railway franchise. It calls for an extension to Fernwood Cemetery, a reduction of fares to six tickets for 25 cents, 70-lb. rails on all lines within the year and $20 monthly franchise tax to be devoted to park maintenance. It would provide for free use of the city lines by the Evansville Railways and use of the tracks of the Henderson Traction Company by builders of other interurban lines touching Henderson. The present franchise of the Henderson Traction Company expires in October of this year.

Baltimore, Md.—The United Railways & Electric Company has asked the Council for a franchise across the new Hanover Street bridge.

Boston, Mass.—The Park and Recreation Commissioners have granted permission to the Boston Elevated Company to construct a loop track in Franklin Park, off Seaver Street and opposite Humboldt Avenue in connection with the company's plans for more extensive use of the Seaver Street line and the Egleston Square elevated station.

St. John, N. B.—An agreement has been entered into between the city of St. John and the St. John Railway, under which the company's charter, expiring in 1918, will be extended for five years. The company agrees to pay the city $5,000 for each single mile of track for laying concrete foundations under the rails as the street paving operations proceed.

Cincinnati, Ohio.—Stanley Shaffer, secretary of the West End Rapid Transit Company, notified the Cincinnati City Council on March 24 that the franchise intended for his company, as revised by the Republican Executive Committee, is not acceptable to it. Unless the franchise is restored to its original form and passed at an early date, Mr. Shaffer said the company will withdraw its application for a franchise. The company proposed to build a road 6½ miles long to bring the cars of the Cincinnati, Lawrenceburg & Aurora Electric Railway from Anderson's Ferry to Third and Race Streets in the heart of the city. [Jan. 1, '16.]

Warren, Ohio.—The Mahoning & Shenango Railway & Light Company has received a franchise from the Council of Warren to construct an extension on Main Street from South Street to Pine Street and on Pine Street to the southerly limits of Warren; also on South Main Street from Walnut to Second Street, on Second Street to Highland Avenue to Hoyt Street and on Hoyt Street to Tod Avenue.

Portland, Ore.—The Portland & Oregon City Railway recently petitioned the Council for a six months' extension of time on its franchise in which to complete its line within the city limits of Portland. The line has been completed in the city, as far as Bybee Avenue, and cars are operating between Bybee Avenue and the town of Milwaukie. Construction of other portions of the line in Portland, provided in the franchise, has been delayed because of difficulty in obtaining rails, inclement weather experienced during the winter months, and difficulties encountered in securing an agreement with the Spokane, Portland & Seattle Railway, the Oregon-Washington Railroad & Navigation Company, and the Portland Railway, Light & Power Company, for track connections and common user privileges on certain streets where the line must use tracks of the companies named. The Portland & Oregon City Railway has asked the Council, unless the other companies make an agreement with it for common user privileges, etc., in the near future on an equitable basis, to proceed to outline the terms of such an agreement.

***Ephrata, Pa.**—The Reading & Ephrata Street Railway has asked the Council of Ephrata for a franchise to construct a line on West Main Street from the Reading & Columbia Railroad to Church Street and Church Avenue to the borough limits. This company proposes to construct a line from Ephrata to Reading via Stevens, Denver, Reinholds Station, Galen Hall and Wernesville.

Sharon, Pa.—The Mahoning & Shenango Railway & Light Company has accepted the East Side street railway franchise passed by the Council on March 7.

West Reading, Pa.—The Reading & Womelsdorf Transit Company has received a franchise from the Council to construct double tracks on Penn Avenue from the bridge to Eighth Avenue.

Salt Lake City, Utah.—The Salt Lake & Utah Railroad has asked the Board of County Commissioners for a franchise to construct an extension through Granger and Pleasant Green, 15 miles.

TRACK AND ROADWAY

Northern Electric Railway, Chico, Cal.—This company plans to rebuild its bridge over the American River just outside of Sacramento.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—Owing to financial conditions, this company's project to construct a line between Fresno and Hanford has been abandoned.

Municipal Railways of San Francisco, San Francisco, Cal.—The Board of Supervisors recently voted $5,000 for the preparation of plans and specifications and for the purchase of materials for the new Twin Peaks tunnel railway. The sum of $3,755 was also voted for preliminary investigations and reports by the city engineer on projected extensions of the Municipal Railway system, including the Market Street portion of the Church Street extension, Potrero Avenue, Fifteenth Street and Park Hill, Townsend Street, Sunset district, transpark railway and Stockton Street line to Third and Townsend Streets.

Capital Traction Company, Washington, D. C.—This company expects to begin the removal of its tracks from M Street to the new Pennsylvania Avenue bridge over Rock Creek about April 15 and it is expected that the bridge will be opened to traffic about May 15.

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company is relaying with new ties and heavier ballast its Oregon Street line through the campus of the University of Illinois.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—It is reported that all preliminaries pertaining to the construction of this company's proposed line to connect Harrisburg, Marion, Pittsburg, Johnston City, West Frankfort and Herrin have been completed and construction will be begun about April 1. W. H. Schott, Chicago, president.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—An extension of the city line of this company at Wabash to the City Park and to the plant of the Service Motor Truck Company has been planned.

Gary & Interurban Railroad, Gary, Ind.—This company plans to construct an extension on Buchanan Street.

Richmond, Ind.—The Chamber of Commerce of Richmond has approved the proposed subsidy of $100,000 for a traction line to connect Richmond with Union City and to connect with the Cincinnati, Bluffton & Chicago Railroad. The county commissioners have been asked to call an election in Richmond and in Wayne Township to vote on the proposed subsidy. [March 18, '16.]

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—The Public Utility Commission of Kansas has granted the Kansas City, Kaw Valley & Western Railway the right to use a part of the old bridge across the Kaw River to reach the south bank. From the north side a bridge of pilings will be constructed between the old and new bridges. The road will operate on this to a point where the narrowing space between the bridges will not permit it to proceed further between them and at that point the rails will turn to the old bridge. The possibility of crossing the river before the new bridge is completed will, it is thought, hasten the extension of the interurban line from Lawrence to Topeka.

Bangor Railway & Electric Company, Bangor, Me.—This company is planning extensive repairs and improvements on both its local and interurban lines. The State Street tracks in Bangor will be replaced with heavier rails, the Old Town division will have new and heavy rails in places where the track has not already been renewed, and new rails will be laid through the village of Orono and at other points on the line.

Holyoke (Mass.) Street Railway.—A preliminary survey has been made by the engineers of this company and town officials of the proposed extension of the South Hadley Falls line.

Plymouth & Sandwich Street Railway, Plymouth, Mass.—Plans are being considered by this company to construct an extension from Fresh Pond to Sagamore Beach.

***Highland Park & Royal Oak Railroad, Detroit, Mich.**—Plans are being made by this company to construct a line between Highland Park and Royal Oak. The line will connect with the proposed extension of the Detroit United Railway on Oakland Avenue at the Six-Mile Road, extending north, northwest and west for about 6 miles to the Rochester interurban line on the Ten-and-a-Half Mile Road. The right-of-way for the line has been acquired by the Troyoak Land Company, whose officers and directors are practically the same as those of the railway company. The company proposes a four-track system, two tracks for fast limited service and two for local traffic. Robert E. Barber, secretary, Troyoak Land Company, Highland Park, is interested.

Kansas City (Mo.) Railways.—This company has recently let contracts for material to be used in the rehabilitation of its lines, as follows: 4000 tons of 7-in. T-rails to the Lorain Steel Company at $160,000; five carloads of track spikes to the Illinois Steel Company at about $6,000; 60,000 white oak ties to the Hobart Lee Tie Company at about $50,000.

Southwest Missouri Railroad, Webb City, Mo.—This company will reconstruct about 3 miles of track in Joplin, using 80-lb. Shanghai and 70-lb. A.S.C.E. rails. New rock and concrete foundations and new ties will be used.

Brooklyn (N. Y.) Rapid Transit Company.—Work has been begun by this company on the third-tracking of the Myrtle Avenue elevated line between Willoughby Avenue and Palmetto Street and the four-tracking of the Brighton Beach elevated line between Church Avenue and Malbone Street.

New York & Queens County Railway, New York, N. Y.—The Board of Estimate has voted to appropriate $144,000 for the repaving of the roadway of the Queensboro Bridge in accordance with the plans of the bridge department. The inside trolley tracks, which are used by the New York & Queens County Railway, will be torn up and not replaced, thus necessitating the operation of all bridge trolley cars on the one pair of tracks located on the bridge shelves.

Hamilton, Ont.—It is reported that arrangements have been made with the Dominion Power & Transmission Company by which the hydro-radial railways will operate over the tracks of the Hamilton Street Railway on their route through Hamilton.

Southern Oregon Traction Company, Medford, Ore.—Operation was begun on this company's line from Jacksonville to the eastern limits of Medford on March 27. It is reported that the company is considering the construction of an extension from Jacksonville to the Blue Ridge Mine, 30 miles, the city of Medford to assist in financing the scheme.

Pittsburgh (Pa.) Subway Company.—Plans have been submitted to the Pittsburgh Council by this company for the construction of a subway from Point District, Liberty Avenue and Ferry Street, along Oliver Avenue to Grand Street, thence to Webster Avenue and Fullerton Street, through Herron Hill to Grant Boulevard, along Center Avenue to East End. The cost is estimated at $15,000,000 to $20,000,000.

Nashville & Eastern Electric Railway, Smithville, Tenn.—It is expected that construction on this company's line will begin within the next month. The road is to be built from Smithville to Lebanon, connecting there with the Nashville, Chattanooga & St. Louis Railway. C. T. Edwards, Alexandria, is interested. [Jan. 22, '16.]

Corpus Christi (Tex.) Traction Company.—This company has accepted the franchise granted to J. H. Caswell last summer and will immediately begin work on the construction of an interurban line from Corpus Christi to Ward Island, 8 miles. A bond issue of $100,000 will be made. A. R. Ponder has received the contract for construction material, including engine and cars to handle the material. [Feb. 5, '16.]

San Angelo, Tex.—Representatives of Stone & Webster have completed a survey of conditions in San Angelo and have returned to Boston to render a report which is expected to determine whether or not this corporation will ask the municipality for franchises for a street railway system in San Angelo.

***Williamsburg, Va.**—A survey has been begun for an electric railway from Williamsburg to the proposed dynamite plant of E. I. duPont de Nemours & Company of Wilmington to be erected on York River about 4 miles from Williamsburg. It is also proposed to construct a line in Williamsburg. E. G. Mercer of the Mercer Engineering & Construction Company, Richmond, is interested.

Chester & City Point Railway, Chester, Va.—Surveys have been begun on this company's proposed line from Chester to Hopewell. The line will connect at Chester with the Seaboard Air Line Railway. As soon as the preliminary work is completed, construction on the track and roadbed will be begun and it is expected that the line will be ready for operation this summer. The line will be built by the Vaughan Construction Company of Roanoke. H. D. Eichelberger, Chester, president. [Feb. 26, '16.]

SHOPS AND BUILDINGS

Muscatine & Iowa City Railway, Muscatine, Iowa.—Work will be begun April 1 by this company on the construction of new shops and roundhouse at Muscatine.

Burlington County Transit Company, Mount Holly, N. J.—This company's repair shop and carhouse at Hainesport containing nine cars were completely destroyed by fire on March 29. The loss is estimated at $50,000.

Tidewater Power Company, Wilmington, N. C.—This company, which recently lost by fire its carhouse and machine shops at Ninth and Orange Streets, Wilmington, has begun work on the construction of a new repair shop, which is to be completed by May 1. All contracts for replacement on account of the fire have been closed.

Scioto Valley Traction Company, Columbus, Ohio.—Plans for the new terminal to be built for the Scioto Valley Traction Company at Columbus have been submitted to the Public Utilities Commission of Ohio.

POWER HOUSES AND SUBSTATIONS

Wilmington & Philadelphia Traction Company, Wilmington, Del.—The National Properties Company has placed an order with the General Electric Company for an additional turbine for the account of the Wilmington & Philadelphia Traction Company in Wilmington.

Madison Light & Railway Company, Madison, Ind.—The Public Service Commission of Indiana has granted the Madison Light & Railway Company permission to issue $13,000 in securities, the proceeds to be used for improvements to its power plant.

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—C. G. Taylor, receiver for this company, has been authorized by Federal Judge Killits to buy new boilers for the company's main power plant.

Manufactures and Supplies

ROLLING STOCK

People's Railway, Dayton, Ohio, is reported in the market for five new cars.

Lincoln (Neb.) Traction Company is not building any new cars, as recently reported.

International Railway, Buffalo, N. Y., is asking for prices on twenty large center-entrance cars.

Stark Electric Railroad, Alliance, Ohio, has ordered three all-steel center-entrance cars for city service.

Phelps-Dodge Company, New York, N. Y., is inquiring for prices on a small gasoline industrial locomotive.

American Sheet & Tin Plate Company, Pittsburgh, Pa., is reported as inquiring for prices on five motor and five trailer cars.

Scranton (Pa.) Railway is expecting to purchase five new cars, through the American Railways Company, Philadelphia, Pa.

Burlington County Transit Company, Mt. Holly, N. J., on March 29 lost nine cars in a fire which destroyed its carhouse and repair shops.

Holyoke (Mass.) Street Railway has ordered five car-bodies from the Wason Manufacturing Company and five from the Laconia Car Company.

Altoona & Logan Valley Electric Railway, Altoona, Pa., is expecting to purchase five new cars, through the American Railways Company, Philadelphia, Pa.

Public Service Railway, Newark, N. J., on March 26 lost by fire one of its cars near its car barn at Newton Avenue, Camden. Two snow sweepers were damaged.

Everett Railway, Light & Water Company, Everett, Wash., has ordered four cars of the Birney type from the American Car Company. The order was placed through the Stone & Webster Management Association, Boston, Mass.

Puget Sound Traction, Light & Power Company, Bellingham, Wash., has ordered four light Birney type cars from the American Car Company. The order was placed through the Stone & Webster Management Association, Boston, Mass.

San Antonio (Tex.) Traction Company has ordered fifteen cars from the American Car Company and fifteen from the St. Louis Car Company. The cars will have a seating capacity for thirty-six passengers and will be of the two-man type.

Schenectady (N. Y.) Railway was mentioned in the last issue as expecting to purchase sixteen new cars. The cars will be ordered, but the figure of total cost, owing to a typographical misplacement of the decimal point, appeared in type much too large.

Kankakee & Urbana Traction Company, Urbana, Ill., noted in the Electric Railway Journal of March 4 as being in the market for an express car, has purchased from the Niles Car & Manufacturing Company one 51-ft. baggage and express car.

Wisconsin Railway, Light & Power Company, Winona, Minn., has specified the following details of equipment for the seven prepayment, double-end inclosed cars which were recently ordered from the St. Louis Car Company:

Seating capacity	38
Weight of car body	17,000 lb.
Bolster centers, length	20 ft.
Length of body	28 ft.
Length over vestibule	42 ft.
Width over sills	8 ft. 6 in.
Width over all	8 ft. 9¼ in.
Height, rail to floor level,	3 ft. 3½ in.
Rail to trolley base	11 ft. 5⅝ in.
Body	semi-steel
Interior trim	cherry
Headlining	Agasote
Roof	arch
Underframe	steel
Air brakes,	Nat'l Brake & Elec. Co.
Control	West. K 51-A
Fare boxes	St. Louis
Fenders	H. B.
Gears and pinions	Nuttall
Handbrakes	St. Louis
Heaters	Peter Smith
Motors	2 307C V 1
Paint	Patton Paint Co.
Sanders	O. B.
Seats,	Pressed steel and cane, reversible
Step treads	Universal
Trolley base	U. S.
Trucks	St. Louis
Varnish	Patton Paint Co.
Ventilators	Peerless
Wheels	Griffin

Southwest Missouri Railroad, Webb City, Mo., has just completed three new cars and will purchase six additional cars as soon as orders can be placed. All cars have previously been built in the railway company's shops, but business has increased to such an extent lately that the cars cannot be built fast enough. All new cars will be double-end like those in service. Smoking compartments will be omitted from new cars.

Bangor Railway & Electric Company, Bangor, Me., has specified the following details for the three prepayment, center-entrance, radial truck cars which were recently ordered from the Laconia Car Company:

Seating capacity	42
Weight of car body	12,500 lb.
Single truck wheelbase	13 ft.
Length over all	33 ft.
Length over vestibule	32 ft.
Width over sills	8 ft. 2 in.
Height, rail to sills	2 ft. 1¾ in.
Height, sill to trolley base	10 ft. 2½ in. approx.
Body	Composite
Interior trim	Bronze
Headlining	Agasote
Roof	Arched
Underframe	Steel
Air brakes	West
Cables	West
Car trimmings	Laconia
Conduits and junction boxes	Crouse-Hinds
Control	K-36
Couplers	Laconia
Curtain fixtures	National
Curtain material	Pantasote
Destination signs	Hunter
Fenders	Libby
Hand brakes	Lord
Heaters	Consol.
Headlight	Golden Glow
Journal boxes	Laconia
Motors	West., 532-B, outside hung
Sanders	Kilbourn
Seats	Heywood Bros.
Seating material	Rattan
Step treads	Mason
Trolley catchers	Wilson
Trucks	Phila. Holding Co.
Ventilators	Automatic
Wheels	Griffin

TRADE NOTES

Baldwin Locomotive Works, Philadelphia, Pa., have moved their New York office from 50 Church Street to 120 Broadway.

Imperial Rubber Company, New York, N. Y., on and after May 1, 1916, will have its New York offices located in the Equitable Building, 120 Broadway.

Electric Storage Battery Company, Philadelphia, Pa., will on April 1 move its St. Louis office from the Fullerton Building to larger quarters at 1508 Federal Reserve Bank Building.

Holden & White, Chicago, Ill., have taken over the general sales agency of the Garland Ventilator Company, Chicago, and will represent the Drew Electric & Manufacturing Company, Indianapolis, Ind., in the Chicago territory.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued separate folders describing its form K trolley frog and its double-beam section insulator, form L 4.

Lincoln Bonding Company, Cleveland, Ohio, has issued the first number of the *Lincoln Magazine* which contains a description of the company's rail-bonding process.

Cowan Truck Company, Holyoke, Mass., has issued a catalog describing the various uses of its transveyor, a low-built hand truck for moving and storing heavy machinery and other material on movable wooden platforms.

Redmond & Company, New York, N. Y., have issued a reprint of an article which recently appeared in the *Independent*, entitled "Buying Bonds as Business Insurance." The article emphasizes the necessity for a reserve fund of high-class marketable bonds in all business organizations.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a folder which contains lists comprising nearly all the electric railways in Indiana and Ohio, which are users and most of which are contract customers or companies which have made repeat orders for tool-steel gears and pinions. The companies listed as users of this equipment operate 7121 motor cars as against only 192 motor cars operated by non-using companies.

Curtis Pneumatic Machinery Company, St. Louis, Mo., has issued Catalog No. 63, describing and illustrating its various types of air compressors, air hoists, trolleys and trolley systems, sand blasts, pneumatic and hydropneumatic elevators and jib and traveling cranes. Railway companies will find of interest the illustrated descriptions of pneumatic straightening presses for reclaiming wrecked steel cars, hoists on single I-beam trolleys for removing ashes from boiler pits, bracket jib cranes, mast jib cranes and self-supporting jib cranes for unloading rails.

Buda Company, Chicago, Ill., has issued a binder which includes all catalogs comprising its complete line of materials. These include motor cars for railroad inspection, section and maintenance service; track gages and levels; hand and push cars, track-laying cars and velocipedes; track-bonding drills; safety crossing gates; electric headlights; storage-battery shop, warehouse, industrial and freight-house trucks; station bumping posts; repair links for wrecking chains; rail benders; switch and semaphore stands; switch rods; tool grinders; car replacers and jacks.

Bailey Meter Company, Boston, Mass., has issued Bulletin No. 5, which describes briefly some of the different types of recording meters and testing instruments which have been developed during the past six years in the mechanical engineering department of the Fuel Testing Company, through the personal work and direction of E. G. Bailey. These meters and instruments are particularly adapted to the many needs of modern power plants, steel mills, and miscellaneous uses for measuring and recording the flow of steam, water, air and gases for any other fluids under practically all conditions of pressure, temperature and capacity.

Atlas Preservative Company of America, New York, N. Y., has issued a handbook entitled, "How to Keep a Clean Track," which contains information and instruction on how to obtain the best and most economical results through the use of the Atlas "A" weed killer and track preservative. The booklet contains a number of photographs showing excellent results obtained on electric railways. The data included in the booklet is based on years of practical experience with all types of vegetation throughout the United States, Central America and Cuba, Philippine Islands, Hawaii, Porto Rico and Canada. This company has also issued a booklet entitled "Atlas the Weed Killer," which treats in a more general way the uses to which this preservative can be employed.

Western Electric Company, New York, N. Y., has issued a catalog entitled "The Voice of the Road," which outlines and illustrates the necessary uses of the telephone equipment for interurban and street railways. The bulletin explains telephone dispatching means best management; cuts platform expense by adjusting service to the minute; improves headways by uniform spacing of cars after a blockade; allows quick rerouteing during such occasions as street parades; localizes blockades such as those caused by fires; procures a flexible schedule; keeps in touch with work cars, thus saving much unnecessary mileage for emergency trucks; allows for the ordering of short line cars with minimum inconvenience for passengers; meets complaints quickly; allows employees to obtain accurate time; accelerates first aid after accidents and allows for prompt investigation of accidents by the claim department.

NEW PUBLICATIONS

For the Railroads. By H. T. Newcomb, Bond Building, Washington, D. C. 192 pages, paper.

This book has been prepared by Mr. Newcomb for the railroads in order to place before the public some of the principal arguments against unwise statutory restrictions. The booklet is a compendium of useful data and general information in regard to the operation and regulation of steam railroad carriers.

Principles and Practice of Cost Accounting. By Frederick H. Baugh. Published by the author, P. O. Box 682, Baltimore, Md. 194 pages. Cloth, $3.

This book is a practical discussion of cost accounting, more attention being paid to the technique of the accounting involved in reaching an accurate determination of cost than to theoretical discussions of wage plans, efficiency tests, and the like. Mr. Baugh has ably summarized the general principles upon which cost accounting for manufactured articles is based, the application of these principles to the most common types of manufacture, and the illustration of the details involved. To his mind, the real value of cost accounting is found in a close analysis of the various contributing expenses, their classification and apportionment, and the assembling of statistics to show the composition of the total cost. The book is well supplied with tables and forms, and by no means the least interesting chapters are the final two, showing with concrete figures how departmental cost accounts are developed.

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.
Consolidation of Street Railway Journal and Electric Railway Review

Vol. XLVII NEW YORK SATURDAY, APRIL 8, 1916 No. 15

DO YOUR WORK YOURSELF

The Public Service Commission for the First District of New York may, as Chairman Oscar Straus says, "look with favor" upon 80-cent gas legislation for certain wards in Brooklyn and Queens, but we believe that such legislation would constitute a distinct retrogression in rate-making policy. The commission has had before it for a long time several cases affecting rates in the wards in questions, with the testimony all collected, and this should form the basis from which it should, if possible, fix the proper rates. If there are any legal technicalities that make action by the commission on the merits of the case impossible, it should render a formal opinion clearly stating the facts. To turn back the cases voluntarily into the turmoil of politics is nothing but a nullification of the potential usefulness of the commission. The gas cases in question may need expeditious treatment, but this should not be secured by the commission through shifting its duties if it is at all capable to act in the matter.

MORE LIGHT ON STEAM RAILROAD ELECTRIFICATION

In the electrification of steam railroads, history is being made and written at the same time. The successive chapters in this history are the accounts of the conspicuous and significant electrifications which have been installed, such as the Chicago, Milwaukee & St. Paul, the Norfolk & Western, the Great Northern Cascade tunnel, etc. Each of these is contributing its share to our store of technical and economic information. In this issue of the ELECTRIC RAILWAY JOURNAL is an article in which are described some of the early operating problems on one of the most recent electrifications. The spirit of this article is typical of that of the railroad men and manufacturers who have contributed to the rapid advance of heavy electric railroading. The experience of one has been placed at the disposal of all, whether this experience had developed virtues or defects in the equipment and in its installation and operation. An A. I. E. E. paper entitled "The Log of the New Haven Electrification," written a few years ago and now a classic, contains the story of the early failures and successes of that pioneer single-phase installation. A symposium comprising an important part of the program of the 1915 Deer Park convention of the A. I. E. E. consisted of similarly helpful records from several roads. There is everything to be gained from such frank interchange of facts in a field so new as this one, and those which Mr. Grimshaw has given us in his article this week indicate the attractiveness which such pioneer work must possess to the engineer who is fond of solving original problems.

CONCENTRATION IN CONVENTION PROGRAMS

Approximately one-sixth of this issue is devoted to a detailed report of the annual meeting of the Illinois Electric Railways Association. It is worth the space because the meeting was of an out-of-the-ordinary type. Its plan was unusually definite. Railroad men and manufacturers put their heads together in an effort to make and receive suggestions as to how to produce transportation more cheaply. They summoned theory as well as experience to their aid. Such concentration of effort and unity of purpose are bound to produce results. By focusing interest on one topic not only is valuable information brought to light, but the importance of the subject discussed (where it is important, as in this case) is impressed upon the association membership and beyond. There is undoubtedly a waste of energy and labor in the operation of electric cars, and any possible reduction of this waste should receive the most careful consideration. Savings are already being made, and the work is hardly begun. Such meetings as the one in question will further the movement. We predict that transportation in Illinois will cost less next year as the result of this discussion unless unit costs of material and labor advance abnormally.

WHY DOES THE CIRCUIT BREAKER OPEN?

A correspondent recently called attention to the phenomenon of the opening of car circuit breakers when the cars are descending grades at high speed with power on. As F. E. Wynne of the Westinghouse Electric & Manufacturing Company has had occasion to make a special study of this phenomenon, the editors asked him to state his theory in explanation and he has done so clearly in a letter printed in last week's issue. Naturally the first question that arises in one's mind in this connection is, "What is a motorman doing with power on under such circumstances anyway?" The answer is probably, "Making up time." The next question is, "How can a constant potential motor draw much power under any circumstances when running at high speed?" Examination of the characteristic current-speed curve of the series motor shows that the faster it goes the smaller is the current drawn from the line. While, under conditions of steady load and uniform line voltage the current could never reach a zero value, it approaches zero value as the theoretical limit. If under these conditions the power supply is interrupted for even an instant, say by poor contact at the trolley wheel, it is conceivable that the magnetic flux in the motors would be jarred out very quickly due to vibration. When power is restored the current will rise to abnormal values because, for the instant, there is no counter emf. in the circuit and there is only the resistance of the motors to limit its value. That the magnetic field does die away rapidly was indicated in results of tests of magnetic brakes made in 1904 by the Electric Railway Test Commission. These tests showed that if the brakes were not applied promptly there was an appreciable time lag before the field built up again. There is another probability in connection with the tripping of the circuit breakers in the present instance, namely, that the motors flash over. The sudden rise in current, combined with the high speed and accompanying vibration, provide conditions favorable for flash-over. This is the motor's protection against abuse. All of which goes to prove that there are advantages in addition to energy saving in coasting on down grades.

ANOTHER CONVERT TO PUBLICITY

With the beginning of hearings in Congress on the bill passed by the Senate to provide for a government armor-plate plant comes the announcement that the Bethlehem Steel Company will conduct a publicity campaign for the purpose of laying the merits, or demerits, of this proposition before the country. The formal announcement to this effect says that "In order that all concerned may have the clearest, most concrete and definite information this company can give on this question, so important both to the nation and to itself, the Bethlehem Steel Company will issue a series of statements to Congress. Copies will be supplied to the press, to public officials and to anyone interested."

The first of these statements is headed "Why should government money be spent for an armor factory?" and deals with two possible reasons for such an expenditure; namely, the insufficiency of existing plants and the possibility that the government could produce armor at a lower price than must be paid to private corporations. Other bulletins show that even if the government should immediately begin an armor plant it would not be turning out armor for three or four years, and when the campaign is completed the public will have before it, plainly and tersely stated, all the information and arguments that an intelligent man should have to enable him to make up his mind whether or not he would vote for a government armor plant.

It is evident from these bulletins that the company is following a carefully thought-out policy, the execution of which is in expert hands. This was also evident from the distribution of and press comment on, the remarks regarding armor plate in the company's recently-issued annual report, and the statements of the company's officials.

It is not difficult to apply the wisdom of the policy adopted by the Bethlehem company to the affairs of electric railways. What the Senate armor-plate bill proposes is that the government shall spend $11,000,000 for the purpose of duplicating facilities already in existence for the manufacture of armor. There is hardly a possibility that the government can make armor as cheaply as it is now being bought, but the Bethlehem company has offered to let the government make its own estimates of the cost of producing armor and agrees to furnish it at a price which will be as low as the lowest price at which the government could possibly make it.

The resemblance between the government armor-plant proposition and one to parallel an existing railway or lighting plant, or to duplicate their facilities, is too clear to require demonstration. It resembles, though perhaps not so closely, other situations with which public utilities have to deal. The Bethlehem company has shown what is the wise thing to do under such circumstances—adopt means to get the facts of the matter before the public. The only criticism that can be made in this connection is that the company did not begin its campaign of education before the Senate acted on the bill. But as it is, the House and the public are going to be informed as to the merits of the armor problem before the bill to establish a government plant becomes a law.

Like the case of the Du Pont company, recently referred to in these pages, the course pursued by the Bethlehem company will, we hope, impress public service corporations with the wisdom of a thorough-going policy of publicity, not only in emergencies, but all of the time and especially in anticipation of injurious legislation and regulation.

RETURNS IN UNREGULATED INDUSTRIES

Electric railways that are endeavoring to pay reasonable returns on their existing investments and at the same time attract the additional capital needed for betterments and extensions are fully aware of the fact that the question of a fair rate of return is not a purely academic one. While public service commissions generally admit the necessity of further development of regulated industries and are willing to allow a "reasonable" rate of return, they are led by their public interests to determine the permissible rate on the basis of their judgment of what the public should concede rather than on the basis of a comprehensive analysis as to what the controlled industries would be required to pay in the face of competition on all sides for money. They deal too much with arbitrary limits, such as legal interest rates, whereas they would in many cases do greater justice to utilities if they took into more full account the attractive rates of return that are so generally obtainable in the industries not under their control. Many attempts, it is true, have been made to find out such rates, but too often they have not been conclusive because the published reports of the unregulated companies have included in the assets good will, patents and other intangible values in such a way that the rate of return on the real investment could not be ascertained.

A noteworthy effort to overcome this fault and to show the true rate of return for unregulated industries, however, was recently made by J. E. Sterrett, a well-known public accountant, in an article in the March *American Economic Review*. Mr. Sterrett studied the various audit reports prepared by his firm and eliminated a considerable number which did not disclose the intangible amounts included in the assets, or which showed inflated profits because reasonable provision or allowance had not been made for management expenses. He finally had left 158 diversified and scattered companies reporting for the fiscal and calendar years in 1912 and 1913, when, in view of the general business conditions prevailing, the profits may safely be assumed to have been not more than a fair average. For these companies the annual profits, after providing for expenses of operation and management, including depreciation of plant and equipment, represented a return of 13.67 per cent on the real investment. Only 23 companies of the 158 earned less than the usual legal rate of interest, while for other companies the record was as follows: 117 cases, 8 per cent or more; 97 cases, 10 per cent or more; 86 cases, 12 per cent or more; 70 cases, 15 per cent or more; 44 cases, 20 per cent or more; 28 cases, 25 per cent or more; 17 cases, 30 per cent or more, and 10 cases, 40 per cent or more. On the other hand, as Mr. Sterrett points out, the maximum rate of return thus far allowed by the various State commissions for controlled enterprises has been 8 per cent, and in some cases it has been put as low as 7 per cent or even 6 per cent.

The objection may be made that the foregoing figures for the uncontrolled industries are for prosperous companies and do not reflect general conditions, but Mr. Sterrett explains that the public accountant examines both unsucccessful and successful enterprises. In fact,of the 23 companies before mentioned that earned less than the usual rate of interest, 19 earned less than 6 per cent, 14 earned less than 5 per cent, and 4 companies showed no return at all available for interest charges. Furthermore, it should be remembered that we are dealing with the high rates of return that have been secured by a group of unregulated companies selected at random, as contrasted with the maximum rates beyond which commissions are not disposed to allow any utility to go, however successful.

While competition in the unregulated fields is supposed to keep down profits just as regulation does in the case of the monopolistic utilities, Mr. Sterrett's data seem to show that regulation is the more severe taskmaster and thus far has permitted much less free play in the acquisition of profits. Commissions have been loath, as he says, to grant the utilities a return at all comparable to that being earned by unregulated enterprises, even when the latter are exposed to intense and active competition. What the commissions need is a deeper appreciation of the fact that it was only the speculative element of fair profits that made possible the early development of utilities. Fair profits commensurate with the risks involved and attractive in the competitive money market are just as necessary for the development of the future, and the public can accomplish the most good for itself by being liberal with the investors in obtaining the money required. Commissions may save the public a few cents in decreased rates, but they are more than likely thereby to cost the public dollars through the restriction of utility development, and such a penny-wise pound-foolish policy is far from being required by public self-interest.

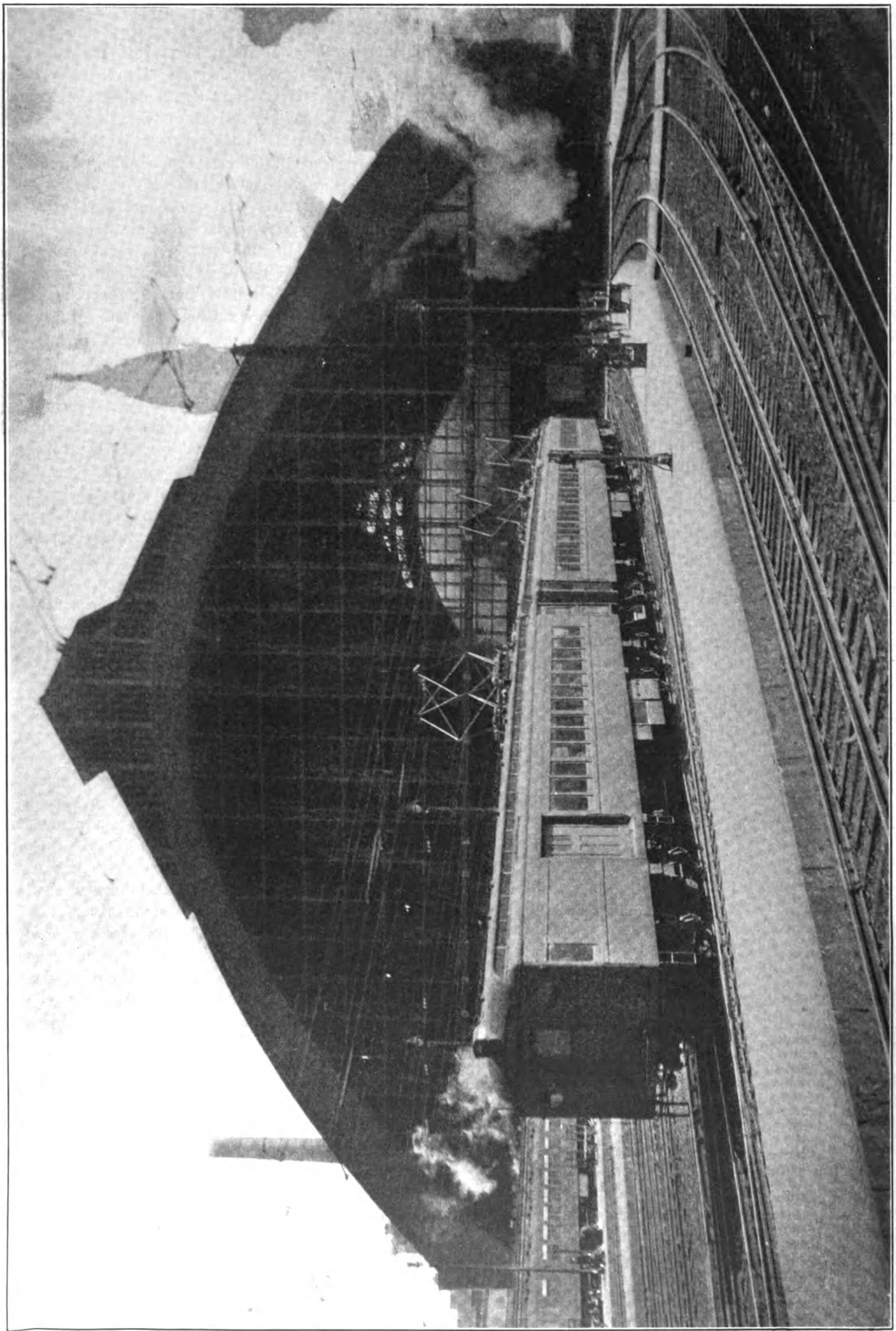
RELIABILITY IN OVERHEAD CONTACT SYSTEMS

We may assume for purpose of argument that the problems involved in designing an overhead contact system so that it will "stay put" have been largely solved. This leaves for consideration electrical strength and mechanical flexibility, both of which have been far from easy to obtain. Lack of these to the necessary degree caused the slight early operating difficulties on the Philadelphia-Paoli electrification. Doubtless every overhead contact heavy traction undertaking could furnish interesting stories along the same line.

The weak link in high-tension power work has always been the insulator. Insulation conditions are bad enough on transmission lines, but in supporting a contact system over a steam railroad they are much worse. Unfortunately the materials which are strong electrically, that is, having ability to resist puncture under electric stress, are weak mechanically. Furthermore, the insulator must be surrounded by air, which is not perfect as an insulating medium, necessitating the use of considerable bulk in the insulator merely to increase the jumping distance through the air. The insulating material must also be of special form to increase the surface creepage distance. All of this applies to overhead lines in general. In heavy railway work provision must be made for hammer blows and in many cases for smoke deposits in addition. When the Hoosac tunnel was to be electrified at 11,000 volts the engineers faced the insulation problem with even fewer data at command than they would have now. The conclusion reached was that all the insulation that there was room for should be put in, regardless of traditional factors of safety. This was done, and the result has justified the procedure.

Flexibility of contact wire is only less important than permanence of insulation. Bitter experience has demonstrated the futility of trying to provide a level contact wire of uniform resistance to upward pressure. The original New Haven overhead had double catenary messengers with stiff triangular hangers. It was unsuccessful until the auxiliary contact wire was added. The latest construction on this system is very flexible. Interurban railways learned the same lesson. For example, one road found that the best results followed when catenary hangers were spaced at long intervals. The general opinion seems to be that the contact wire should, in effect, lie upon the collector, the hangers being merely to hold it in a minimum height position when not in active contact service. Loop hangers permitting relative motion of messenger and contact wire have, therefore, become popular.

On the Philadelphia-Paoli electrification a few hard spots developed in the overhead, as was to be expected. There was slight trouble also with the section breaks. Smoke deposits on the insulators required the reinforcing of some of them. On the whole, however, the inauguration of the service was carried out with remarkable smoothness, and the experiments on the main line have solved the problems of the Chestnut Hill branch work now progressing well and the other extensions of the electric service which must come in due time.



P. R. R. Main Line Electrification—Electric Train Leaving Broad Street Station, Philadelphia

Operation of the P. R. R. Philadelphia-Paoli Electrification

Notes on the Plans Used for Eliminating the Difficulties Which Were Experienced During the Early Period of Operation and on the Organization of the Operating Staff in the Electrified Zone

By F. G. GRIMSHAW

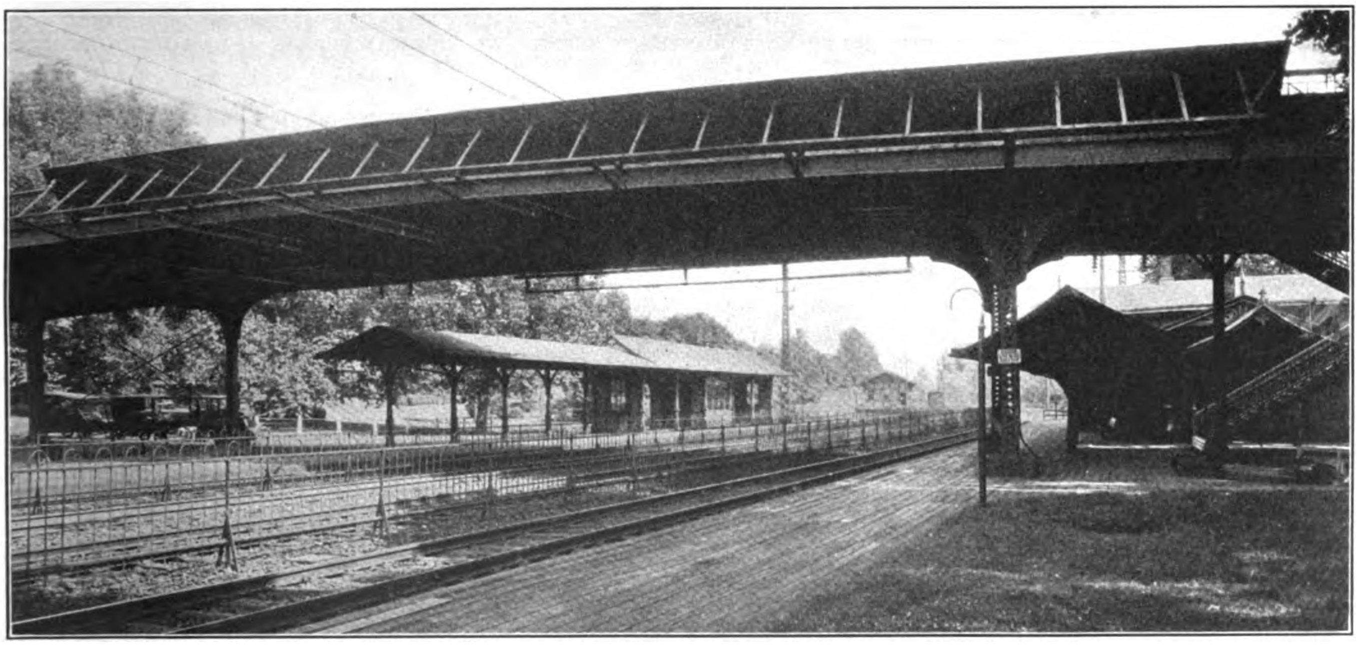
Assistant Engineer of Electrical Equipment, Pennsylvania Railroad, Philadelphia, Pa.

THE electrification of the main-line suburban service between Philadelphia and Paoli, a distance of 20 miles, was undertaken for the purpose of relieving the congestion of train movements at Broad street station which accompanied all-steam operation. A detailed study of the conditions at this point had demonstrated that by handling this service with multiple-unit electric trains instead of steam locomotives, a very considerable reduction in the number of shifting movements could be made and the traffic density at the throat of the station so reduced as to provide, in effect, a reasonable margin of reserve capacity.

The 11,000-volt single-phase system was selected for this installation as best adapted to possible future extension beyond the zone of local traffic, and construction work was begun in March, 1914. Arrangements were made with the Philadelphia Electric Company to supply power for this service from its main plant at Christian street and the Schuylkill River, and four submarine cables were installed between that point and a substation constructed by the railroad company on the opposite bank of the river. Between this point and a second substation located in the West Philadelphia yards, four single-phase transmission lines were installed, two of these lines being carried through to the west end of the electrified zone at Paoli and supplying power to substations located at that point and at Bryn Mawr, the other two lines being provided to take care of the proposed extension of the electric service to the Chestnut Hill branch of the New York division.

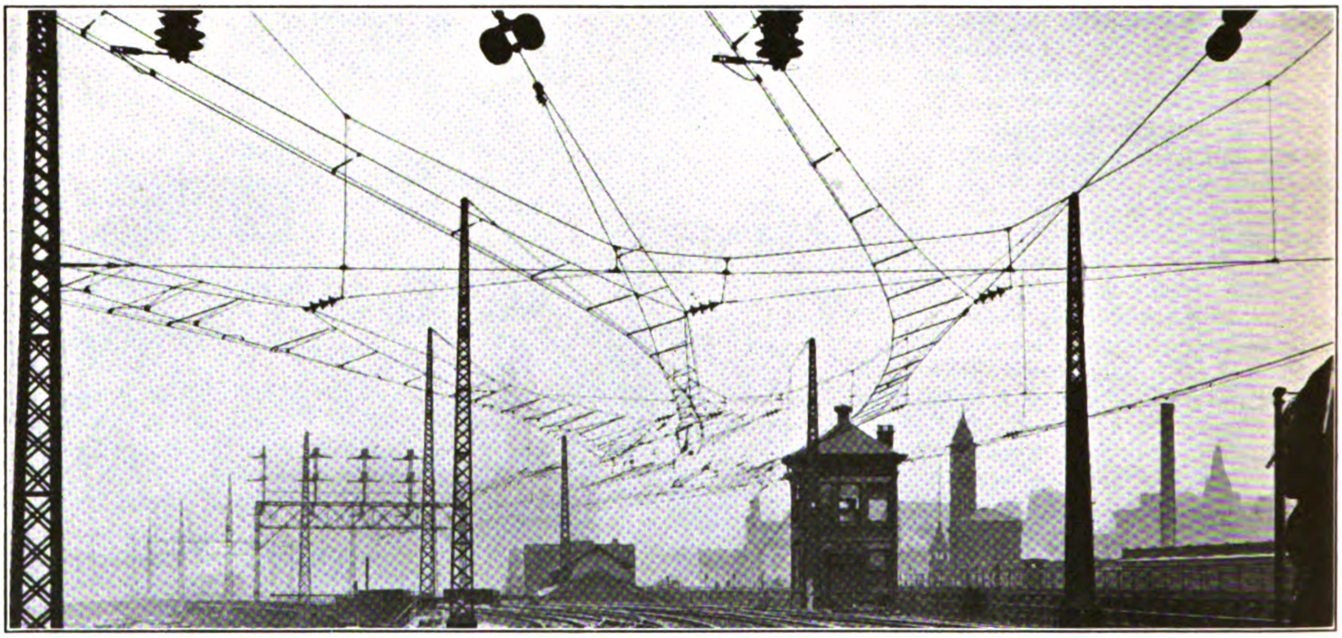
The catenary system over the main tracks was divided into three electrical sections, one, including the station and approach tracks at Broad street and the main tracks east of West Philadelphia station, to receive power from West Philadelphia substation; a second, including the main tracks between West Philadelphia and Bryn Mawr, to be supplied from the substations at those points, and a third, comprising the main tracks between Bryn Mawr and Paoli, to take power from substations at each end of that section. In addition to the electrified main tracks, a portion of West Philadelphia car yard and the entire yard at Paoli were equipped for electrical operation.

In the course of the construction work it was found desirable to complete and energize the lines and substations in successive steps with a view to testing out the equipment and incidentally to instruct the enginemen and trainmen, all of whom were previously employed in steam service. The lines first energized included one transmission line to Bryn Mawr substation and all contact wires between Rosemont and Overbrook, a four-track section, approximately 6 miles in length. Interlockings located at Overbrook and Bryn Mawr made it readily possible to operate test trains between these points with a minimum of interference to regular traffic, and such trains were run in this section for a number of weeks with Bryn Mawr substation as the power distributing point. Following successively this initial step, the energized lines were extended first to Devon, 6 miles west of Rosemont, then to Paoli, the



P. R. R. MAIN LINE ELECTRIFICATION—HIGHWAY BRIDGE WITH ORIGINAL TYPE OF CATENARY SUPPORT AND SCREEN FOR PROTECTION OF PUBLIC AGAINST CONTACT WITH CHARGED WIRES west end of the line, then to West Philadelphia station, and finally to and including the tracks at Broad street station. The test or instruction train operation during this prelimiary period proved to be of great value in bringing out the defects in certain features of the original construction, thereby giving opportunity for a redesign of such details as the work progressed. It also made possible the instruction of all men in the handling of the equipment prior to the opening of regular service.

With the completion of the construction work regular electric train service was inaugurated with eight of the seventy-eight trains comprising the schedule, four in each direction, it having been thought advisable to build up the service gradually rather than attempt to make the change from steam to electric service in one step. From this small beginning the number of electric trains was gradually increased until the entire Paoli service was being handled electrically. One result of making the change to electric operation in this manner was the running of electric trains during the change-over period on steam train time. This made necessary an excessive amount of coasting to avoid waiting for time at stations and clearly showed the possibilities of the electric service in the direction of quickening schedules. A reduced running time is now in effect and experience to date indicates that the schedules can be still further cut down.



P. R. R. MAIN LINE ELECTRIFICATION—PRESENT STANDARD CATENARY SUPPORT AT HIGHWAY BRIDGES AND OVERHEAD RAILROAD CROSSINGS, LOCATED OVER CENTER OF TRACK

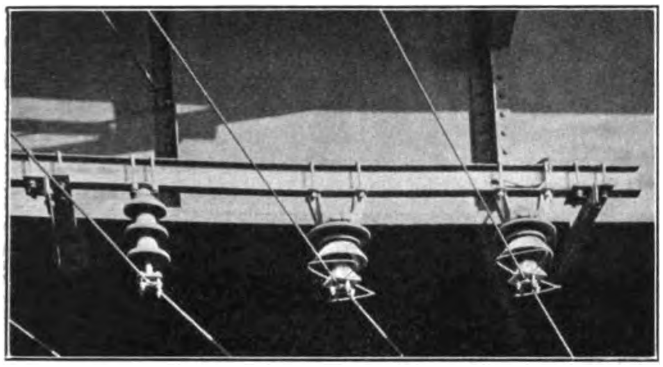
OPERATING DIFFICULTIES EXPERIENCED

Between West Philadelphia and Paoli there is a large number of overhead highway bridges, of which several clear the top of track lines by not more than 17 feet. The transmission lines, as well as the catenary system, pass under these bridges and, as originally installed, were carried on post-type insulators made up of three 8-in. porcelain disks cemented into malleable-iron caps in series. In the typical highway-bridge overhead construction, these post-type insulators were mounted on I-beams attached to the bridge structure. The insulators carried at the lower end impregnated wood sticks to which were fastened the messenger and contact wires. These insulators on dry flashover test withstood 175,000 volts, and on rain test 90,000 volts. The territory included within the Paoli electrification, however, handles a very heavy steam traffic, the smoke and steam conditions under the highway bridges, particularly on the west-bound side, being very severe. As a result of these conditions, the insulators and wood sticks quickly became covered with a soot deposit and evidence of leakage from the live circuits to the base of the insulators soon made its appearance.

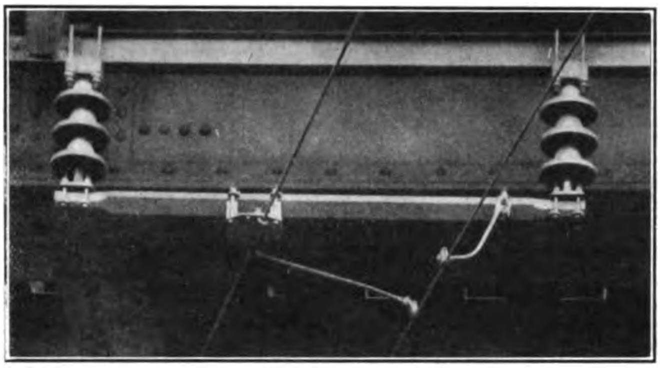
At certain bridges where the conditions of clearance and volume of steam traffic handled were least favorable, a number of insulator flashovers occurred, many of these cases being coincident with the passing of heavy steam trains under the bridges. Cleaning of these insulators met with indifferent success and it was finally decided to replace them with others having greater creepage distance.

The insulator selected is of a special type with two large petticoats, one of 13 in. diameter and the other of 12½ in. diameter. As applied to the particular purpose under discussion two of these insulators are mounted in series. A few installations were made where two combination units were mounted on the bridge structure, one at either side of the track center line supporting a piece of pipe to which the catenary structure was fastened. The arrangement commonly employed, however, involves the use of one combination unit per support per track, located directly above the center line of the track and carrying the messengers and contact wires. Both of these last-mentioned installations have proved very successful and no failures have occurred to date.

A limited application of a larger post-type insulator in combination with a pipe support for the catenary structure has also been on trial for a limited period with good success. The 8-in. post-type insulator above mentioned also proved a failure as a support for the transmission lines under highway bridges. The high capacity of this insulator under test conditions led to its selection for this particular service, although the potential to ground on the transmission lines is 22,000 volts as compared with 11,000 volts on the contact wires. As the transmission lines are located to one side of the tracks, the same conditions that caused the failure of this insulator on the contact wire circuit, however, also rendered it unsatisfactory for the transmission lines. After numerous failures it was replaced in this service with an adaptation of the pin-type



P. R. R. MAIN LINE ELECTRIFICATION—OLD AND NEW TRANSMISSION LINE INSULATORS UNDER HIGHWAY BRIDGE. THREE-SHELL, 8-IN. POST TYPE AT LEFT, 12-IN PIN TYPE AT RIGHT



P. R. R. MAIN LINE ELECTRIFICATION—ORIGINAL, 8-IN. POST-TYPE INSULATOR AND CATENARY SUPPORT AS USED AT HIGHWAY BRIDGES AND OVERHEAD RAILROAD CROSSINGS

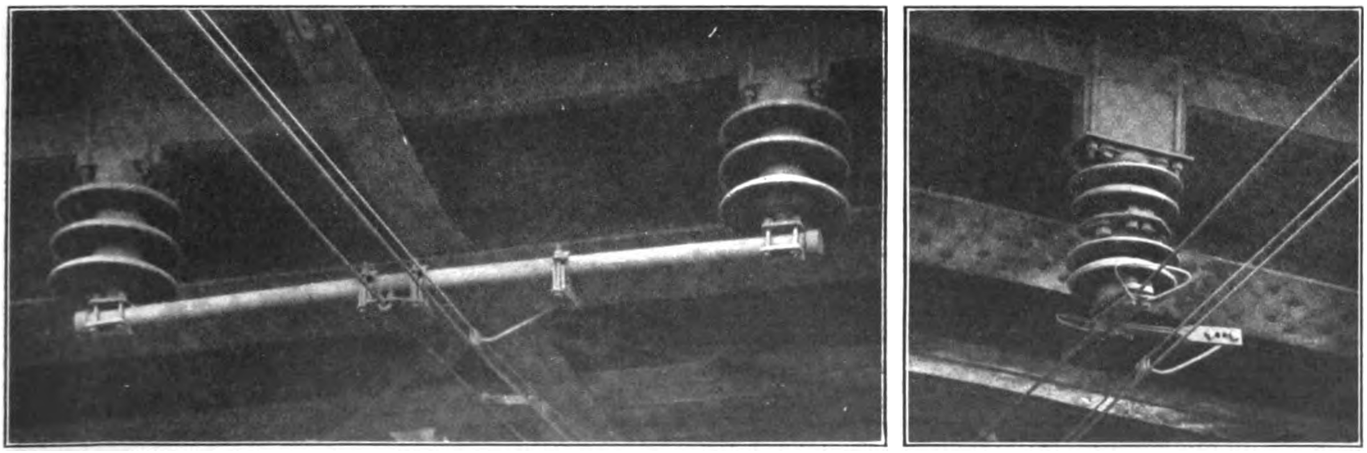
insulator originally used on the transmission lines at points other than highway bridges. This insulator is of the four-petticoat type, with a maximum diameter of 12 in., and its use under bridges as well as on poles and other structures has been most successful, one failure only having occurred to date.

To insure flexibility in the catenary system and avoid hard spots at hangers, the combination of main messenger supporting an auxiliary messenger which in turn carries the contact wire is used. To facilitate erection, a round auxiliary was adopted in conjunction with a grooved trolley wire, the clips holding the latter being a loose fit on the round wire. Some trouble has developed with this construction on tangents as the result of a tendency of the contact wire to turn around the auxiliary, allowing the pantographs to strike the clips. This trouble has been confined almost entirely to cold weather, when the stresses in the wires are maximum. It has been corrected locally by the use of a combined hanger and clip holding the wires in the same vertical plane, or by shimming the clips at the auxiliary fit with thin sheet copper, the clips being then clamped securely to the auxiliary wire. This means of overcoming the trouble promises well, but the complete success of the scheme is not yet assured.

The section breaks first installed were of the wood-stick type, with short, round wire gliders for yard or low-speed service and long T-iron runners for main tracks. This form of break, while satisfactory for low-speed movements, flashes objectionably under high-speed traffic. Extended trials were made with the main track breaks of this type in an attempt to eliminate this trouble, but without success. They were finally replaced on the main passenger tracks with air brakes in which the contact wires of adjoining sections overlap and dead-end on wood strain insulators located above the plane of the pantograph. This form of break, when properly adjusted, gives excellent service and will undoubtedly replace those of the original wood-stick type still in use on main tracks.

As first erected, the trolley wires were held in alignment on curves by pull-offs attached to steady strands supported at the catenary poles by porcelain strain insulators with wood strain insulators between the contact wires of adjacent tracks. The design involved the use of a stiff vertical member attached to the auxiliary and contact wires in conjunction with a pull-off rod, the assembled unit forming an inverted right-angled triangle. These pull-offs were found to cause hard spots in the line, at which flashing developed, and after considerable experimenting they were all removed. With change in temperature from summer to winter conditions, the alignment and height of the contact wire, which after the removal of the pull-off was free to move, changed on curves, making adjustments at certain points necessary. A few of the original pull-offs were replaced prior to a recent cold snap as a precautionary measure at points where the pantographs were riding too much off center. It is felt, however, that such adjustments in the contact-wire suspension can be generally made as will allow a safe margin of clearance between end horn and contact wire for both summer and winter conditions, as well as keep the variation in height of wire above running rail within permissible limits.

Considerable trouble was experienced during the first sleet storm on account of the formation of sleet on the pantographs, the weight of the accumulated ice counteracting the pantograph spring tension and preventing proper contact between shoe and trolley wire. Experi-



P. R. R. MAIN LINE ELECTRIFICATION—CATENARY INSULATOR, 14-IN. POST TYPE WITH PIPE SUPPORT. AT RIGHT, EXPERIMENTAL CATENARY INSULATOR WITH 13-IN. AND 12½-IN. PETTICOATS, ALSO SHOWN IN SILHOUETTE IN VIEW ON THE OPPOSITE PAGE ments were made with different grease mixtures as a coating for the pantograph tubing for the purpose of preventing or reducing the formation of ice on those parts, but with indifferent success. It was found necessary to remove the ice from the pantographs at terminals. Experiment showed that the sleet could be quickly and thoroughly removed by the use of steam directed against the pantograph framework from suitable nozzles handled by men stationed on the car roofs after the pantographs had been locked down and grounded, and the matter is now handled in this way. As a further precautionary measure during times of severe sleet storms extra electric trains are operated over the line, covering the hours when no regular electric trains are running to keep the contact wire reasonably clear of ice.

OPERATING ORGANIZATION

The organization adopted for handling the operation and maintenance of the electrical equipment included in the Paoli electrification is similar to that in effect on other electrified divisions of this company. The electrified zone includes portions of both the Philadelphia and Philadelphia Terminal divisions, and the master mechanic of the latter division reporting to each of the division superintendents concerned is at the head of the local organization having charge of the line, substations and car equipment. Reporting to the master mechanic is an assistant engineer of electric equipment, who has direct charge of the electric operation. He is assisted by a foreman of substations and transmission, and a foreman of electric car shop. One assistant foreman gives his entire attention to substation maintenance, and a second is assigned to the car shop located at Paoli.

One wire train is used, working for the present both day and night turn, each crew being in charge of a gang leader. No attempt is made to work on live circuits, the power being removed and the line grounded in all cases before work is started and after the necessary clearance has been obtained. The operation of the high-voltage circuits is in charge of three power directors located at the West Philadelphia substation and covering the twenty-four-hour period. No work is permitted on any part of the line or substation equipment until it has been authorized by the power director on duty, the necessary switches controlling the circuit or apparatus affected opened and a permit issued to the emloyee on the form provided for the purpose. Telephones that have been installed at very frequent intervals within the electrified zone provide means for promptly reaching the power director in case of trouble, or for handling clearances in connection with line maintenance.

PREVENTION OF ELECTRICAL ACCIDENTS TO EMPLOYEES

The adoption of the high-voltage overhead contact system for the Philadelphia electrification made it essential that careful study be given to the problem of preventing accidents due to employees or others coming in contact with these high-voltage lines. A detailed investigation of the personal injuries that have occurred from electrical causes on other electrified divisions of this railroad, as well as on others using the high-voltage overhead system, was made and these accidents were classified. Rules for the protection of employees and others were then formulated in the light of this knowledge and incorporated in instruction books that were prepared for the information and guidance of men employed within electrified territory.

Certain of the rules so prepared required for their observance a modification of long existing transportation methods, particularly in the movement of freight trains. A case in point was the rule prohibiting all but qualified traction department men from getting on top of high, rolling equipment while on electrified tracks. The grade from Paoli to the freight receiving yards at Philadelphia is a descending one, with a break between Wayne and Bryn Mawr. It was formerly the practice in handling the heavy east-bound slow freight trains in this territory to set up the pressure-retaining valves on the head end of the train leaving Paoli, to put them down between Wayne and Bryn Mawr, and again to set them up before passing the latter point, to facilitate control of the train. The manipulation of these valves necessitates trainmen riding on tops of cars, and in this territory where a number of comparatively low bridges cross the right-of-way such a proceeding would be attended with considerable danger. Experiment proved that it was feasible to set up retainers before entering the electrified zone at Paoli and to leave them in the raised position until the train reached the yard. Should the retainers be brought into action by brake applications before passing Bryn Mawr it then became necessary to stop the train and bleed the brake cylinders or to haul the train with brakes set on the head end over the short opposing grade at this point. In practice it has been found possible to follow the second alternative, and little or no delay has occurred from the working of this rule which undoubtedly reduces to a minimum the possibility of electrical injury to trainmen.

When steam derricks must be used within electrified territory they must be accompanied by a qualified lineman who arranges to have power removed from such circuits as necessary and the circuits grounded before work is started. Unqualified workmen such as painters, tinners, carpenters, etc., are not permitted to work on structures close to high-voltage wires unless accompanied by a lineman, who is responsible for their safety. Where work of this kind must be done, power is first removed from adjacent circuits with which there is a possibility of the workmen coming in contact, and the circuits are grounded. By rigid adherence to these and similar rules, it is hoped that electrical injuries will be kept down to a minimum.

Vienna Tramways' Semi-Centenary

The Vienna Tramways, according to the *Tramway and Railway World*, celebrated their semi-centenary in the midst of the war. The first tramcar was run in the Austrian capital in 1865 over a line 2.5 miles in length. From this small beginning during the last fifty years there has been built up an undertaking which now forms the greatest municipal enterprise of the city of Vienna, and provides transport for its 2,000,000 inhabitants. The original undertaking, which was a private enterprise, was taken over in 1903 by the municipality. Since that date the tramways have been greatly extended, routes having been constructed into new suburbs, and the speed of the cars raised from 6.2 m.p.h. to about 7.5 m.p.h.

Remarkable attention has been paid to the question of housing tramway employees. A well-built block of apartments of attractive architectural design has been constructed for the accommodation of the employees and their families. No less than 6600 separate apartments have been provided under healthy conditions and in attractive surroundings. Public baths and playgrounds have been erected in connection with the dwellings, and every effort has been made to add to the welfare of the employees. Previous to the outbreak of the war, 12,000 men were employed in the tramway department.

Illinois Association Discusses Power Economies

The Relation Between Car Operation and Power Consumption Aroused Intense Interest at the Chicago Meeting of the Illinois Electric Railways Association—Abstracts of Papers Presented Are Published

ECONOMY of power in car operation, as reported by a sub-committee of the engineering committee of the Illinois Electric Railways Association, and the constructive suggestions to obtain this end offered in several papers delivered at the Chicago meeting, brought out a lively and profitable discussion of this important subject. Practically the entire program was given over to this subject, and essentially every phase of car operation which would contribute to reduced energy consumption was discussed at length.

J. R. Blackhall, general manager Chicago & Joliet Electric Railway, presided, and after calling attention to the committee appointments listed in the pamphlet sent out by Secretary W. V. Griffin, he introduced H. H. Adams, superintendent of shops and equipment Chicago Surface Lines, who spoke as chairman of the committee on standards of the American Electric Railway Engineering Association. Mr. Adams said that a campaign had been inaugurated by the standards committee to further the use of association standards. He called attention to the work that had been done since 1906 to establish thirty-five different standards and twenty-seven recommendations. Mr. Adams said that the member companies were not using these standards as much as they should, perhaps because the value of the standards was not appreciated. He also said that these standards included twenty-five sets of specifications which are specially valuable to the smaller companies. If a more general use of these could be brought about, it would tend to reduce prices and would certainly improve the quality of materials purchased under them. Mr. Adams admitted that there might be some question whether these standards and specifications were all that they should be, because some compromises had been necessary to take into account the best interests of the entire industry. He also brought out the fact that these standards and recommendations were only adopted after they had passed the gauntlet of criticism, and therefore they represented the best thought of the industry. Mr. Adams closed with the statement that the standards committee felt that either through a lack of familiarity or interest the specifications were not being generally used, and it wanted to find out why this condition existed. If the specifications are unsatisfactory, the committee would like to have definite criticisms of them.

G. W. Welsh, superintendent of power East St. Louis & Suburban Railway Company, East St. Louis, Ill., then delivered an illustrated address concerning the power-dispatching system of his company. This system was completely described by Harold W. Clapp, vice-president of the East St. Louis & Suburban Railway Company, on page 156 of the January 22 issue of the ELECTRIC RAILWAY JOURNAL. Upon inquiry at the close of his address Mr. Welsh stated that the energy supplied from the Keokuk hydroelectric development was very reliable; in fact, there had been no interruptions other than those to be expected in any transmission line. Interruptions, however, had been exceptionally few in connection with the service over this transmission line.

At this point President Blackhall briefly called attention to the possibilities of increasing efficiency in car operation. He said that railway companies had installed devices to check fare collections, and recent developments indicated that it was just as important to install instruments to check energy consumption.

G. T. Seely, assistant general manager Elevated Railroads of Chicago, then read the report of the sub-committee which considered power economy in car operation. Before reading this report, which is published elsewhere in the account of this meeting, Mr. Seely stated that his committee was one of three that were appointed to investigate the general subject of power economy in its relation to transmission lines, return circuits and in car operation. He said that the committee felt that so much had been written on the subject that any report would simply be a repetition. Therefore it decided to invite the various authors who had discussed this subject to deliver addresses.

In connection with this report Mr. Seely showed the relation between the energy consumption and outside temperatures with a lantern slide. He said that the energy used in heating cars can be very easily wasted in the spring and fall of the year when the temperature in the car is not regulated by a thermostat. The men are careless and frequently turn on the heat too soon or fail to turn it off when the temperature in the car has risen above that necessary for comfort. To meet this condition on the elevated railroads, dispatchers at the various terminals read the car temperatures and regulate the points of heat accordingly. He called attention to a record for January, 1915, which showed a reduction in energy consumption even though low outside temperatures prevailed. Mr. Seely was of the opinion that this saving was largely due to turning off the heaters as soon as the cars were placed in the storage yard.

Mr. Seely also mentioned the results obtained by installing coasting boards on the elevated lines. Such a system, however, could not be used on surface or interurban lines, but was applicable to elevated railroads that had definite stops. During the rush hours these coasting boards could not be observed as closely as during the off-peak hours if schedules were to be maintained. Mr. Seely said that the South Side division of the elevated railroads had saved about 5 per cent by installing coasting boards.

H. A. Johnson, master mechanic of the elevated railroads, said that between 9 and 10 per cent energy reduction had been obtained on the West Side lines of the elevated system by installing the coasting boards. Mr. Johnson also described the manner in which the locations for these boards had been selected. He said that a train was put on a test for several days, during which a careful record of normal operation was observed. Following this, the motorman was instructed how to save power and asked to coast as much as he could and still keep within the schedule. After several days of operation in this manner the coasting points were determined and the boards installed. This test train showed a reduction of approximately 10 per cent in energy consumption over that recorded previous to instructing the motorman how to coast. The results of these tests were plotted, and B. I. Budd, then general manager of the West Side lines, sent it with a personal letter to each of the motormen, requesting their cooperation to reduce power, and instructing them how to do it. As mentioned before, the motormen responded to this request, and an average of between 9 per cent and 10 per cent reduction in the total power consumed resulted.

H. H. Adams, Chicago Surface Lines, opened the discussion by outlining his experience in the value of instructing trainmen how to operate cars efficiently. He mentioned a test made on the Metropolitan system of New York City, in which a line was metered for a week to obtain the average energy consumption per car-mile under normal operating conditions. The following week the motormen were instructed how to coast and otherwise operate their cars efficiently, and the third week the meters were again read. As a result of this instruction a reduction of 10 per cent was made in the watthour per ton-mile consumption. Mr. Adams also called attention to the importance of saving the energy frequently wasted by the electric heaters. He said that thermostats would automatically reduce the amount of power used for this purpose to a minimum, a fact which was demonstrated by the results obtained from a number of thermostats now in service on cars on the Chicago Surface Lines. The effectiveness of this device was especially emphasized during the rush hours when a reduction in energy consumption was most advantageous. He estimated that thermostats had reduced the amount of energy used in heating cars approximately 40 per cent.

J. B. Tinnon, engineer maintenance of way Chicago & Joliet Electric Railway, Joliet, Ill., described the results obtained by installing Sangamo meters on his company's lines. Mr. Tinnon's description is published elsewhere in this issue.

At this point the morning session was adjourned for the regular association luncheon, after which the afternoon session convened. This session was opened by a paper by J. F. Layng, engineer General Electric Company, on the relation between car operation and power consumption. This paper, with illustrations, is published elsewhere in these proceedings.

MR. CHAPPELLE DISCUSSES PRINCIPLES

C. C. Chappelle, consulting engineer and vice-president Railway Improvement Company, New York City, outlined the fundamental principles of efficient car operation. He opened with the statement that many operators thought that the energy-saving principles advanced by various engineers were only theoretical, but he wanted to emphasize the fact that their application was a practical operating proposition. Certain savings can be made by applying these principles to equipment purchased and later to its operation on a given line. Mr. Chappelle called attention to the importance of stop elimination and a reduction in the duration of stops to reduce energy consumption. He said there were certain limitations affecting energy saving, in so far as the equipment was concerned, and that the character and quantity of the service were equally important factors in limiting the results. He frequently called attention to the different phases of this subject, mentioned in his article published on page 117 of the Jan. 15 issue of the ELECTRIC RAILWAY JOURNAL. To illustrate his point concerning the effect of the number of stops per mile upon the energy consumption, he cited an average condition of seven stops per mile. He said a change of 0.7 per cent above or below this number of stops per mile would increase or decrease the energy consumption proportionately from 12 per cent to 15 per cent. Mr. Chappelle then took up the question of the duration of stops and said that even with definite stops, such as obtain on subways and elevated roads, the length of the stop affected the schedule speed, which in turn controlled the energy consumption. He said that a difference of one second in the time consumed in making a stop meant an increase or decrease of 10 per cent in the energy consumption. The number of stops fixes the schedule speed with given motor characteristics. The speaker then emphasized the importance of carefully analyzing the motor characteristic curves supplied by the manufacturers. He said these were very dependable and meant much in efficient operation. He also called attention to the increasing platform expense, and to the effect of heavy and light-weight cars on the amount of energy consumed. He mentioned one company which was operating at three different schedule speeds to obtain maximum efficiency.

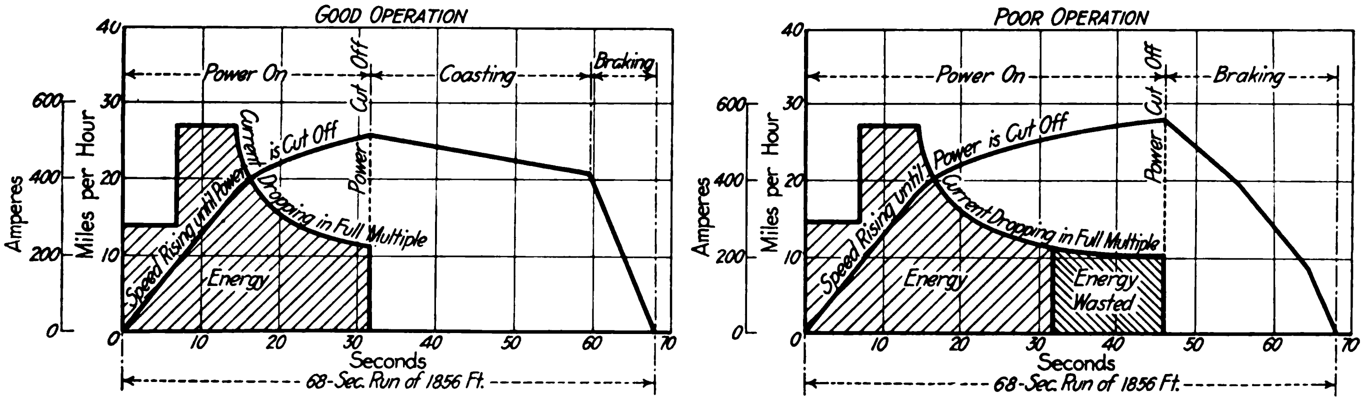
Every company, urged the speaker, should carefully analyze its service conditions to determine the most efficient operation. This is not an especially difficult task, and it can be done for any property and to any class of equipment. The size of the motor controls the rate of acceleration, and the conductor largely controls the duration of stops. Acceleration is limited only by the capacity of the equipment, wheel slippage and the comfort of passengers. Certain rates of acceleration may be obtained by advancing the controller through the various points in a given number of seconds. Mr. Chappelle then stated that the operation of railroads was dependent almost exclusively upon time factors, and that these in turn affected energy consumption. He said the motorman thinks in terms of time, and, therefore, he should be checked in the terms with which he is familiar.

Mr. Chappelle then took up the effect of skip stops on efficient car operation. He believed that the public did not understand that the skip stop would increase schedule speeds, and the railway companies did not appreciate that the adoption of this practice would reduce energy consumption. He said that a change from ten stops to seven stops per mile would inconvenience only 30 per cent of the traffic. In other words, 70 per cent of the traffic would be at points where the cars regularly stop and the other 30 per cent would have to walk not to exceed one block to reach the stopping point. Mr. Chappelle was of the opinion that the present cost of service did not warrant the quality of service the railway companies were rendering to the communities they served. If the skip-stop plan could be adopted, it would permit railways to give 22.2 per cent more service in the case of reduction from ten stops to seven stops per mile, and at the same time reduce the amount of energy consumed 15½ per cent. He thought that the railways should make the value of the skip stop plain to the public, namely, that it would give them more service and thus their objection to this improved method of operation would be removed.

Mr. Chappelle again repeated his suggestion that all railway companies should thoroughly analyze their service conditions. This problem could be approached without the use of instruments, by taking into account the weights and kind of equipment, the grades, curves, schedule speeds and the service rendered. With this information the most efficient operation of the equipment involved could be determined, and then some instrument should be employed to indicate that the most efficient plan of operation was being followed. He was of the opinion that frequently results are not obtained from a given set of conditions because the conditions were changed. He mentioned a case of where a campaign of efficient operation was undertaken which did not produce a reduction in the amount of energy consumed. Investigation revealed that during the period of this campaign the management changed the equipment from single-truck to double-truck cars, a fact which offset any improvement in the car operation. He said that the use of coasting boards was good practice, but they did not check the motormen. Mr. Chappelle closed his discussion with the statement that the value of instructing motormen in efficient operation was lost unless there was some checking system employed to see that they constantly observed these instructions.

MR. LANPHIER INTERESTED IN ENERGY SAVINGS

R. C. Lanphier, general manager Sangamo Electric Company, Springfield, Ill., then outlined briefly the use of current and power measuring instruments to obtain car-operating efficiency. He said that as early as 1902 meters had been used on electric railways in France, but at first not to save energy. This was due to the fact that these meters were only intended to measure the power consumed, and no campaign to reduce the amount was inaugurated. In 1906 meters were installed on motor cars in England and were responsible for marked savings in energy consumption. Mr. Lanphier then said that the coasting clock was introduced in America in 1908 and meters in 1910. He was of the opinion that either instrument was just as effective in bringing about energy savings if equal intelligence was applied to the data they produced.



CHICAGO ELEVATED RAILROADS' CHARTS OF GOOD AND POOR OPERATION OF CARS, USED IN INSTRUCTING MOTORMEN

Mr. Lanphier then described the plan employed in grading men when meters were used, and he believed that the average of all the men in the various classes of service was a fair measure of their efficiency. He said that the ampere-hour meter was so constructed that it recorded the total ampere-hours consumed regardless of the voltage. The same general construction had also been applied to the watt-hour meter, and in it the error had been reduced to a very low point. In service the Economy meters had effected savings which paid for them in a relatively short time. In closing Mr. Lanphier stated that his interests were in common with the railways, namely, that of producing economy in car operation.

CHICAGO & MILWAUKEE ELECTRIC RESULTS

C. E. Thompson, auditor and general agent of the Chicago & Milwaukee Electric Railroad, Highwood, Ill., described the results obtained from Sangamo ampere-hour meters which were installed on the cars of his road in January, 1915. He said that up to the present time the average saving in energy consumed was 8.33 per cent. He said that the experience of the first year had also produced data which would permit the company to effect further savings in the quantity of energy consumed. These data particularly brought out the effect of using different classes of equipment in different classes of service. He stated that on one line a saving of 35 per cent in the amount of energy consumed had been obtained by changing the type of equipment. Mr. Thompson said that his company had followed the practice of many others, namely, that of shifting old equipment to branch lines. Frequently this equipment was too heavy for the service and reduced materially the net earnings of the line so equipped.

Mr. Thompson said that a saving of 4.2 per cent over the same month of the previous year had been effected for January, 1915, for a given class of service, and January, 1916, showed a further reduction of 6.5 per cent. As much as 35 per cent reduction in energy consumption had been obtained for another class of service. Some of this saving had resulted from a change in the type of equipment, but if it had not been for the meters the company would never have realized the possibilities of such a change. He also mentioned the fact that brakeshoe cost had been reduced approximately 30 per cent for the first year's operation with metered cars. Mr. Thompson brought out the interesting point that in some classes of service differences ranging from 60 to 70 per cent in relative efficiency of motormen obtained. He also mentioned that different classes of service affected the unit energy consumption. For instance, two cars of the same type, one in local and the other in limited service, showed a difference of approximately 39 per cent in the energy consumed on a given run. He said that he had recently started to make a comparison of his motormen by different classes of service and on a basis of the cost of energy per thousand car-miles. He said that the energy consumed by the limited trains varied from $60 to $90 per thousand car-miles, and that the difference in these two amounts would approximately pay one-half the wages of a motorman.

VALUE OF INSTRUCTION ON CHICAGO ELEVATED

H. A. Johnson, master mechanic Elevated Railroads of Chicago, outlined the experience of his road in effecting economies in car operation. He opened with the statement that there was a great field for power economies before the electric railway industry. The elevated railroads have given considerable time and study to their conditions to determine what could be accomplished. They had concluded that to get the most out of any plan for saving power a system of checking is of vital importance. It is also necessary to conduct a systematic campaign of instruction among the motormen. In connection with work of this kind, Mr. Johnson said that it had been his general observation that the rate of braking was not understood by most motormen. In order to inform the motormen in this particular, as well as regarding other points of efficient operation, the elevated railroads employ an experienced instructor who devotes his entire time to schooling the motormen. A chart setting forth the results of efficient and inefficient operation was posted at various points where it could be studied by elevated railroad motormen to assist them in this work. A reproduction of this chart is shown in the illustration on page 687. This chart was of educational value to the motormen, and it was largely responsible for the results produced in the economy campaign.

E. S. Gillette, electrical engineer Aurora, Elgin & Chicago Railroad, Aurora, Ill., took part in this discussion, and outlined his road's experience in instructing motormen in the efficient operation. Mr. Gillette's written discussion will be published in a later issue. President Blackhall then closed the discussion by emphasizing the importance of attention to the question of economy in car operation and the value of a system of checking. To bring out his point he said that Congress, legislatures and city councils could pass laws, but the public would not obey them unless there was some police system. He was of the opinion that some checking device on the car was absolutely necessary to accomplish the maximum results.

ILLINOIS ASSOCIATION COMMITTEES

President Blackhall has appointed the following committees of the Illinois Electric Railways Association to serve during 1916:

Membership committee: F. E. Johnson, the Ohio Brass Company, chairman; Marshall E. Sampsell, president of the Central Illinois Public Service Company, and G. T. Seely, assistant general manager Chicago Elevated Railroads.

Electrical engineering committee: John Leisenring, signal engineer Illinois Traction System, chairman; C. H. Jones, assistant electrical engineer Chicago Elevated Railroad; G. W. Welsh, superintendent of power East St. Louis & Suburban Railway, and E. S. Gillette, electrical engineer Aurora, Elgin & Chicago Railroad.

Mechanical engineering committee: H. A. Johnson, master mechanic Elevated Railroads of Chicago, chairman; J. M. Bosenbury, superintendent of motive power Illinois Traction System, John Sutherland, master mechanic Tri-City Railway, and J. N. Graham, master mechanic Rockford & Interurban Railway.

Way committee: B. J. Fallon, engineer maintenance of way Elevated Railroads of Chicago, chairman; J. B. Tinnon, superintendent of way Chicago & Joliet Electric Railway, H. F. Merker, engineer maintenance of way East St. Louis & Suburban Railway, and W. F. Carr, engineer maintenance of way Chicago, Ottawa & Peoria Railway.

Traffic committee: W. P. Potter, general passenger agent Illinois Traction System, chairman; R. Breckenridge, traffic agent Aurora, Elgin & Chicago Railroad; C. C. Shockley, general freight and passenger agent Rockford & Interurban Railway; F. L. Butler, general manager and treasurer Chicago & West Towns Railway, Charles F. Speed, vice-president and general manager Evanston Railway, and T. F. Grover, president Terre Haute & Western Railway.

Safety committee: W. H. Heun, superintendent Chicago & Joliet Electric Railway, chairman; Joseph O'Hara, superintendent Springfield Consolidated Railway; Henry B. Adams, safety supervisor Aurora, Elgin & Chicago Railroad; L. H. Moss, superintendent Elgin & Belvidere Electric; B. W. Arnold, superintendent of transportation Chicago, Ottawa & Peoria Railway, and Dr. H. E. Fisher, medical examiner Chicago Elevated Railroads.

Publicity committee: E. E. Soules, manager publicity department Illinois Traction System, chairman; J. M. Strasser, vice-president Illinois Light & Traction Company; H. E. Weeks, secretary and treasurer Tri-City Railway; F. C. Eckmann, general manager Aurora, Plainfield & Joliet Railway; R. H. Hayward, general manager Galesburg & Kewanee Electric Railway, and W. W. Crawford, secretary Chicago & Interurban Traction Company.

Program committee: L. E. Gould, ELECTRIC RAILWAY JOURNAL, chairman; H. J. Kenfield, *Electric Traction;* J. W. Busch, Westinghouse Electric & Manufacturing Company; A. P. Jenks, General Electric Company; J. H. Bliss, Jr., general manager Chicago, Aurora & DeKalb Railroad, and W. V. Griffin, secretary and treasurer Chicago Elevated Railroads.

Economy of Power Consumption in Car Operation*

BY G. T. SEELY

Assistant General Manager Chicago Elevated Railways

The cost of power for the propulsion, heating and lighting of cars has increased greatly in the last ten or fifteen years. This is due to heavier car construction, higher schedule speeds, a higher standard of heating in the winter months, where electricity is used for heating, and more profuse illumination. The cost of power is one of the largest items in the total cost of operation of electric lines, varying from 10 per cent to 22 per cent of the total expense.

As an illustration of the increase in the cost of electrical energy per car-mile on the South Side Elevated Railroad, in 1900 the consumption was 2.5 kw.-hr. per car-mile, in 1905, 2.9 kw.-hr., and it is now from 3.4 to 3.5 kw.-hr. There has been no increase in the size of the car, and at least one-half of the cars are those which were in operation in 1900, the increase being due to higher schedule speeds, which necessitate heavier motors and heavier cars for the newer equipment, and a more liberal use of current in the winter months for heating.

The amount of current used to operate any system of cars is affected by two main elements: first, the design of each part of the car, and second, the operating methods. During the last two years the question of economy of power consumption has received a great deal of attention from operating officials and manufacturers, and there have been a number of very excellent articles published in the electric railway papers and in the publications of the various manufacturing companies which have covered practically every phase of both the proper design of each part of the car and also the proper operating methods. For this reason the committee has not considered it advisable to abstract these papers, but will give an outline only of the various items that should receive attention.

EFFECT OF DESIGN ON CURRENT CONSUMPTION

The various factors having a bearing on current consumption that are affected by the design of the various parts of the car are as follows:

1. *Weight.* The largest part of the energy consumed in propelling a car is used in overcoming the inertia of the car and load. The energy required is determined

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*Report of Engineering Committee Illinois Electric Railway Association.

by the formula $F = \frac{1}{2} MV^2$, where M represents the mass of the car and load, and V represents the maximum velocity of the car in feet per second.

2. *Motor and Control Design.* The motor losses include the I^2R losses, the iron losses, friction and windage, and the gear and axle-bearing losses. The control losses are principally those occurring in the rheostat.

3. *Train Resistance.* The train resistance includes the resistance of journals, the resistance of the air, curve resistance and track resistance.

4. *Current Used by Accessories.* This includes the use of current in electric heaters, lights, headlights, air compressors, fans for ventilators, etc.

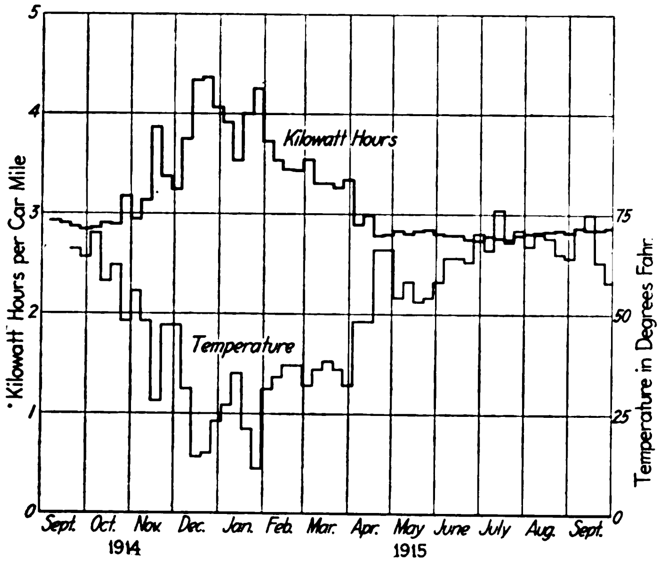


CHART SHOWING EFFECT OF HEATER LOAD ON UNIT ENERGY CONSUMPTION

5. The length of the stop has an important bearing on the current consumption for any given schedule, and therefore the proper design of the entrances and exits of cars so as to reduce the car stop as much as possible is important.

The committee has not attempted to discuss in detail the various phases outlined above, nor to indicate the possible savings to be made by better design, as this will be covered very fully by the papers to be presented later.

EFFECT OF OPERATING METHODS ON ENERGY CONSUMPTION

The following are a number of the ways in which power may be saved on the average road:

1. By efficient work of the motorman.

(*a*) Where hand control is used the proper rate of acceleration of the car is important, as current may be wasted in the resistance when the controller is not fed up promptly.

(*b*) Proper braking of the car is important. The motorman should stop the car in the minimum distance consistent with the comfort to the passengers.

(*c*) The maximum amount of coasting consistent with maintenance of the schedule will give minimum energy consumption. The amount of coasting depends upon the rate of acceleration and braking of the car, and will be fully treated in the discussion.

(*d*) The motorman should give proper attention to time points, not running ahead of the schedule. If the motorman exceeds his schedule at any point, he must either loaf during the latter part of the run or arrive at the terminal ahead of time, in either case wasting energy.

2. By proper attention to the use of current by equipment accessories. This includes care in the use of electric heaters, especially in the spring and fall, and when cars are laid up in the yards. Air, also, may be wasted by excessive whistling or by "fanning" of the air valve by the motorman. Care should be observed in the use of lights on the cars, turning them off when the cars are laid up.

3. By the reduction in the number of stops on any run to a minimum. Each unnecessary stop increases the amount of power required to make any given schedule.

4. By the arrangement of the stops in hilly country so that none will be made at the foot of a grade.

5. By attention on the part of the crew to the length of stops in loading and discharging passengers.

6. By the adjustment of the brakes to prevent dragging on the wheels.

7. By the use of the most efficient cars possible.

Use of Ampere-Hour Meter and Results Obtained by Chicago & Joliet Electric Railway

BY J. B. TINNON
Engineer Maintenance of Way Chicago & Joliet Electric Railway Company

The principles of efficient car operation have been known to the railway engineer for a number of years, and have been brought out here and in many excellent articles in the technical magazines, but it has been only in the last few years that practical data have been available to show what is being accomplished along these lines. I shall briefly outline the experience of the Chicago & Joliet Electric Railway in the use of ampere-hour meters, the method of bringing the principles of efficient operation before the men, and the results which are being accomplished.

The power for this company is purchased from the Public Service Company of Northern Illinois at its Joliet plant, and it is distributed to our three substations located at Joliet, Lemont and Summit. There are from nineteen to twenty-three cars in regular operation on the eight city lines and from four to eight cars on the interurban line. In November, 1913, forty-three of the passenger cars were equipped with ampere-hour meters, and within another month all of the passenger cars will be equipped with the newest type of meter.

A motorman makes out a meter slip for each car and line on which he operates, noting his meter readings and the trips made on that car and line. The energy consumption and mileage are calculated and noted on this same slip. Twice each month these slips are sorted and totaled for the various lines and motormen. From these figures an average of the ampere-hours per car-mile is computed for each class of car and each line operated. Then, by comparing each man's consumption with the average consumption for each line, a total percentage or "figure of merit" is obtained, showing whether he is using more or less power than the average man. Total power and mileage data are obtained at the same time, and from these curves are plotted for comparison. Once or twice each month a meeting is arranged for the men, when these percentages and curves are discussed with them. The principles of efficiency are pointed out to them by means of blackboard illustrations of speed-time curves explained in as simple a manner as possible. Any questions brought up by the men are also discussed for the benefit of all. This method of instruction has been found to be more effective than the attempt to show each man the fundamental points while he is operating a car.

For the purpose of comparison of the savings made since these meters have been installed I shall use the figures of actual kilowatt-hours used or purchased at the Public Service plant. The respective amounts of energy purchased for the years 1913, 1914 and 1915 are 9,629,960 kw.-hr., 9,250,210 kw.-hr. and 8,066,686 kw.-hr. The respective mileages for these years are 2,187,415, 2,212,796 and 2,143,287. Expressing these figures in kilowatt-hours per car-mile we have: 1913, 4.40 kw.-hr. per car-mile; 1914, 4.18 kw.-hr. per car-mile, and 1915, 3.76 kw.-hr. per car-mile, showing a decrease under the preceding year of 5 per cent for 1914, and 10 per cent for 1915, a total of 15 per cent for 1915 under 1913. January of this year has shown a decrease of 4 per cent as compared with the same month last year. February, however, showed an increase of 5 per cent over last year, but this was largely due to the bad weather conditions existing throughout this month.

It has been a doubtful question whether the increased rates of acceleration and braking which are essential to efficient operation would not offset the saving in actual consumption by increasing the peak-load charges. On the contrary, our peaks have been found to decrease. Using the same three years for comparison the peaks were 2244 kw. for 1913, 2148 kw. for 1914, and 2082 kw. for 1915; or, 1914 showed a decrease of 4.3 per cent as compared with 1913 and 1915, a decrease of 3.1 per cent as compared with 1914. Also only two of the peaks during 1915 occurred in the winter months, whereas in previous years nearly all of the peaks came in the months of December, January and February.

In conclusion, I might add that very material savings have resulted from the use of meters, in the maintenance of electrical and braking equipment, especially in the number of brakeshoe renewals.

Car-Operating Efficiency

BY J. F. LAYNG

Railway and Traction Engineering Department, General Electric Company, Schenectady, N. Y.

There are certain fundamental economies that can be obtained in operating motor cars. These result from variation in the running time, number of stops per mile, duration of stop, rates of acceleration and braking, and equipment weights. A careful study of each of these elements is necessary to determine if any road is operated at minimum cost and maximum efficiency. The facts can be demonstrated by the efficiency engineer, just as are all items of expense which are entered in the books of a railway.

The increase in the cost of producing transportation will cause the future successful management thoroughly to study the conditions of operation of each particular division comprising a property. It is a regrettable fact that the number of stops per mile and the duration of stop are phases of operation which have received but scanty consideration. For example, how many managers know how many stops their cars make per mile? In investigations of requirements in connection with the sale of equipment manufacturers receive statements from managers of properties varying sometimes 100 per cent from the actual conditions. It is an almost invariable belief that a car makes more stops than an actual check shows to be the case.

To show just what these points mean in service, a number of calculations have been made and curves plotted therefrom, showing the results graphically. These calculations have been based on fundamental laws from which there is no appeal. It has been known that on test runs there are great differences in the power used by a car even when the service conditions are the same. With the same number and duration of stops, the energy consumption will vary more than 30 per cent when the car is operated by different motormen. This illustrates the differences which are possible to obtain by operating the car at different rates of acceleration and braking, the difference being, of course, in the amount of coasting which is obtained by the different methods of operation. A few years ago a number of investigations were made to determine some systematic method of securing the maximum coasting at all times. As a result the coasting-time clock was designed, and watt-hour and ampere-hour meters were used, with the idea of obtaining the maximum amount of coasting which will give the minimum of energy consumption.

To illustrate the above points calculations were made and curves prepared for a car weighing 18 tons complete with load, and equipped with two motors. The car is assumed to be geared for a free running speed of 22 m.p.h., the run to be 1000 ft., the schedule speed to be 10.65 m.p.h., and the stops to be of seven seconds duration. A resistance of 20 lb. per ton was used throughout the calculations.

Fig. 1 shows the results for accelerating rates of 0.75, 1.0, 1.25, 1.5 and 2.0 m.p.h.p.s. The corresponding watt-hours per ton-mile are 110, 90, 83, 79 and 76. The percentage of difference in energy used between 110 and 90 watt-hours per ton-mile is 18, while the successive savings between 90, 83, 79 and 76 are 7.5, 5.5 and 3.8 per cent respectively. This analysis shows that low rates of acceleration are exceedingly wasteful and inefficient, while the differences in energy consumption at

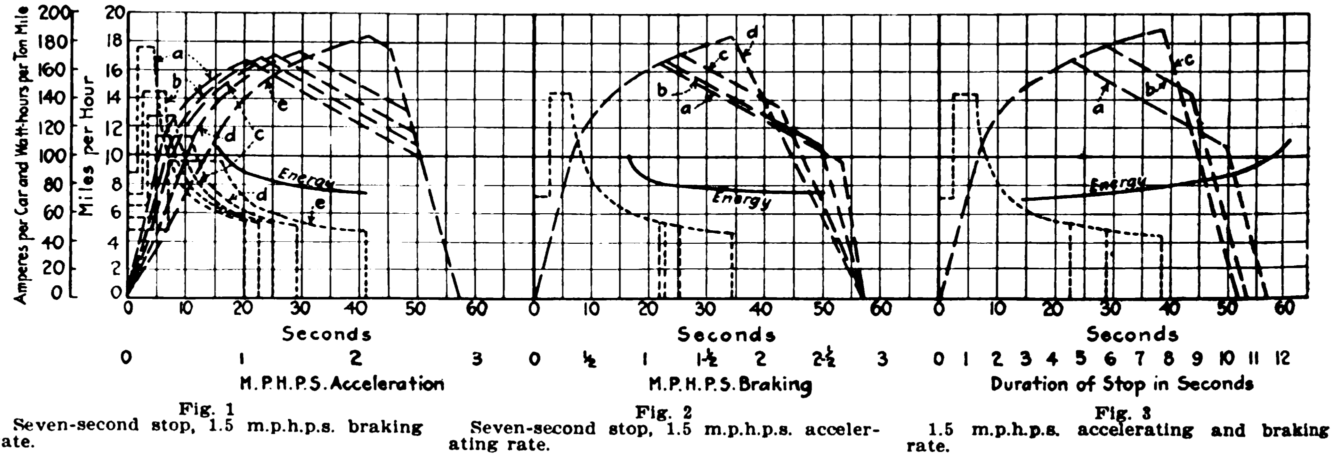


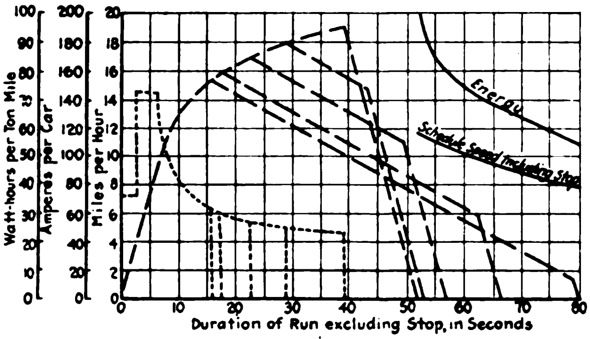
Fig. 1
Seven-second stop, 1.5 m.p.h.p.s. braking rate.

Fig. 2
Seven-second stop, 1.5 m.p.h.p.s. accelerating rate.

Fig. 3
1.5 m.p.h.p.s. accelerating and braking rate.

Data: Weight of car, 18 tons; run, 1000 ft.; resistance, 20 lb. per ton; schedule speed, 10.65 m.p.h.; time-current plotted in dotted lines, time-speed in dash lines, and rate of acceleration, rate of braking and duration of stop respectively plotted against energy in solid lines.

CAR OPERATING EFFICIENCY—FIG. 1—GRAPH SHOWING DECREASE IN ENERGY AS RATE OF ACCELERATION IS INCREASED. FIG. 2—GRAPH SHOWING DECREASE IN ENERGY AS RATE OF BRAKING IS INCREASED. FIG. 3—GRAPH SHOWING INCREASE IN ENERGY FOR GIVEN RUN AND SCHEDULE AS DURATION OF STOP IS INCREASED



Data: Weight of car, 18 tons; accelerating and braking rate, 1.5 m.p.h.p.s.; resistance, 20 lb. per ton; duration of stop seven seconds.

CAR OPERATING EFFICIENCY—FIG. 4—GRAPH SHOWING DECREASE IN ENERGY AND SCHEDULE SPEED AS COASTING IS INCREASED

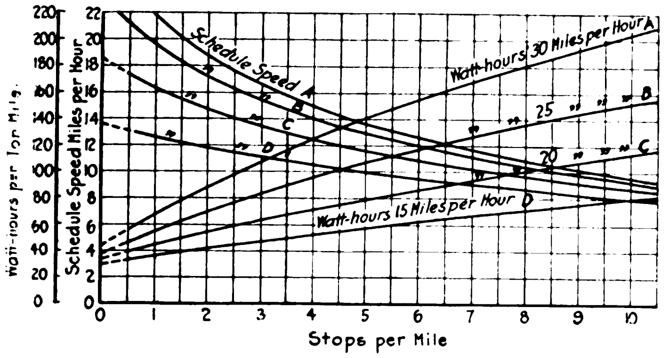
the higher rates of acceleration, while material, are not nearly so great. The total difference in energy consumption of 110 watt-hours per ton-mile, for acceleration at 0.75 m.p.h.p.s., and 76 watt-hours at 2 m.p.h.p.s. is 31 per cent. This is a larger saving than can be obtained in normal operation, as will be explained later.

It is evident that the use of a control which is automatic in its operation will enable the management to select a predetermined economical rate of acceleration with the assurance that it will be maintained in service.

Fig. 2 shows the effects of braking at the rates of 0.825, 1, 1.5 and 2.5 m.p.h.p.s. The resulting energy consumptions are 100, 85, 79 and 76 watt-hours per ton-mile respectively. The successive percentage differences between these figures are 15, 7 and 4.5 per cent, and the total difference between the extreme values is 24 per cent.

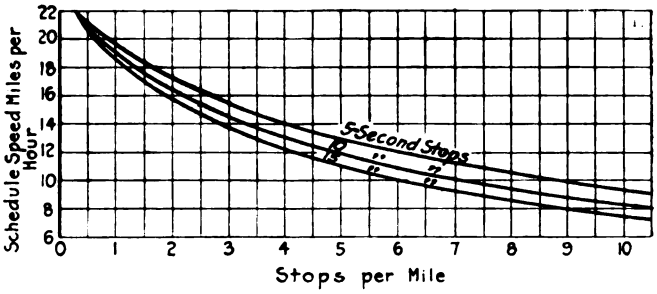
While the savings shown by these two sets of curves for different rates of acceleration and braking are not additive, it is possible to obtain either saving separately. With the lowest rate of braking and accelerating there is a point where the lines cross, which would make it impossible to keep the prescribed schedule.

In Fig. 3 is illustrated the effect on the energy consumption of lengthening the stop from 7 to 10.9 and 12.3 seconds, and still maintaining the same schedule. With the seven-second stop the energy required is 74 watt-hours per ton-mile, with the 10.9-second stop it is 81 watt-hours, and with 12.3-second stop it is 105 watt-hours. These results indicate the advantage of rapid loading and unloading of the passengers, and it brings in the consideration of the method of fare collection, the use of low steps and the general subject of the efficiency of trainmen.



Data: Weight of car, 20 tons; car geared for 15, 20, 25 and 30 m.p.h. maximum speeds respectively; accelerating and braking force, 150 lb. per ton; coasting 20 per cent of power-on period; duration of stop, five seconds.

CAR OPERATING EFFICIENCY—FIG. 6—GRAPHS SHOWING RELATION OF SCHEDULE SPEED AND ENERGY CONSUMPTION TO STOPS PER MILE



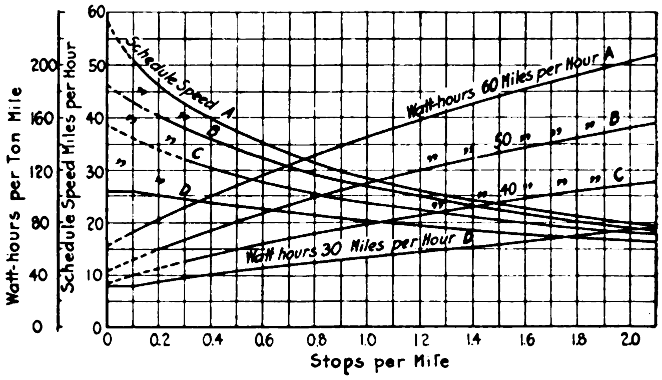
Data: Weight of car, 20 tons; accelerating and braking forces, 150 lb. per ton; coasting 20 per cent of power-on period.

CAR OPERATING EFFICIENCY—FIG. 5—GRAPH SHOWING RELATION OF SCHEDULE SPEED AND STOPS PER MILE

Fig. 4 illustrates the saving of energy by extending a given schedule. The energy saving shown by the curve will probably, however, be offset by the greater expenditure for platform wages. The tendency of progressive operators is to facilitate the making of high schedule speeds, and analysis shows that in general it is advisable to sacrifice power and maintenance savings for platform wages, since the latter represent such a large portion of the operating ratio. However, there are lines that have large leeway in the schedules, but on which conditions are such that changes in running time and service conditions will not allow a car to be cut out of the service. In this case the maximum amount of coasting can be procured effectively.

One of the important railway problems is to secure the maximum number of car-miles per hour. In order to establish a ready check as to what schedule speeds are possible with a given number of stops per mile, and the corresponding power consumption, the curves of Figs. 5, 6 and 7 are presented.

Fig. 5 is designed to show the influence of the duration of stop on the general efficiency of a system. In securing data for new equipments, it is found in different cities that the average duration of stop varies from five to ten seconds. The importance, from a power consumption standpoint, of shortening the stop to a minimum, with maintenance of a given schedule speed, has been shown in Fig. 3. However, there are conditions where, instead of maintaining the schedule speed, the running time is extended. To explain this latter condition the curves shown in Fig. 5 were made. With a car geared to a free running speed of 25 m.p.h., making seven stops per mile, it is possible to make a schedule speed of 10 m.p.h. with ten-second stops. With five-second stops the schedule speed will be increased to 11.2 m.p.h., or 12 per cent.



Data: Weight of car, 40 tons; accelerating force 120 lb. per ton; braking force, 150 lb. per ton; coasting 20 per cent of power-on period; duration of stop, fifteen seconds.

CAR OPERATING EFFICIENCY—FIG. 7—GRAPHS SHOWING RELATION OF SCHEDULE SPEED AND ENERGY CONSUMPTION TO STOPS PER MILE

The curves of Fig. 6 show data for a 20-ton car geared for free running speeds of 15, 20, 25 and 30 m.p.h. and the corresponding watt-hours per ton-mile are also shown. Fig. 7 gives the same information for a 40-ton interurban car, geared for 30, 40, 50 and 60 m.p.h. free running speeds. The relation of stops per mile, schedule speed and power consumption is clearly shown. With the 20-ton car, geared for a free running speed of 25 m.p.h., by comparing the services of seven and nine stops per mile, it will be noted that with seven stops per mile it is possible to make 11.2 m.p.h. schedule speed, and that the power consumption is 2.52 watt-hours per car-mile, while with nine stops per mile a schedule of 9.8 m.p.h. can be made with an energy consumption of 2.88 kw.-hr. per car-mile.

To illustrate the power and schedule savings that can be made we can assume that a car makes 40,000 car-miles per year and the energy costs 1 cent per kilowatt-hour delivered at the car. Then the difference between seven and nine stops per mile represents a saving of $144 per year in power. A schedule speed of 11.2 m.p.h. corresponds to 3571 car-hours operation. while with a schedule speed of 9.8 m.p.h. the car would be in service for 4081 car-hours. These data illustrate the advisability of eliminating useless stops, and of inaugurating skip stops, near-side stops, etc. It is true that on some lines, even though the schedule speed was increased from 5 per cent to 10 per cent, it would not be possible to decrease the number of cars actually required for the service, but there are more cases where it is possible to take the full advantage of the savings to be obtained by operating at maximum schedule speed.

The advantages resulting from reducing the number of stops and thereby increasing schedule speeds do not all accrue to the railway, but they are shared in large proportion with the patrons. Assume that operating conditions have been so changed that it is possible to shorten a schedule by five minutes. If the car carries fifty passengers it is reasonable to assume that twenty-five of these benefit to the full extent of the saved time. On this basis the total time saved for one-half the passengers is 125 minutes. Some companies have adopted different schedule speeds economically to meet the varying conditions of traffic. One operates four different schedules, which apply to the morning rush, midday service, evening rush and the evening service. During the non-rush hours the schedules are speeded up and the number of cars is reduced, while the proper interval between cars is maintained.

The curves of Figs. 6 and 7 apply only to tangent level track, and do not allow for traffic delays. In ordinary practice the addition of 10 per cent to the schedule speed will permit the application of the theoretical values to actual conditions.

So far we have been discussing the savings which are possible to be obtained in operation. The savings possible through weight reduction are also attractive. The use of trucks and motors adapted for 24-in. wheels is an illustration. In one case a pair of trucks for the large wheels weigh 14,000 lb., and the cars are equipped with two motors weighing 3370 lb. each. By substituting four 900-lb. motors for the heavier ones, the total weight saving in the motors would be 3140 lb. By substituting 24-in. wheel trucks for those necessary with the larger motors, a further weight saving of 5400 lb. results, making a total reduction in car weight of 8540 lb. This reduction amounts to 20 per cent of the weight of the car, and much more than pays for the investment. There are in nearly all cars which were built some time ago certain elements for which lighter-weight material could be substituted at a small cost.

During the past year there has been a growing tendency to apply light-weight, one-man cars to many services. This is not confined to any particular district. On nearly every property which I have visited recently there has been a tendency to place small, light-weight, one-man cars in stub-end service. In many instances a car having a seating capacity of approximately thirty passengers would be large enough for practically all needs. On city systems there are usually several lines on which the receipts per car-mile are far below the average. These are the lines which drain the net earnings and constitute a necessary evil. The small car in many of these cases will transform deficits to net earnings.

By way of illustration a service where two cars were required may be cited. At present cars weighing 56,500 lb. are operated by two men. The company buys energy at 2 cents per kilowatt-hour. The conductors' reports showed that, with the exception of one trip a day, never were more than fifteen passengers carried. However, these cars were used to transport the workmen of a factory, which always closed at a definite hour, and at this period eighty passengers had to be carried. During the remainder of the day the load varied from two to fifteen passengers. The management of this company has practically decided to purchase four 10,000-lb. one-man cars, seating thirty passengers. The power bill will be reduced to approximately one-fifth, and the labor cost to slightly more than one-half. The preliminary analysis of one-man car operation by another progressive management shows that there will be (1) a saving of wages, (2) a saving in power, (3) a saving in maintenance cost, (4) a development of traffic due to more frequent service, and (5) a reduction in accidents.

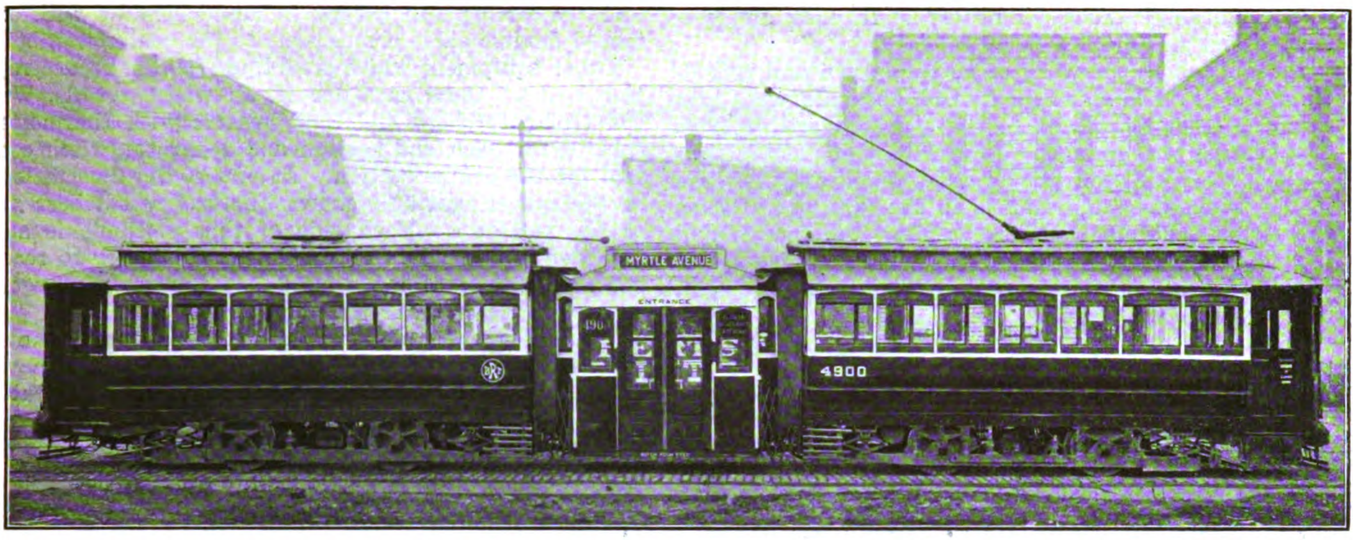
Of course, it is not expected that these light-weight, one-man cars will be substituted for every class of service. There are certain service conditions, such as the congestion in the downtown city streets, which would make it inadvisable ever to attempt, or even seriously consider, the use of small cars. From the present indications it would seem, however, that a large number of places can be found where the installation of the small cars would pay 50 per cent or more on the investment.

The one-man car should be equipped with every possible safety and time-saving device, which should include air brakes, control with "dead-man's" release, which automatically cuts off power, applies the brakes, sands the track and opens the car door. When these features are properly applied, they are time savers and put the railway company in the position of having provided the public with the greatest possible protection against accident.

Civil Service Examinations Announced

The United States Civil Service Commission announces an open competitive examination on April 19, 1916, for the positions of junior electrical engineer and signal engineer at various places designated in a special list. From the register of eligibles resulting from this examination, certification will be made to fill vacancies as they may occur in these positions in the Interstate Commerce Commission. Positions will be filled as follows from the register resulting from this examination: Grade I, $1.200 to $1,680 a year; grade II, $720 to $1,080 a year.

Rating in the above examinations will be based 50 per cent on educational training and experience, and 50 per cent on theory and practice.



BROOKLYN ARTICULATED CAR—SIDE VIEW OF NEW CAR, 62 FEET, 10 INCHES OVER ALL

The Brooklyn Articulated Car

An Articulated Car Unit Has Been Built by the Brooklyn Rapid Transit System to Determine the Feasibility of Rebuilding Other Single-Truck Cars to the Same Type

THE Brooklyn Rapid Transit System has recently placed in service an articulated car unit made up of two single-truck cars and a low floor vestibule, similar to the type used by the Boston Elevated Railway.

Unlike Boston, Brooklyn has practically no narrow winding streets to favor the use of an articulated unit for topographical reasons, and it has only enough single-truck cars to make up forty-six such units in all. Therefore, in Brooklyn, the problem of using articulated units narrows itself down to these questions:

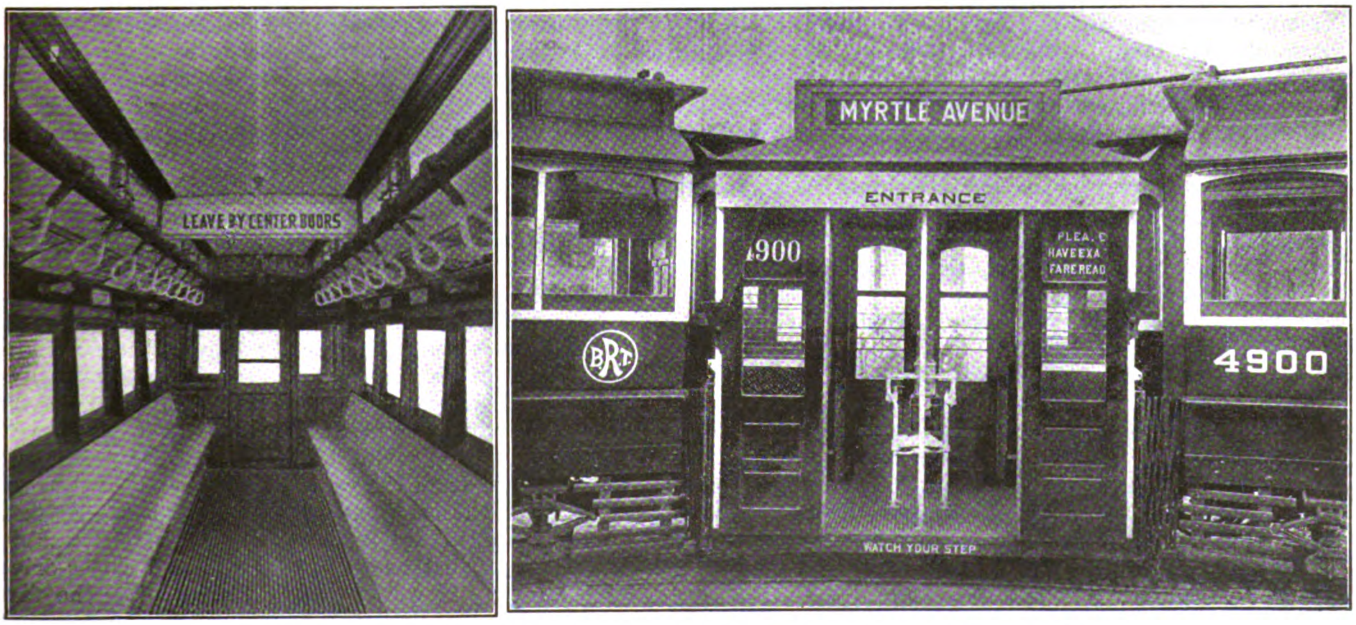
Will it pay to reconstruct and modernize these single-truck cars and buy center vestibules for them in preference to buying entirely new center-entrance cars of slightly smaller capacity?

Will it be possible to operate an articulated unit as efficiently as center-entrance cars in such features as running speed, length of stops, ease in passenger handling, etc.?

Will fare collection be as satisfactory as on center-entrance cars?

To answer these questions, the trial units will be operated over a number of lines. The results will be studied by a committee appointed by President Williams consisting of C. D. Meneely, vice-president and treasurer; W. Siebert, superintendent surface transportation, and W. G. Gove, superintendent mechanical department.

The articulated car unit is made up of two single-truck cars and one center vestibule. To adapt the car bodies for this service, it was necessary to cut off a 4-ft. 10-in. platform on each, leaving only enough of the hood at the inner ends to form the junction with the vestibule. The outer ends of the cars were vestibuled, but this did not change the length of the car. The length of the articulated unit is 62 ft. 10 in. over all, this being made up as follows: center vestibule 13 ft.

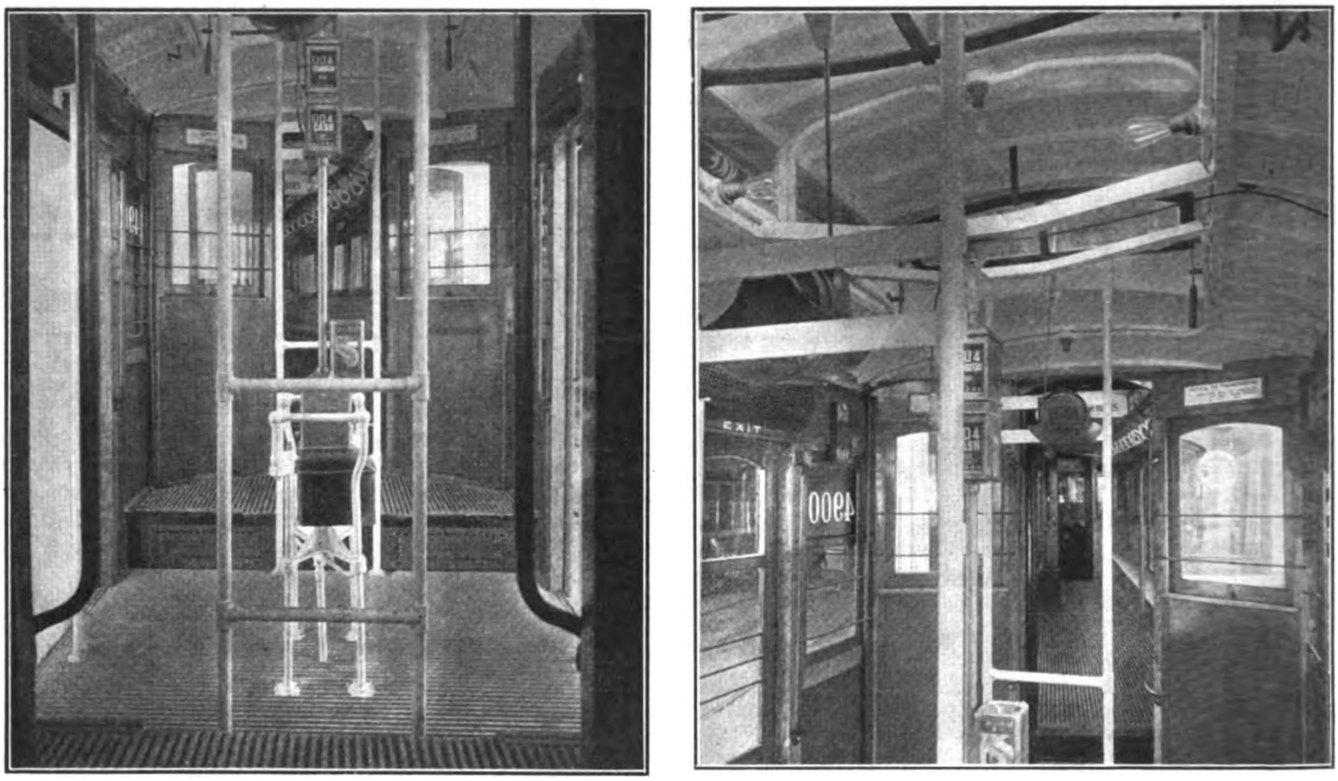


BROOKLYN ARTICULATED CAR—INTERIOR OF CAR; SIDE VIEW OF CENTER VESTIBULE

2 in. long, single-truck car bodies 20 ft. each, and vestibuled end platforms 4 ft. 10 in. each.

In addition to the work of cutting down and remodeling the car bodies as mentioned, the cars were also changed from the closed to the semi-convertible type. The seating was changed to the extent of placing four folding seats on each platform, of which only two are in use when the motorman is in the vestibule. When the corner vestibule seats are in place, the door behind them is locked. The doors on the opposite sides are of double folding type, but they would be operated for exit only during contingencies.

Externally the cars were renovated by painting them in the company's new standard color, Aurora red for the body, citron yellow for the posts and trimmings and buff for the roof. Internally, the cars were renovated by finishing the ceiling in white enamel. Tungsten 23-watt lamps were also installed, thus adding greatly to the attractiveness of the interior.



BROOKLYN ARTICULATED CAR—VIEWS OF INTERIOR OF CENTER VESTIBULE—ON ONE THE MOTOR-DRIVEN COIN REGISTER IS CLEARLY SHOWN, THE OTHER ILLUSTRATES THE TWO TROLLEY CATCHERS WITH ROPES PASSING THROUGH CHUTES IN ROOF

Instead of using leather handstraps, the company has fitted this unit with a Rico tubular porcelain glazed metal hanger of B. R. T. design. This hanger has the usual tension spring by which it assumes an angle out of the way of the passenger when it is not being held vertically by him, but it has been improved in the manner of attachment to the rod, since it can be taken off merely by the loosening of a single nut. Faraday buzzer push buttons have also been installed for the convenience of the passengers.

Aside from these changes and additions, a number of other alterations were required. The brake-rigging had to be changed owing to the installation of Westinghouse semi-automatic air brakes, which are operated both from the motorman's valves and from the emergency valve at the conductor's stand in the center vestibule. Peacock geared brakes replace the original hand brakes. While no change was made in the motor equipment, the control was changed to K-28, the old resistors were replaced by E.M.B. unbreakable grids, and the wiring was placed in metal conduit with armored flexible cable connections to the center vestibule.

Other equipment which would go into the reconstruction cost of these cars are H. B. wheel guards, Wilson trolley-catchers and Gold heaters with thermostat control for each end section and separate switch control for the center section. As one of the illustrations of the center vestibule shows, the trolley catchers are in the vestibule. Each side of this vestibule is also provided with ladders to enable the conductor to reach the roof and to afford a hand-hold for the passengers as they leave or enter the cars.

The center vestibule is of the Laconia Car Company's standard type, with floor only 14 in. above the pavement. It is furnished with pneumatically-operated doors made by the National Pneumatic Company. These doors are operated from a handle instead of a push button. Faraday single-stroke bells are used for signals between the conductor and the motorman. To avoid the necessity of carrying too many circuits across the center vestibule, a separate switch panel is located in each car.

An exceptionally interesting feature is the use of one of the International Register Company's motor-driven coin registers of the type described in the ELECTRIC RAILWAY JOURNAL for Jan. 8 in the article on "Fare Collection Revolutionized at Boston." A comparison of the motor-driven coin register with the method of fare collection now used on the Brooklyn center-entrance cars should prove instructive. In the latter cars, the conductor is provided with a change-making table, the pedestal of which carries the various push buttons for controlling doors, giving signals, etc. The conductor makes change from the cash on the table and rings up the fares on the cash and transfer registers, by means of push buttons. He is therefore relieved of handling any pull-rope, just as in the case of the motor-driven coin register. However, the registration of the fares depends upon him rather than upon a coin register.

COMMUNICATION

Car Operation Efficiency: Energy Input Method of Determining Motormen's Efficiency

RAILWAY IMPROVEMENT COMPANY
NEW YORK, March 27, 1916.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 19, 1916, C. H. Koehler suggests a possibility that the general fundamental principles outlined in my article in your issue for Jan. 15 are not controlling in the attainment of efficiency under practical operating conditions.

There are two possible methods for checking efficiency in the use of power. The results, *i.e.*, the power input to the car, may be measured, or the factors controlling and determining such results may be checked. Some undoubtedly believe that checking the result is the preferable system, and, as Mr. Koehler's criticism is based on such a belief, it seems desirable to analyze somewhat in detail his suggestions, and to show their relation to the general principles.

In his letter, Mr. Koehler overlooks two practical principles involved in this subject. The first is that the manufacturer and the user of motor equipment select equipment and gear ratio suitable for operation with the motors in multiple under normal average traffic conditions. The second is the basis for the application of the law of averages to the variation in such factors as length of run, duration of run, scheduled speed, etc., factors which are recognized as affecting practical operating results. In my article these averages were determined and their application was analyzed by means of the recognized and accurate method of plotting speed-time and power diagrams based on the characteristic performance curves for the motor equipment.

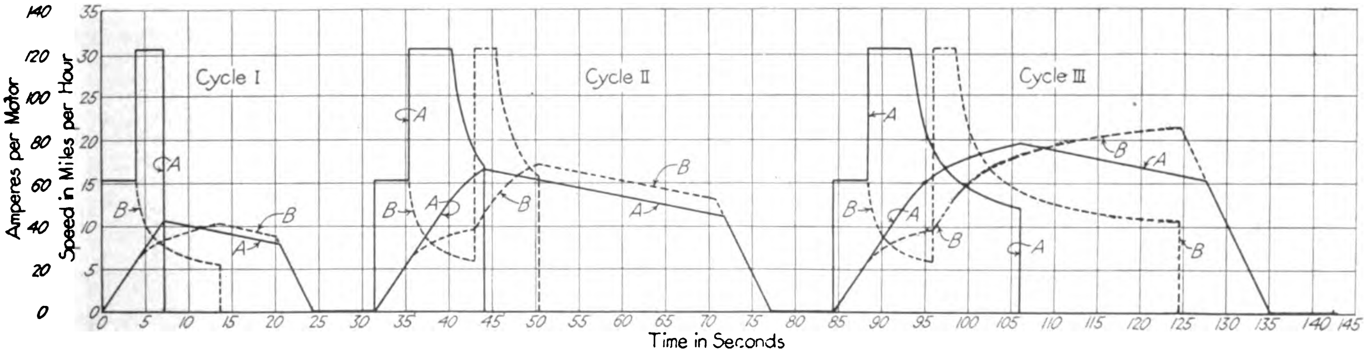
There is no doubt that with equipment selected for normal operation in multiple at a given scheduled speed and with a given average number of stops per mile, there are conditions where energy saving results from series running. This is particularly true in congested districts where stops are frequent. Here, if normal multiple operation is followed, the controller must be thrown off at or near the full multiple position. For such short runs, the rheostatic losses from full series to full multiple are so great relatively that a saving in power will result from series running.

Between the normal mode of multiple operation and series operation, an intermediate mode of operation is possible, *i.e.*, pausing a few seconds in the series position, the notching up to full multiple. Under such conditions, the general rules laid down in my previous article apply, although the general use of this mode under conditions in which multiple operation is contemplated will result in a loss, as it produces only an equivalent average lower rate of acceleration. There are, however, certain rather infrequent traffic conditions involving rather short runs, where the advantages of series operation are relatively small compared with multiple operation, under which pausing on the series position of the controller obviously results in saving. Practical operating results, however, demonstrate that the best results are secured with few and simple rules for the direction of the motorman. Increase in the rates of acceleration and braking results in increased coasting and corresponding reduction in power consumption. Therefore, pausing on the series position of the controller should be discouraged to attain the best efficiency in practical operation. As series operation and operation involving pausing on the series position of the controller seem to be the basis of Mr. Koehler's argument, it is worth while to apply his principle to average conditions.

In the accompanying Fig. 1 the application of these principles is shown in three sets of diagrams. Cycles I and II are Mr. Koehler's suggested runs of one block and three blocks respectively, making a total run of four blocks, with an average of ten stops per mile. The length of this run is 0.2 mile or a distance approximately only 5 per cent of the average one-way trip. He has assumed an average number of stops 11 per cent higher than those made upon one of the most congested lines in Chicago, the Madison Avenue line of the Chicago Surface Lines; 33 1/3 per cent higher than the average number of stops (seven and one-half) generally considered as typical of the average railway line, and just double the number of stops mentioned as the average for the particular equipment on the line of Company B in my article of Jan. 15.

In Fig. 1 is also an additional run of only four blocks, Cycle III, to be made immediately following Cycles I and II. This run is well within reasonable practical probabilities, for the three Cycles I, II and III aggregate only a total run of 0.4 mile, or approximately 10 per cent of the average one-way trip. In this total run the equivalent average number of stops is seven and one-half per mile, or approximately that encountered in average practice. In Fig. 1 Diagrams A represent the performance of Mr. Koehler's Motorman A defined as "after a coasting record." Diagrams B represent the performance of his motorman B represented as having definite anticipatory knowledge in reference to the stop requirements of traffic conditions. The cycles of operation of the two motormen may be summarized as follows:

Motorman A following the mode of normal operation contemplated in the selection of the equipment as suiting the average traffic conditions, notches straight up



CAR OPERATION EFFICIENCY—FIG. 1—OPERATING DATA FOR TYPICAL RUNS OF DIFFERENT LENGTHS to multiple at the rate of 1½ m.p.h.p.s., gets bell to stop in 7.2 seconds after starting, throws off power, coasts 13.3 seconds, brakes at the rate of 2 m.p.h.p.s., and makes a seven-second stop at the end of the first block. Motorman B accelerates to the series position of the controller at the same rate, but in anticipation of a stop (or from general sluggishness) pauses on the series position, gets bell to stop 7.2 seconds after starting, continues in series until 13.6 seconds from starting, cuts off power, coasts 6.3 seconds, brakes at the rate of 2 m.p.h.p.s., and makes a seven-second stop at the end of the first block. This run is 259 ft. long.

In Cycle II, Motorman A accelerates at the same rate to full multiple, continues in multiple until he attains the speed which his experience and judgment have established as suitable for the probable traffic conditions considered in relation to the time-element factors controlling his ultimate efficiency, then throws off power, coasts 21.5 seconds, brakes at 2 m.p.h.p.s., and makes the seven-second stop called for, at the end of the third block of his three-block run. Motorman B accelerates in the manner and for the reasons outlined for Cycle I to the series position, pauses on the series position for 7.5 seconds (for the bell that came not), then passes to multiple and continues in multiple a sufficient time to make up for the delay caused by pausing on series, then coasts 20.4 seconds, brakes at 2 m.p.h.p.s., and makes the seven-second stop called for at the end of the third block of this three-block run. The length of this run is 791 ft.

In Cycle III, Motorman A accelerates in the manner and for the reason previously described to full multiple, continues in multiple until he has attained the speed his experience and judgment have established as suitable, as above, then throws off power, coasts 21.5 seconds, brakes at 2 m.p.h.p.s. and makes the seven-second stop called for at the end of the fourth block of this four-block run. Motorman B accelerates, in the manner and for the reasons previously described, to the series position, pauses on the series position 7.5 seconds (for the bell that came not), then passes to multiple. But the habit based on the wrong principles for normal operation has caused so much delay in time that in order to maintain schedule, power must be used (resulting in no coasting) until the application of the brakes is at the rate of 2 m.p.h.p.s. He makes a seven-second stop at the end of the fourth block of the four-block run. The total length of this run is 1056 ft.

Table I shows the data for the above cycles. From the table it will be noted that in Cycle I there is a considerable saving in energy from pausing on and continuing at only series position, as Mr. Koehler found. In Cycle II the two methods of operation produced substantially the same results, although I find a slight difference in favor of proceeding to full multiple at once. Cycle III shows a great advantage in favor of proceeding at once to full multiple, much more than offsetting the reverse result from Cycle I.

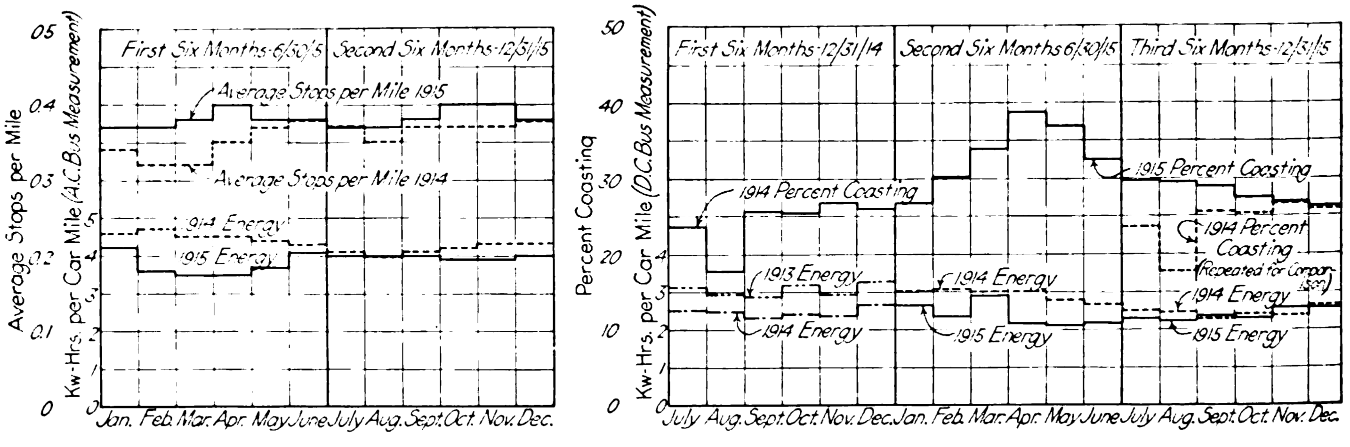
It is interesting to note that even for the relatively short run (Cycles I, II and III) the ratio of the increase in per cent coasting to the resulting per cent saving in power of A and B operation gives a ratio of 1 to 0.51. This illustrates the fact that there is a definite ratio existing between increase in per cent coasting and per cent saving in power, as was demonstrated from the fundamental principles in my former article.

In the foregoing analysis the exact principles of operation suggested by Mr. Koehler have been conceded and applied for comparison. Every practical operator knows that regardless of the use or non-use of any efficiency checking device, other limitations control the operations of the motormen in congested districts where runs like that shown in Cycle I would be used. Therefore, under these conditions, the motormen rarely attempt multiple operation. The need is apparent, however, for impressing the motormen with the importance of the time element under these conditions, and this time element should be checked for the proper results.

TABLE I—SUMMARY OF DATA FOR DIAGRAMS SHOWN FOR CYCLES I, II AND III

	Cycle I	Cycle II	Cycle III	Total Run, Composed of Cycles I and II	Total Run, Composed of Cycles I, II and III
Length of run—feet	259	791	1,062	1,050	2,112
Corresponding number stops per mile	20.38	6.68	4.97	10.06	7.5
Schedule time A and B—7 stops 1 mile	31.40	53.0	57.85	84.40	142.25
Schedule speed A and B—m.p.h.	5.62	10.16	12.50	8.48	10.12
Seconds coasting—A	13.3	27.6	21.50	40.9	62.4
Seconds coasting—B	6.3	20.4	....	26.7	26.7
Per cent coasting—A	42.35	52.10	37.17	48.43	43.85
Per cent coasting—B	20.04	38.50	....	31.63	18.76
Ampere seconds—A	641	1,183	1,720	1,824	3,544
Ampere seconds—B	540	1,205	2,240	1,745	3,985
Kilowatt-hours per car-mile—A	3.623	2.193	2.376	2.550	2,460
Kilowatt-hours per car-mile—B	3.053	2.232	3,093	2,440	2,767
Increase in per cent coasting A over per cent coasting B	22.34	13.60	37.17	16.80	25.09
Per cent power saving for A over B referred to power for A	—15.72	1.86	30.2	—4.32	12.47

In his communication Mr. Koehler calls attention to an apparent discrepancy in the performance of motormen, referred to in my article, all of whom would have a 40-per cent coasting record for the specified variations of traffic conditions. The schedule speeds and number of stops per mile for which this percentage of



CAR OPERATION EFFICIENCY—FIG. 2—ENERGY CONSUMPTION DATA, ANNAPOLIS SHORT LINE; FIG. 3—ENERGY CONSUMPTION DATA, CLEBURNE INTERURBAN LINE coasting was shown with widely-varying ranges in kilowatt-hours input, closely approximates the actual conditions existing on a certain line of a well-known railway on which the daily services of some sixty-four different motormen are required. On this line, 40 per cent more cars are required for the evening rush hours than for the morning rush hours, and the number is nearly four times greater than that required at medium schedule for the service between the morning and evening rush hours. The night service with its smaller number of cars approximates the highest schedule.

The classifying and subdividing necessary equitably to compare the sixty-four motormen on such a line may be the simple matter that Mr. Koehler suggests, but it is evident that the 40-per cent coasting shown as being the measure of their efficiency for the particular conditions existing will appeal to the practical operator.

Fortunately, practical results are available from recent periodicals confirming the correctness of the conclusions established from the fundamental principles involved in car operation efficiency. The Feb. 26, 1916, issue of the ELECTRIC RAILWAY JOURNAL contains an admirable article by D. E. Crouse, entitled, "Ampere-Hour Meters on the Annapolis Short Line." Without any desire to detract from the value of Mr. Crouse's article, I have subdivided his first-year comparative results from the use of meters into two periods, *i.e.*, the first six months' use, ended June 30, 1915, and the second six months' use, ended Dec. 31, 1915. Fig. 2 shows in graphical form the comparative results (based on a.c.-bus measurement) for the respective first and second six-month periods.

The Stone & Webster *Public Service Journal*, January, 1916, issue, contains an article by R. E. Griffiths entitled, "The Coasting-Time Recorder and Its Operation." From the data in Mr. Griffiths' article Fig. 3 has been prepared, showing the comparative results (based on d.c.-bus measurement) on the Cleburne interurban line of the Tarrant County Company, for the first eighteen months' operation of coasting recorders, ended Dec. 31, 1915, the eighteen-month period being divided into first, second and third six-month periods of comparative operation.

Figs. 2 and 3 show results obtained in practical operation under somewhat similar conditions, *i.e.*, interurban service, which approaches more nearly uniform conditions for schedule speed, number and duration of stops, etc., than can possibly exist for ordinary street railway service.

Fig. 2 shows for the Annapolis Short Line a saving in power of 16.4 per cent from the first six months' use of meters compared with the corresponding period of the previous year. The average number of stops per mile was 0.04 greater for the meter period. Mr. Crouse states in his article that the work done is indicated by the relation of the average number of stops per mile. Similarly, Fig. 2 shows a saving in power of only 4.7 per cent for the second six months' use of the meters, although the comparative number of stops per mile increased only 0.01 stop per mile.

Fig. 3 shows for the Cleburne interurban line a saving in power of 19.6 per cent, with an average of 24.2 per cent coasting for the first six months' use of coasting recorders, compared with the corresponding period of the previous year. Similarly (see Fig. 3), there was a saving in power of 18.7 per cent, with an average of 33.1 per cent coasting, for the second six months' use of the recorders for the comparative periods and the third six months' use, which covers comparative periods with the coasting recorders in use, shows a saving in power, for the comparative periods, of 2.8 per cent, with an increase in coasting from 24.2 per cent to 28.1 per cent.

The interesting feature of the cited data is that the saving in power on the Annapolis Short Line from the use of meters dropped from 16.4 per cent average saving for the first six months to only 4.7 per cent average saving for the second six months' use of the meters, although the traffic conditions were comparatively easier, based on the comparative increase in the average stops for the latter period.

On the other hand, the saving in power on the Cleburne interurban line for the first six months' use of recorders was 19.6 per cent, for the second six months 18.7 per cent, and for the third six months 2.8 per cent increase, compared with the results of the first six months' use, notwithstanding that the gross earnings per car-mile (another accurate measure of work done), I am advised, showed more than 6 per cent increase.

The foregoing actual results confirm the fact that the fundamental principles involved are as described in my previous article.

C. C. CHAPPELLE,
Vice-President.

Cost Efficiency

Efficiencies of Machines Are Misleading Except Upon a Basis Including All Factors of Cost

IN the current issue of the *General Electric Review*, H. M. Hobart discusses the subject of "Cost Efficiency," or commercial efficiency, in connection with prime movers, as opposed to the commonly-used "energy efficiency," or the ratio of energy output to energy input. The electric locomotive, he said, when operated at its rated load, and under normal service conditions, delivers to the driving wheel about 85 per cent of the electrical energy taken from the contact system. This figure, however, is affected by the weight of the locomotive which has to be hauled as part of the train. If, for example, a 100-ton locomotive hauls a 900-ton train, the "drivers-to-drawbar" efficiency is 90 per cent and the "pantograph-to-drawbar" efficiency is 76.5 per cent. However, taking into account the various kinds of work required of locomotives, one might assume a figure of 70 per cent as the over-all efficiency of the machine.

However, if the electric locomotive is supplied from a large generating station which sends three-phase current over a transmission line, say 100 miles long, to substations from which the railway is supplied, only about 13 per cent of the energy in the coal will be delivered to the transmission and converting system which will have an over-all energy efficiency of its own of some 72 per cent up to the locomotives, so that the latter will deliver only half of the energy in the coal at the drawbar. Thus, from coal to drawbar there is an efficiency of 6.5 per cent for electric operation. Tests have shown a typical steam locomotive to have an efficiency of 4 per cent but when the actual losses of service are considered the over-all efficiency is nearer 3 per cent. Nevertheless, these figures are utterly insufficient as criteria of the two systems. The "cost efficiency" must be considered.

For example, if the cost of electricity at the power station is 0.6 cent per kilowatt-hour at the step-up transformer which has an efficiency of 97.5 per cent, the true cost of the electricity delivered to the transmission line would be 0.615 cent per kilowatt-hour. But, as a matter of fact, proper allowances for repairs, interests, depreciation, etc., increase this cost by a further 0.012 cent, making the real cost 0.627 cent per kilowatt-hour, and against the cost of 0.6 cent per kilowatt-hour prior to stepping up. From this can be conceived the idea of a "cost efficiency" which shall take all the cost factors into account in considering a machine. Thus, while the energy efficiency of the transformer is 97.5 per cent, cost efficiency is 0.6 divided by 0.627, or 95.6 per cent.

In the same way, the cost efficiency of the transmission line would become 78.6 per cent; that of the step-down transformers 94.5 per cent; that of the substations 70.6 per cent, and that of the direct-current distributing system 78.8 per cent, making a total over-all cost efficiency of only 39.6 per cent for the power supply of the electric locomotive, and thus it may be seen that the real efficiencies of the steam and electric locomotives are not so far apart after all.

The author then discussed the Diesel engine, which has an indicated thermal efficiency of 40 per cent, as against 23 per cent for the steam turbine, or 18.4 per cent when the 80 per cent efficiency of the boilers is considered. Including mechanical losses, the two efficiencies become respectively 32 per cent and 16.5 per cent. However, the cost of a heat unit obtained from crude oil at 4 cents per gallon, and from coal at $4 per ton, will be respectively 0.33 cent per kilowatt-hour and 0.28 cent per kilowatt-hour of energy output. Therefore, notwithstanding that the steam turbine's efficiency is only half that of the Diesel engine, its fuel cost is actually lower under the assumed conditions. In addition, the Diesel engine has the disadvantage of great weight cost and complexity, weighing some 300 lb. per kilowatt of rated output while steam-turbine-driven sets weigh as little as 30 lb. per kilowatt, all auxiliaries being included in both cases. If the cost efficiencies were worked out the results would show very much to the disadvantage of the internal combustion engine, except under such conditions as very high-priced coal, or an exceptionally high load factor.

The efficiency of the human being as a prime mover was also considered on the basis that the food daily consumed by a man has a calorific value of about 4 kw.-hr. About 8 per cent of this represents the mechanical output of which a man is capable, which, averaged over twenty-four hours, represents about 14 watts. If the man compresses his efforts into one hour per day, he is presumably capable of an output of about 340 watts, or nearly 0.5 hp. On the basis of an output of 0.34 kw.-hr. per day as representative of a man's capacity as a prime mover, his total output in a working length of forty years would amount to 4850 kw.-hr. which at a price of 5 cents per kilowatt-hour, would be worth only $243, whereas his cost to the community during his lifetime would be several tens of thousands of dollars.

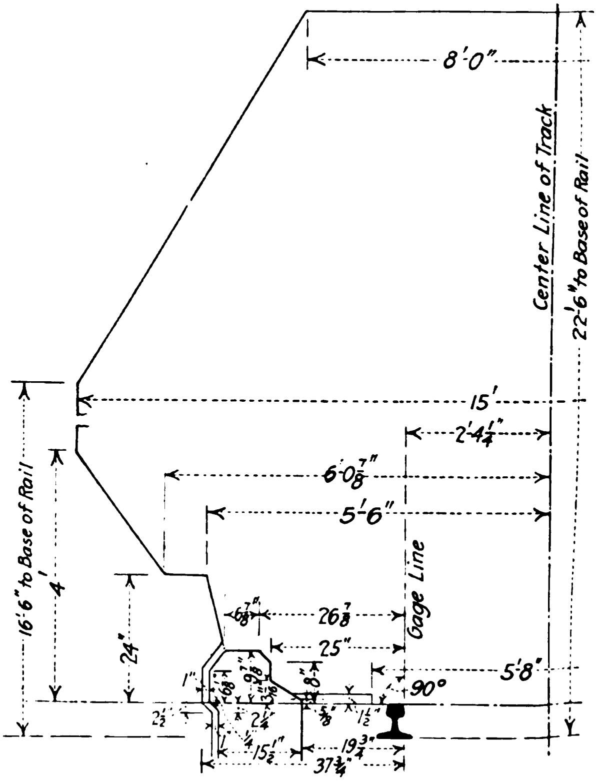
Clearance Diagram for Railway Structures

American Railway Engineering Association Adopts Recommended Form of Clearance Diagram for Structures—Nine Exceptions to Meet Various Conditions Are Noted

At the convention of the American Railway Engineering Association, reported in the ELECTRIC RAILWAY JOURNAL for April 1, 1916, page 641, a recommended form of clearance diagram for structures was adopted. This diagram was made subject to considerable revision from the form originally proposed by the committee submitting it, and the changes have been incorporated in the diagram shown in the accompanying illustration, the most important one of them being the addition of the clearance lines for third-rail construction adopted as standard by the association at a previous convention.

As noted on the diagram, the clearance lines are subject to exceptions which have been introduced to meet conditions where it is necessary to encroach within the space included in the diagram. These exceptions are as follows: (1) Grade-crossing elimination work in cities. (2) Separation of grades in new construction work in cities or other restricted situations. (3) Loading platforms along side tracks, freight houses, warehouses, piers, etc. (4) Doors of engine houses and other buildings where the design makes the recommended clearances impracticable. (5) Coach or other yards where the available space is very restricted. (6) New work where the physical conditions make the recommended clearances impracticable. (7) Platforms at coach-floor level in subways and other similar situations. (8) Overhead clearances on tracks used exclusively for passenger service. (9) Other special situations requiring special clearances.

In the diagram as originally submitted by the committee no provision was made for the clearance lines for third-rail construction, and the omission was covered by a clause to the effect that the standard third-rail clearances should form the lower 24 in. of the general clearance diagram. The intersection of the line of demarcation between the general clearance lines and the third-rail clearance lines with the diagonal line forming the lower portion of the side of the original diagram comes at a point that cannot be expressed exactly in fractions of an inch. The position of this point is shown on the line cut as being 24 in. above the top of the rail, and 6 ft. 7/8 in. from the center line of track. Expressed exactly, this dimension would be 6.0714285 ft., the figure being a circulating decimal slightly less than the figure actually shown in the drawing. The dimension was expressed as a fraction of an inch for the reason that this does not affect any of the other dimensions in the diagram and simplifies the expression without introducing more than a really negligible change in the position of the point in question.



A. R. E. A. CLEARANCE DIAGRAM FOR STRUCTURES INCLUDING THIRD-RAIL CONSTRUCTION

American Association News

Company Section No. 10 Is Organized in Dixie—Transportation-Engineering Committee to Report on One-Man Car Operation—Twenty-seven Company Members Have Joined the Association Under the New Constitutional Provision

First Company Section Formed in the South

Section No. 10 was formed in Hampton, Va., on March 31, by employees of the Newport News & Hampton Railway, Gas & Electric Company, with an initial enrollment of sixty. A preliminary organization had been formed under the chairmanship of G. H. Caskey, auditor of the company, which prepared plans and elected officers as follows: President, E. C. Kelly, shop foreman; vice-president, H. C. McAllister, motorman; secretary, W. Collins; treasurer, R. C. Tignor; directors, W. Stewart, secretary; G. H. Caskey, auditor; B. J. Megison, superintendent of transportation, and C. D. Porter, engineer.

A novel feature of the inauguration was the use of an original ritual for inducting the elected men into office and making clear to them the nature of their new duties. Mr. Caskey performed this rite for the president who, in turn, initiated the others. E. B. Burritt, secretary of the association, and H. C. Clark, editor of the association magazine, were in attendance and explained the work of the asssociation to the men. Mr. Burritt laid particular stress on the relation of the sections to the association while Mr. Clark spoke of the social aspects of the section activity.

Short talks were also given by J. N. Shannahan, president; E. B. Peck, general manager; R. J. Booker, treasurer; B. J. Megison, C. D. Porter and E. C. Kelly. Good wishes for the success of the new section were expressed by Messrs. Lawton and Crossman, of the electric light and gas departments, respectively, which departments are forming sections of the N. E. L. A. and the A. G. I. After the talks questions were asked and answered and an oyster supper was served.

It was hoped President Charles L. Henry and company section committee chairman Martin Schreiber would be present. As they could not do so a resolution was passed inviting them to address a later meeting.

Mr. Clark reports that while this section is not as large as some, it promises to make up in enthusiasm for its necessarily limited size. He said that there was a fine spirit in evidence at the meeting. The questions which were asked indicated that the men wished to make the most of the opportunities which the section organization will provide.

Study of One-Man Car Situation

A meeting of the joint Engineering and T. & T. Associations committee on transportation engineering was held in Pittsburgh on March 24. Those present were W. A. Carson (co-chairman, T. & T.), Evansville, Ind.; C. F. Hewitt, Albany, N. Y.; P. N. Jones, Pittsburgh, Pa.; J. W. Allen, Boston, Mass., and F. R. Phillips (co-chairman, Engineering), Pittsburgh, Pa. The committee selected from its assignments the topic "Economics of One-Man Car Operation," concluding that the best results will be secured by concentration of effort. The several phases of the subject are to be considered by the several members and reports are due in Mr. Phillips' hands by May 1.

As indicative of the problems which the committee considers to be involved in this line, the following outline, approved at the meeting, is appended:

1. Conditions under which it is considered desirable to operate one-man cars: (*a*) On suburban lines tapping densely populated districts; (*b*) on streets where traffic congestion is great; (*c*) in jitney-bus competition; (*d*) on short belt lines; (*e*) on feeder lines.
2. Effect of frequency of service (made possible by the use of one-man cars) upon riding habit.
3. Reduction in cost of operation.
4. Possibility of furnishing transportation for the public (in districts not now possible) because of reduction in cost of operation.
5. Attitude of public.
6. Attitude of public service commissions.
7. Franchise stipulations.
8. Additional duties required of the operator, if any, and possible assistance from street inspectors.
9. Operation of one-man cars as night cars.
10. Difficulties of operation: (*a*) Grade crossings; (*b*) trolleys; (*c*) fare collection; (*d*) collection and distribution of transfers, making change, etc.
11. Advisability of operating on the same routes with cars of other types.
12. Proper size and seating capacity of car, considering loading capacity and ability of the operator to handle the number of passengers able to board the car.
13. Possibility of reduction in number of boarding and alighting accidents.
14. Design of the entrance and exit ways; separate or combined, controlled manually or by power.
15. Seating arrangement with reference to the effect upon the rapidity of taking on and discharging passengers.
16. Necessity for an emergency exit.
17. Brake operation, by power or manual.
18. Consideration of the use of automatic devices.
19. Consideration of the types of one-man car now in operation, with data.

"Manufacturers" in the Association Fold

Twenty-seven companies or firms have to date joined the association under the new provisions of the constitution. The complete list, with the names arranged approximately in the order in which the applications were made, is given below.

General Electric Company; Drew Electric & Manufacturing Company; ELECTRIC RAILWAY JOURNAL; Westinghouse Electric & Manufacturing Company; Aluminum Company of America; Railway Audit & Inspection Bureau; International Register Company; Trolley Supply Company; International Steel Tie Company; Kenfield-Davis Publishing Company; Ohio Brass Company; Chattanooga Armature Works; Sherwin-Williams Company; American Engineering Company; C. M. Koury Company (furniture dealers, Atlantic City); Archbold-Brady Company; Railway Improvement Company; Stone & Webster Engineering Corporation; Goldschmidt Thermit Company; Westinghouse Traction Brake Company; Tool Steel Gear & Pinion Company; Wheel Truing Brake Shoe Company; Curtain Supply Company; American Steel Foundries; Railway Materials Company; McQuay-Norris Manufacturing Company; Pantasote Company.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Flange Oiler for Reducing Curve Friction on Interurban Railways

BY F. G. LISTER
Mechanical Engineer El Paso & Southwestern System, El Paso, Tex.

The Oregon Electric Railway, with headquarters at Portland, Ore., has tried some successful experiments with a pneumatic flange oiler for interurban cars and locomotives, designed and patented by A. W. Olsen, air-brake machinist for the company. The general plan and the details of the oiler are shown in the accompanying illustrations.

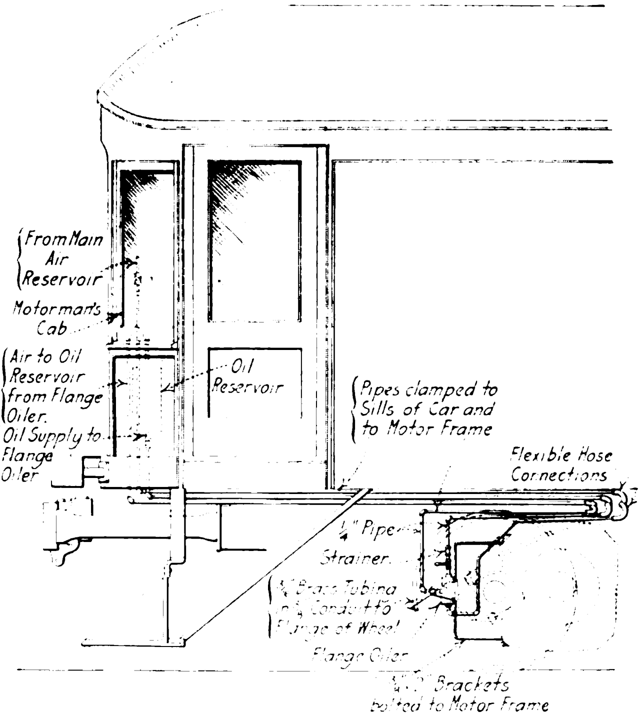
The oiler is operated by air pressure from the brake reservoir, and it consists of the following parts: (1) The lubricator proper, the function of which is to deliver a jet of mixed oil and air when the motorman admits air to it from the air-brake system. (2) An oil reservoir located in the motorman's cab near the heater. (3) A piping system consisting of an oil pipe, an air-pressure pipe and an air-equalizing pipe connecting the upper part of the oil reservoir with the mixing chamber in the lubricator.

The lubricator consists of a cast-iron or brass body, fastened preferably on the frame of the front, or No. 1, motor. In the lower part is a piston operated by air pressure. In the upper part is an oil chamber, in the bottom of which is a valve controlling the supply of oil to a mixing chamber below. The oil valve is lifted by the air piston by means of a regulating bolt which projects upward from the latter. By adjustment of this bolt, the rate at which oil will flow into the mixing chamber can be regulated. Air reaches the mixing chamber through two small air ports connecting it with the air chamber below the piston. In the ports are regulating valves by means of which the rate of admission of air to the mixing chamber can be adjusted. The air piston and the oil valve are seated by coiled springs.

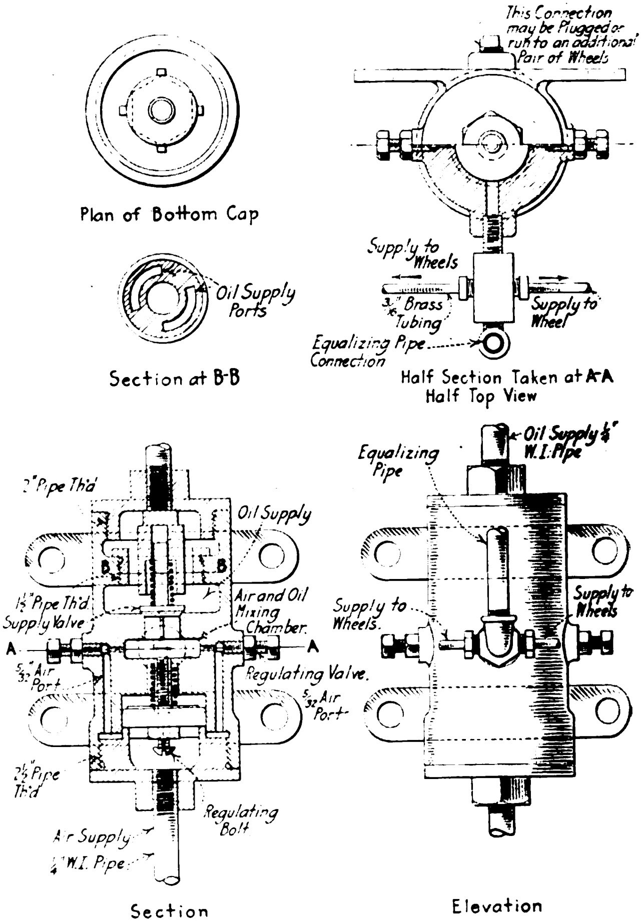
As stated above, the mixing chamber is connected with the upper part of the oil reservoir by means of an equalizing pipe. This permits the oil to flow by gravity from the oil chamber to the mixing chamber when the valve is opened. The mixture of oil and air is delivered to the wheel flanges through tubing drilled to 1/32 in., run through 3/8-in. conduit for protection.

In operation the motorman opens the cock in the oil supply pipe, and when he desires to oil the wheel flanges he admits air from the main air reservoir to the bottom of the lubricator by opening a valve. The piston rises and the regulating bolt strikes the boss on the bottom of the oil valve, raising it slightly. At the same time air is admitted to the mixing chamber and drives the oil out in the form of a spray. When the lubricator is spraying the air pressure in the mixing chamber is about 30 lb. per square inch.

When the oiler is shut off the air remaining leaks out through the tube to the wheels and through a 1/16-in. vent in the air valve operated by the motorman. The air piston and the oil valve then seat themselves


From Main Air Reservoir
Motorman's Cab
Air to Oil Reservoir from Flange Oiler.
Oil Supply to Flange Oiler
Oil Reservoir
Pipes clamped to Sills of Car and to Motor Frame
Flexible Hose Connections
1/4" Pipe
Strainer.
1/4" Brass Tubing in 3/8" Conduit to Flange of Wheel
Flange Oiler
Brackets bolted to Motor Frame

PNEUMATIC FLANGE OILER APPLIED TO MOTOR CAR WHEEL


Plan of Bottom Cap
Oil Supply Ports
Section at B-B
This Connection may be Plugged or run to an additional Pair of Wheels
Supply to Wheels
3/16" Brass Tubing
Supply to Wheel
Equalizing Pipe Connection
Half Section Taken at A-A
Half Top View
2" Pipe Th'd
Oil Supply
B
B
1 1/2" Pipe Th'd Supply Valve
Air and Oil Mixing Chamber.
A
A
5/32" Air Port
Regulating Valve.
5/32 Air Port
2 1/2" Pipe Th'd
Regulating Bolt
Air Supply
1/4" W.I. Pipe
Section
Equalizing Pipe
Oil Supply 1/4" W.I. Pipe
Supply to Wheels.
Supply to Wheels
Elevation

DETAILS OF LUBRICATOR FOR PNEUMATIC FLANGE OILER under the action of the coiled springs, and the operation is over.

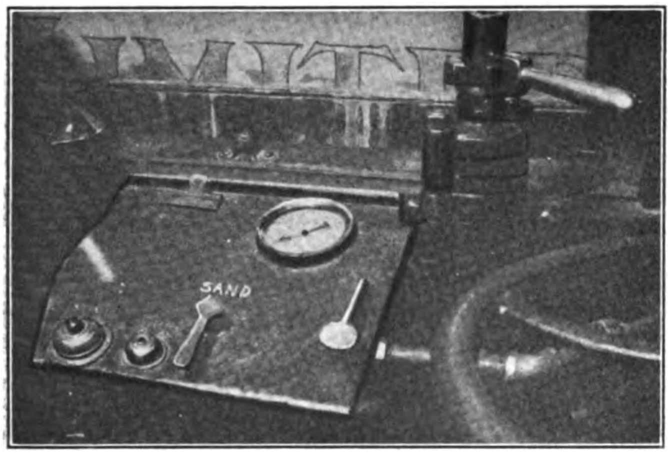
The three pipes leading from the cab run close to the truck center plate, and flexible connections are inserted to permit movement of the truck. Two pairs of wheels can be lubricated at the same time, as there is a connection on each side of the lubricator. In the illustration it is shown applied to one pair of wheels only, the connection on the opposite side being plugged. The oiler as described is designed for clean crude oil, of which the amount required for oiling a curve is so small that it cannot be detected on the gage mounted on the oil reservoir.

The device can be adopted to automatic operation by adding an incased gearing connected with transverse shafts attached to the truck and with a lever hanging vertically next to the right-hand rail. An extended lug attached to the outside of the rail, say 200 ft. from a curve, strikes this lever, turning the shaft and operating a cam mounted upon it. The vertical movement of the cam engages an air valve which automatically starts the flange oiler. On the left-hand side of the car is a lever on another shaft which acts in a similar manner to close the oiler when the car leaves the curve.

Motorman's Auxiliary Control Board

BY H. H. BUCHMANN
Master Mechanic Indianapolis, Columbus & Southern Traction Company, Greenwood, Ind.

Greater convenience and safety in the operation of cars has been obtained by mounting the air gage, sander and whistle valve handles, train order board and signal button on an auxiliary control board placed between the motorman's valve and the controller. A standard arrangement for all of these devices has been adopted, and auxiliary control boards have been installed on all the cars of the Indianapolis, Columbus & Southern Traction Company. A push button controlling the light for this board was also provided, and it closes the circuit against a spring which again breaks the connection when the motorman removes his hand. The standard arrangement of these devices makes them more convenient for the motorman to operate and, at the same time, gives an added factor of safety because he soon becomes so familiar with their location that he can place his hand on any one of them almost automatically. Incidentally the position of the gong push-pins and gong has been standardized for all cars. Six cars have been fitted with auxiliary control boards, and such boards will be added to all the interurban equipment operating over this line. The shelf is made of sheet steel, and it is fastened to the front vestibule center panel with screws and supported with a knee brace. While standardizing the location of the various auxiliaries on this board, the height of the shelf as well as the method of making the various connections was also fixed so that the control boards could be easily detached and are interchangeable.



MOTORMAN'S AUXILIARY CONTROL BOARD IN SERVICE

Electrical Repair Shop Methods as Applied to Platform Controller Maintenance

BY E. D. RANSOM, B.E.

The following paragraphs cover briefly the methods followed in overhauling controllers in the department of electrical repairs of a large railway system. The writer's intention is particularly to describe the short-cuts and improvements which have been developed in this department. On this system, although minor repairs and replacements are made in the maintenance shops, all major repairs and periodical overhaulings are made in the department of electrical repairs. This insures careful workmanship by experienced men, who become expert through performance of the same routine and class of work.

On this system all controllers are overhauled on a two-year basis, the overhauling being done in accordance with the following procedure. These controllers are in operating condition and have been kept up in the local maintenance shops where they have careful attention on inspection, where they are lubricated and where minor repairs are made.

Stripping Controllers. The controller is placed on a bench to be stripped, the cover is removed, cleaned and shellacked inside, dents are removed and the cover is stood up to dry. The controller is then taken apart and the several parts are distributed as follows:

All brass pieces, such as dial caps, tops and copper wipers, which are in good condition, are acid dipped. The control cylinder wiring and reverse wipers and wiring, together with the bottom connection board, are removed and tested for mechanical and electrical strength.

As all of these connections are made permanently at the back of the controller connection board, special attention has to be given to this point as these terminal backs are only exposed at the period of each overhauling. This wiring and the board are then shellacked and are again ready for use, after any necessary repairs have been made.

The blow-out coil is then removed, tested for continuity and connection, retaped, shellacked and returned for assembling. Next the Vulcabeston arc deflector is thoroughly scraped down, removing all carbonization and copper deposits, new sections are installed where needed and, after tightening all joints, the arc deflector is ready for installation.

Control Cylinder. The control cylinder is thoroughly cleaned of all carbonization, and insulating material is scraped to a clean surface. The cylinder is then put in a jig and any loose castings are tightened by the following method: The castings are held in the proper position by clamps, the cylinder is heated up by means of gas jets situated so as to throw heat at the base of each casting, and the castings are given their proper seat. If the cylinder is defective the castings are removed by heating, as described, and the cylinder is built up section by section with new castings and insulating seats.

Reverse Cylinders. New reverse cylinders for replacement are turned out of properly dimensioned wood and segments are installed by means of a jig which holds the cylinder in the proper position and locates the exact position of each segment by template fingers. Old cylinders are placed in the jig and are thus checked for any warping out of alignment.

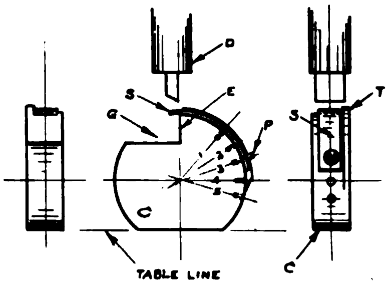
Controller Back and Bearings. Control cylinder bearings, especially the top bearings, are subject to great wear due to the continued pull from the controller handles. It has been found economical to insert brass bushings in the upper castings, thus eliminating lost motion and frequent renewal of the entire casting.

Pawl springs are replaced on overhauling, as well as on inspection. A great deal of trouble was experienced at one time from the breakage of pawl springs, but this was overcome by a very simple method. The old-style springs were hooked at each end by means of a reverse turn of the last coil. It developed that the breakage was always at this bend, where the spring was attached to the pawl, as all the strain and twist was concentrated at this point. To overcome this trouble the pawl spring is now pinned to the pawl by means of a swiveled metal strip, which, in turn is fastened to the pawl spring by anchoring it to the entire last coil, without necessitating any bending at all. This swivel action takes the twist off of the reverse turn, and distributes the tension evenly over the whole coil in a direction perpendicular to the diameter of the turns.

The controller back is next scraped out and a new fiber lining is installed. Due to an epidemic of controller flashes to the back of the controller with the cylinder in the series-multiple position, brought about by peculiar local operating conditions, it has been found advisable to place a layer of mica behind the fiber lining at the point where arcing repeatedly occurred.

Control Cylinder Wipers. All wipers not in good condition are, of course, replaced by new ones, which are manufactured in the machine shop very efficiently and inexpensively, as follows: By means of a die which has been developed in the shop, the wipers are stamped out to the proper size and shape, bent to the proper form and stamped with the owning company's initials on the back, all in one operation. It is only necessary to feed properly dimensioned bar copper to the machine.

The wiper springs and bases are stamped out, punched and shaped in a similar manner in one complete operation. Next the shunts and bases are machine-riveted to the wipers in three places and the complete wiper is ready for use. As the wear of the wiper is only at the point of contact with the segment, old wipers are scrapped with at least 90 per cent of the original copper remaining.



JIG AND CUTTING TOOL FOR CONTROLLER SEGMENTS

Control-Cylinder Segments. Old segments are cut down from larger to smaller sizes by means of a jig, as shown in an accompanying illustration. This is possible because the segments are worn extensively at only one end, there being a good end and hole left. A template section of the cylinder of radius *C* is placed vertically in a punching machine with the gap *G* directly under the cutting tool. On the circumference of this jig is a series of holes, 1, 2, 3, etc., numbered to correspond to the distances between holes for the several sizes of segment.

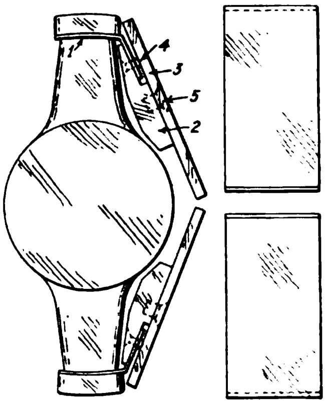
The segment to be cut down is placed on the jig, as shown in the figure at *S*, with a pin through the good hole. This places the other end of the segment under the cutting tool to give the proper size corresponding to the hole used. The segment is held against the template edge *T*, and by operation of the foot pedal on the punching machine the segment is cut off at point *E*, giving a segment of the desired size, the remainder being scrapped.

This jig is also used in making new segments. Bar copper is run through the machine and is bent and cut to proper length and radius by the tool. The saving in new segments is considerable, as the large segments are sometimes cut down twice to successively smaller sizes, until all that remains is a small end.

General. Due to the flashing referred to earlier, additional precautions are taken at the finger board and the segments with the practical elimination of controller flashes. On four-motor equipment the trolley wiper is now inclosed by inserting a ½-in. Vulcabeston shield on each side of the wiper. Similar shields are installed between all wipers where there has been any tendency toward flashing.

In addition to this, and still more important, arc shields have been placed between the segments on the control cylinder at the series-parallel position, preventing flashover to the controller back due to improper operation at this point. The second illustration shows this shield in detail together with the method of attachment to the cylinder, the parts being as follows:

1. Shield support of sheet brass, U-shaped.
2. Shield back of white fiber.
3. Shield of asbestos and wood.
4. Rivet, No. 14 x 7/16 in., flat head.
5. Machine screw, No. 14 x ¼ in., flat head.



ARC SHIELDS FOR CONTROLLER CYLINDER

The U-shaped prong, 1, is inserted under the segment and held in place by the segment screw, the edge then being flush with that of the segment.

Finally, after all the parts have been cared for as described the controller is assembled, proper adjustment of all contacts and springs is made, an initial lubrication is given to the bearings, the cover is closed and painted, and the controller is ready for an additional two-year service.

An Inexpensive Steel Pole Line

BY W. K. PALMER

Consulting Engineer, Kansas City, Mo.

The use of wooden poles in interurban railway construction seems incongruous to the engineer with a sense of the fitness of things, and nearly as inconsistent as would a carpenter job as a part of a lathe or other machine tool, but up to within recently the only type of steel pole available, that used on city streets, has been prohibitive as to cost. Now, however, with the Bates one-piece steel lattice pole a satisfactory substitute for the wooden pole at a moderate cost can be procured.

The engineers of the writer's organization have designed a standard bracket construction and span construction for use with this pole. The bracket construction uses a member made, like the pole, of one piece expanded and has been adopted by the northern division of the Oklahoma & Interstate Railway, 57 miles, in southeastern Kansas and northeastern Oklahoma. The company manufacturing the poles has accepted this bracket arm design as its future standard.

The details of the construction used on this railway are shown in the accompanying diagram. It was decided that pole spacing, for catenary overhead, could safely be increased to 200 ft. on tangent track, and that the reduction of number of poles more than offsets the increase of cost per pole so that an overhead system can actually be built for the same or for even slightly less first cost, using the new design, than when common wooden poles are employed.

STEEL POLES

Estimate of cost of 1 mile of construction using Bates steel pole and brackets, pole spacing 200 ft.

Twenty-six poles at $12.90	$335.40
Twenty-six brackets at $3	78.00
Twenty-six crossarms at 50 cents	13.00
Twenty-six messenger cable insulators at 10 cents	2.60
Twenty-six feeder cable insulators at 5 cents	1.30
Fifty-two telephone wire insulators at 4 cents	2.08
Twenty-six messenger insulator pins at 84 cents	21.84
Twenty-six feeder insulator pins at 16 cents	4.68
Fifty-two telephone wire insulators at 7 cents	3.64
Labor and material for concrete base on pole, twenty-six poles at 64 cents	16.64
Labor for digging hole, setting pole, unloading and distributing pole bracket, crossarms and fittings twenty-six poles at $3.52	91.52
Labor for fitting bracket, cross-arms, insulators and pins, 1 mile	30.00
Total	$600.70

Estimates are always interesting to constructors, although not to be relied upon for too general application, so comparative schedules are given for the cost of construction, for pole line construction only, with steel and wooden poles, as determined for the particular division of interurban railway just mentioned. The cost of an average 1 mile with the steel poles and brackets as shown in the diagram, was estimated as given in the first table.

The cost of 1 mile of 35-ft. Western cedarwood poles and standard bracket on tangent, with 150-ft. spacing of the poles, and a corresponding quality of overhead fittings, would be approximately as follows:

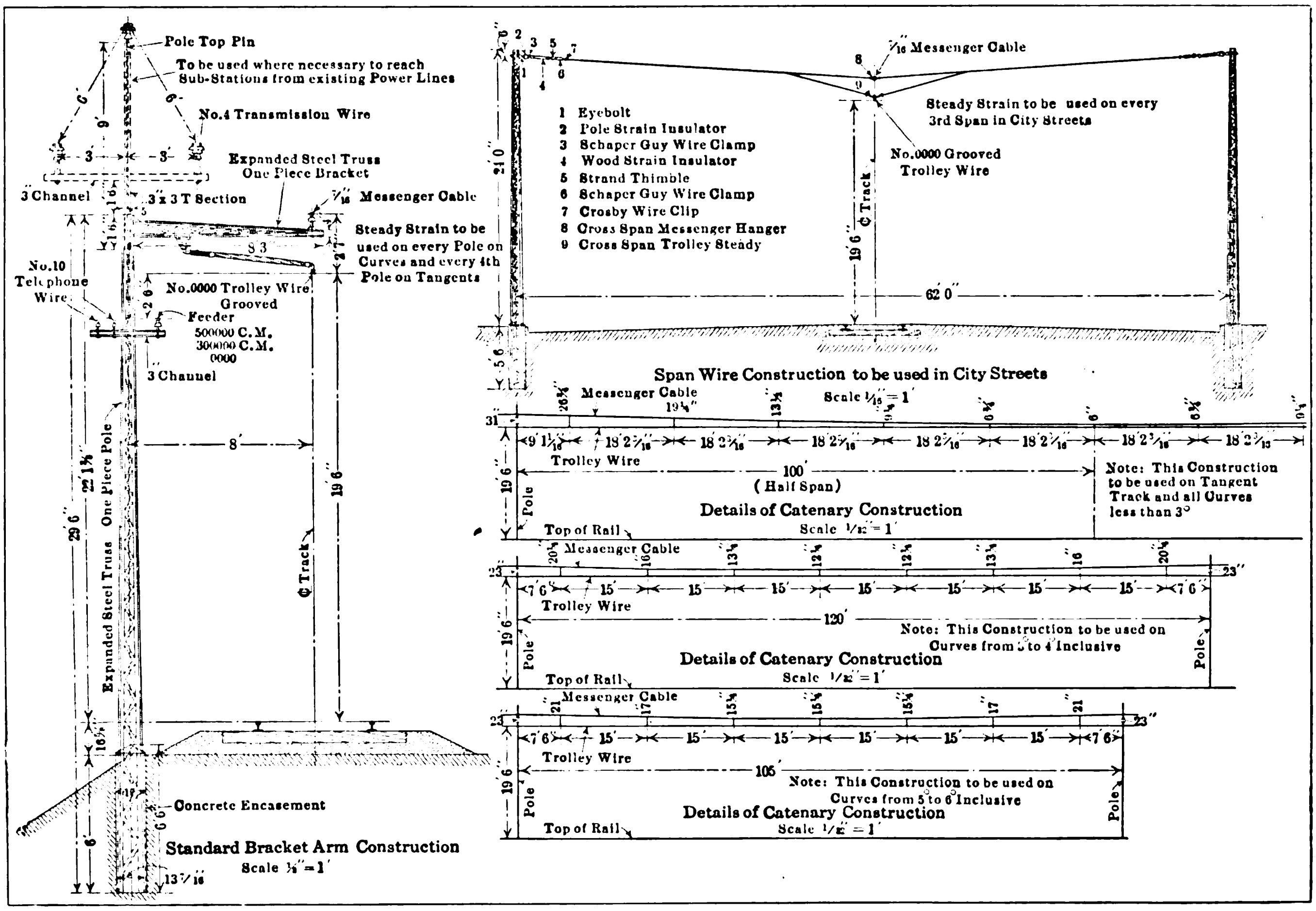
WOOD POLES

Estimate of cost of 1 mile of construction using wood pole and standard bracket, pole spacing 150 ft.

Thirty-five poles at $8.60	$301.00
Thirty-five brackets at $2.60	91.00
Thirty-five crossarms at 25 cents	8.75
Thirty-five messenger cable insulators at 10 cents	3.50
Thirty-five feeder cable insulators at 5 cents	1.75
Seventy telephone wire insulators at 4 cents	2.80
Thirty-five messenger insulator pins at 84 cents	29.40
Thirty-five feeder insulator pins at 16 cents	5.60
Seventy telephone insulator pins at 7 cents	4.90
Labor digging hole, setting pole, unloading and distributing pole, bracket, crossarm and fittings, thirty-five poles at $3.69	129.15
Labor fitting bracket, crossarms, insulators, etc., 1 mile	40.00
Total	$617.85

The estimates given herein do not cover any wire equipment.

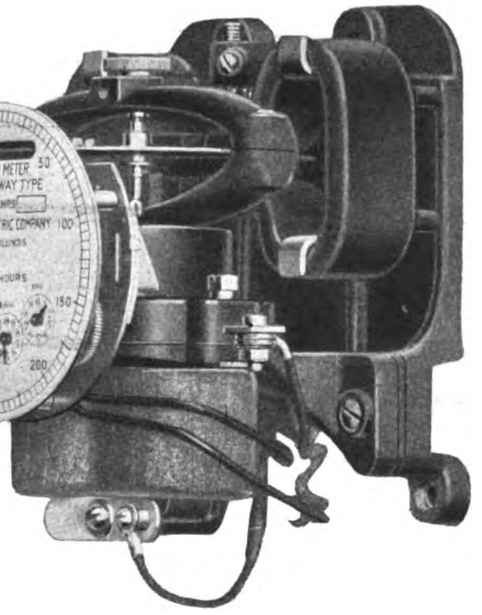
It should be recognized that the foregoing figures are for typical conditions for tangent track, and that these items will vary with curvature and local labor and material costs, so that they may be taken merely as showing what has been found possible in this particular case. But there is strong indication that this new construction may well be considered in connection with any new interurban lines with the expectation that initial costs will not materially differ from those for the old practice, in the aggregate, while at the same time a very real and economic advantage can be secured in added life and diminished maintenance.


Pole Top Pin
To be used where necessary to reach Sub-Stations from existing Power Lines
No.4 Transmission Wire
Expanded Steel Truss One Piece Bracket
3 Channel
3 x 3 T Section
7/16 Messenger Cable
Steady Strain to be used on every Pole on Curves and every 4th Pole on Tangents
No.10 Telephone Wire
No.0000 Trolley Wire Grooved
Feeder 500000 C.M. 300000 C.M. 0000
3 Channel
8'
19'6"
29'6"
21'1/2"
Expanded Steel Truss One Piece Pole
℄ Track
Concrete Encasement
Standard Bracket Arm Construction
Scale 1/8" = 1'
1 Eyebolt
2 Pole Strain Insulator
3 Schaper Guy Wire Clamp
4 Wood Strain Insulator
5 Strand Thimble
6 Schaper Guy Wire Clamp
7 Crosby Wire Clip
8 Cross Span Messenger Hanger
9 Cross Span Trolley Steady
7/16 Messenger Cable
Steady Strain to be used on every 3rd Span in City Streets
No.0000 Grooved Trolley Wire
62'0"
Span Wire Construction to be used in City Streets
Messenger Cable
Scale 1/16" = 1'
Trolley Wire
100' (Half Span)
Note: This Construction to be used on Tangent Track and all Curves less than 3°
Details of Catenary Construction
Top of Rail
Scale 1/32" = 1'
120'
Note: This Construction to be used on Curves from 3° to 4° Inclusive
Details of Catenary Construction
105'
Note: This Construction to be used on Curves from 5° to 6° Inclusive
Details of Catenary Construction
Pole

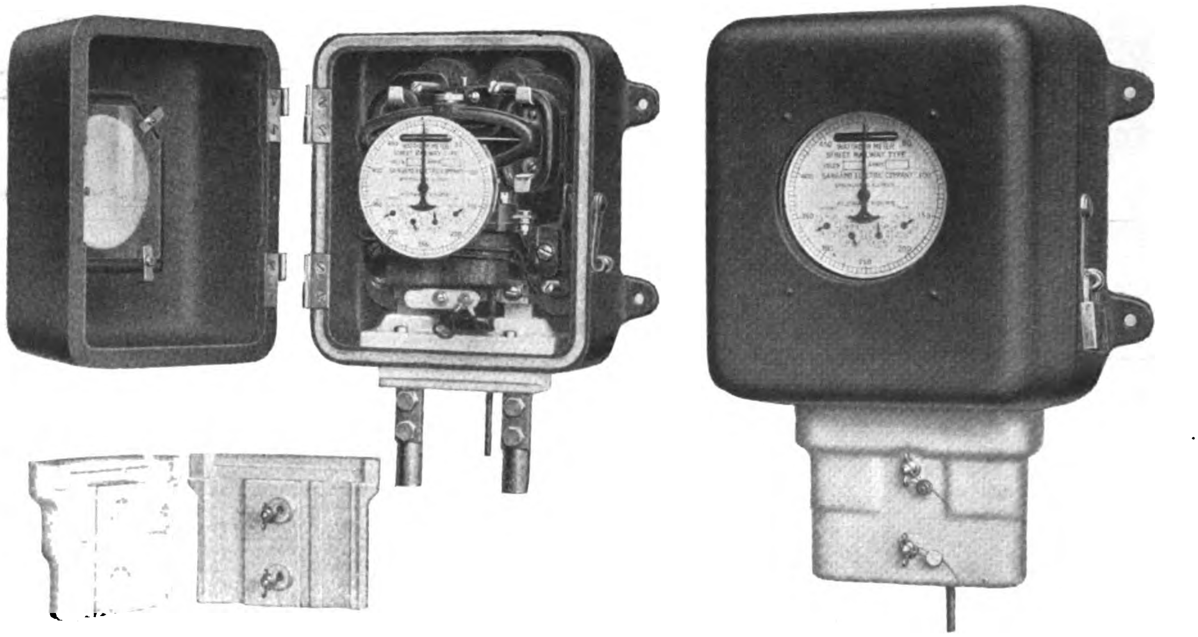
DETAILS OF INTERURBAN OVERHEAD CONSTRUCTION WITH PRESSED-STEEL BRACKET AND CITY SPAN CONSTRUCTION, OKLAHOMA & INTERSTATE RAILWAY

New Sangamo "Economy" Meter

More than twelve years ago the first attempt was made to apply Sangamo mercury-motor direct-current meters on electric railway cars. This was in Montreal, and some interesting observations were made on power consumption. But at that time the meter had not been developed along the lines especially required for electric railway service, and nothing more was done with them for such service. Subsequently, meters of both the ampere-hour and watt-hour types, but principally the former, were successfully applied on many cars in Great Britain, and important economies in power consumption, brakeshoe wear and equipment condition were effected.



METER ELEMENT REMOVED FROM CASE



STREET RAILWAY TYPE OF WATT-HOUR METER, CASE OPEN AND PORCELAIN BLOCK REMOVED, AND CASE AND BLOCK IN PLACE

About four years ago an improved type of Sangamo meter was installed on several cars of the El Paso (Tex.) Electric Railway, and the preliminary results were so satisfactory in indicating economies that could be effected by proper co-operation of the motormen that all cars of this system were soon after equipped. The meters are in successful operation to-day. Some of the results effected on this system were described in an article in the ELECTRIC RAILWAY JOURNAL of July 3, 1915, page 12.

Following this application, Sangamo meters were applied on a number of cars, and the term "Economy meter" was adopted for these electric railway meters to indicate the purpose of their application. The roads using them include the Chicago & Joliet Electric Railway, the Chicago & Milwaukee Electric Railroad, the Rockford & Interurban Railway, the Beaumont Street Railway, the Annapolis Short Line, the Tri-City Railway of Davenport, Iowa, and the City Railway of Dayton, Ohio. It is claimed that on these roads economies in power consumption of from 8 per cent to 20 per cent have been effected, besides marked savings in brakeshoe wear and in the immediate location of faults in equipment. All of these meters were of the Sangamo D-5 type, with large dials to show consumption per trip or per day, as well as dials for total consumption over any period.

During the past year it was found that the conditions of service could be better fulfilled with a meter especially designed and insulated, particularly in view of the advent of many 1200-volt and higher voltage direct-current systems. The new Economy meter, shown herewith, was accordingly designed. In general plan it resembles the D-5 watt-hour and ampere-hour types, but many details especially valuable for this class of service have been introduced. In order to obtain the desired high insulation, the meter is made somewhat larger than standard house-type Sangamo meters, and the terminals are protected by heavy porcelain blocks, so that the meter case may be grounded on circuits up to 3000 volts d.c. with absolute assurance that the operating mechanism will be safely and thoroughly insulated from the case.

It will undoubtedly be necessary in the very severe service on street railway or interurban cars to calibrate these meters at intervals of one to two years, and at intervals of about two years it is desirable to clean and replace the mercury. The new meter has therefore been designed, as shown by the interior views, so that the entire meter element, and not merely the motor or mercury element, can be removed without taking the meter from the car. The cover is hinged and removable, and after this has been taken off, the meter element can be removed as a unit by the removal of six screws, readily accessible. This unit, which may then be calibrated completely in itself, can be immediately replaced by a similar unit, and as all units will be made interchangeable for drop, no calibration will be required on the car when a new unit is put in. The time required to remove a unit and replace it by a new one, including the time required for unlocking the padlock and replacing the cover and padlock, is less than five minutes.

The new type meter will be furnished either with the large circular dial and totalizing circles as shown in the cuts, or with large cyclometer dials giving direct reading figures which can be observed and read clearly almost the entire length of a car. The two patterns are identically alike, except for the dial arrangements.

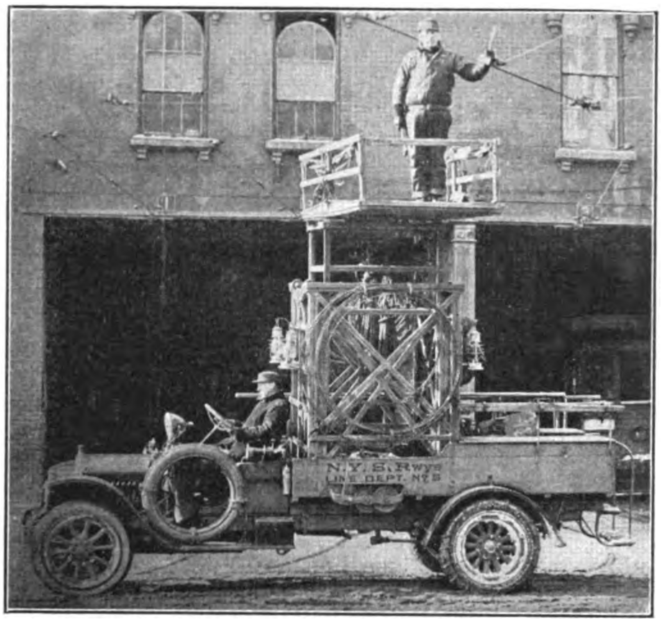
In addition to this improved meter, the Sangamo company has developed a complete system of records, beginning with the original reading taken by the motorman on the meter at the end of each trip or run, and extending to the final tabulation at the end of the month, which goes to the general manager and shows exactly what savings, if any, have been effected on the various lines of his system during the preceding month. The final tabulation also shows the relative value or standing of the various motormen. This standing is shown by a "figure of merit," which takes full account of the relative performance of each man under different service conditions and on different types of cars, so that the men will be fairly compared. By means of such records a keen but friendly rivalry for economy in energy consumption has been developed on the various lines where the meters have been installed and where this system of records has been adopted.

The Sangamo company also offers with the new meters an installation service and co-operation in the way of monthly posters, bulletins, etc., to encourage the men. It is expected that this will effect even more marked economies in the future where these meters are used.

Keeping Track of an Emergency Wagon

Some months ago the New York State Railways, Rochester Lines, purchased a gasoline-driven tower wagon for the line department and for general emergency use in the city of Rochester, this vehicle displacing the two horse-drawn emergency wagons that had previously been used. It was found that the running expense involved respectively in the two methods of operation balanced almost exactly, but that the power-driven truck possessed a very material advantage because of its higher speed and the consequent promptness with which it could be sent to any point where it was needed.

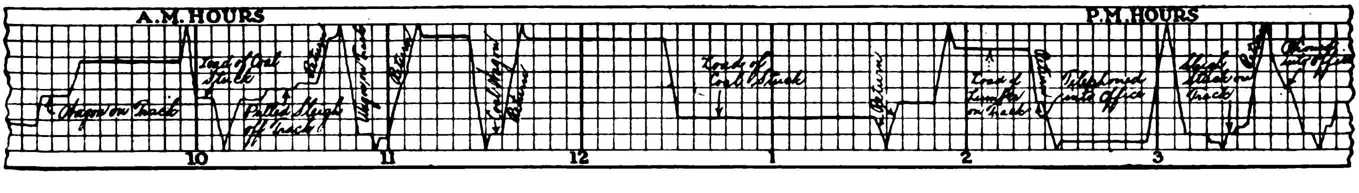
The truck, which is shown in the accompanying halftone, is of the three-section type recently described in the ELECTRIC RAILWAY JOURNAL, and it has given thoroughly satisfactory service for line repairs. Thus far it has always been ready to go whenever a call came in, and only one case of tire trouble has been experienced, the delay in this case being negligible because the wheels are equipped with detachable rims, which require only five minutes' time for making a tire change.



ROCHESTER EMERGENCY TRUCK AND TOWER WAGON

Although the operating expense of the gasoline truck balances that of two horse-drawn wagons, the overhead charges involved by the use of the former are, of course, increased materially, unless credit is given to the gasoline-driven machine for the greater mileage that it makes and the greater variety of work that it can do. It can be used to good advantage, for example, for helping vehicles that have become stalled in positions where they foul the railway company's tracks, the machine in one typical case having hauled a truck-load of pipe which was stuck in a mud hole beside the railway tracks into a position where it could move on. If only horse-drawn emergency wagons had been in service, insufficient power would have been available to haul the truck-load clear of the line, and considerable delay would have resulted owing to the necessity for unloading the pipe from the stalled vehicle.

Consequently, the mileage made each day by the gasoline-driven tower wagon became the dominating factor in the problem of its superiority over horse-drawn emergency wagons, and to determine this mileage, C. L. Cadle, electrical engineer New York State Railways, had the new truck equipped with a recordergraph manufactured by the American Taximeter Company, New York City. This instrument provides a graphical record marked upon a tape similar to that shown in the accompanying illustration. The tape is about 1⅛ in. wide and about 5 ft. long. It is marked in cross-section to show five-minute sub-divisions of twenty-four hourly longitudinal divisions covering a day's run, while ¼-mile transverse divisions show the mileage made. The tape is moved longitudinally by clock-work at a fixed speed, and there is connected to one of the truck wheels a pencil which travels transversely across the tape whenever the truck is in motion. The pencil moves



SECTION OF RECORDING TAPE SHOWING TRUCK OPERATIONS to one side of the tape, and then reverses its direction, traveling to the other side, and so on indefinitely. Therefore, when the truck is stationary a horizontal line appears upon the tape, and whenever the truck is in motion an oblique line is drawn, the slope of which depends upon the speed of the machine.

Each day the tape is removed from the recordergraph and a new one substituted, the record on the marked tape being amplified by making pencil notes to show the reasons for each call made upon the emergency wagon. The used tapes are filed so as to provide a long-time record of mileage made, the truck movements being analyzed to determine whether the utmost use is being made of it. In the section of tape illustrated herewith the short section of horizontal line at the extreme left of the diagram indicates that the truck was in the barn. The short section at the middle of the tape was produced when the wagon was practically stationary in connection with a call that had been made to remove a stalled wagon from the railway tracks not far from the barn. The oblique line above this horizontal section indicates the return to the barn where the truck remained stationary for half an hour, as indicated by the longer horizontal line midway between the middle and the top of the diagram. At the end of this period the truck was called to get a load of coal off the track, and the oblique line running to the top of the diagram, followed by another oblique line descending to a point slightly below the middle, indicates that the run to this call was slightly more than 1½ miles in length, because the complete movement of the pencil across the tape shows a run of two miles, the run in this case including the top quarter and the top half of the tape. The other entries on the illustrated section of the tape are self-explanatory.

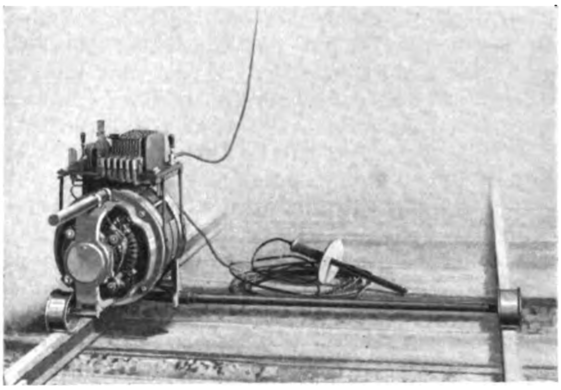
It may be of interest to note the other calls made on the truck during the day to which the short illustrated section of the tape applies. These include, in consecutive order, the removal of a broken-down automobile from the track, also a stalled sleigh and a stalled load of coal, a broken trolley wire repaired, a broken guy wire tied up, another broken trolley wire, a load of hay removed from the track, a section of slack trolley pulled up, a broken trolley wire at a cross-over, and general repairs to a section of trolley wire which occupied about an hour in the early morning period.

Since the gasoline truck has been in operation it has been found that it makes about 875 miles per month, or, say, thirty miles a day. The day in question, however, is an exceptionally heavy one, owing to the presence of heavy snow, and a more than usually large number of calls to haul stalled wagons off the railway tracks, and thus keep traffic moving. A mileage of fifty-six was, in consequence, made during the twenty-four hours in question.

Portable Bonding System Which Does Not Obstruct Traffic

A bonding process designed for non-interference with traffic and for reducing waste of power through the use of a portable motor-generator set has been devised by the Lincoln Bonding Company, Cleveland, Ohio. The process is used by the Cleveland, Painesville & Eastern Railway, Willoughby, Ohio. It is especially adapted for use on elevated railways and in subways.

The motor-generator for supplying the current for bonding, shown in the accompanying illustration, is designed to produce a current of 200 amp. to 300 amp. at 60 to 70 volts. The generator itself is 24 in. long and 16 in. in diameter and the machine weighs 400 lb. complete with switchboard. Two handles are provided for lifting it on and off the track and a third wheel is attached to a pole in such a way that it can be easily snapped into place or removed. The machine can be pushed along the rails, or, if more convenient, drawn along the pavement beside the tracks.

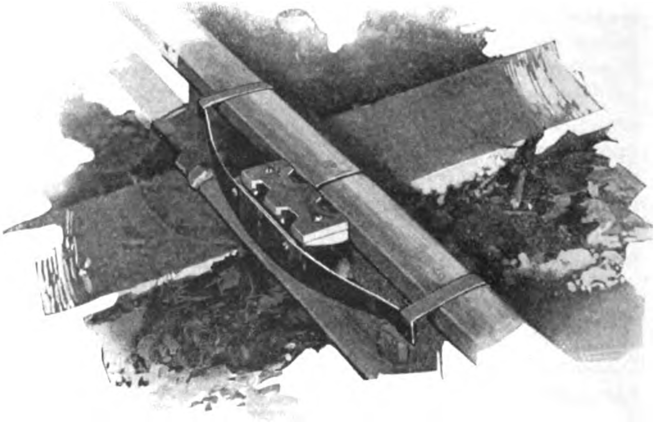


PORTABLE ARC WELDING BONDING MACHINE

The process uses the electric arc as a means for supplying the heat to fuse the ends of the copper bond to the rail. U-shaped laminated copper bonds are used, with heads of a special design. In welding the bond is placed in a mold held in place with spring clips.

In actual practice, a crew of two men are said to have been able, with a week's experience, to put on bonds at the rate of thirty per hour on an interurban track with hourly traffic each way. This was done without extra effort and under conditions in which the machine was moved on the pavement beside the track. The manufacturers state that the best welds are made in about 20 seconds, with approximately 200 amp., and 40 volts across the arc.

BONDS ARC-WELDED TO BALL AND WEB OF RAIL



MOLD, READY FOR ATTACHING BOND TO RAIL

Obviously the contact resistance of this bond is low, and it is not affected by expansion or contraction. The weld is so tough that the bond head can be flattened to a great degree without breaking loose. The bond head can be hit by wagon wheels or other objects even to the extent of pushing it down to the level of the pavement without its being broken loose from the rail.

NEWS OF ELECTRIC RAILWAYS

THREAT TO TIE UP ENTIRE TOLEDO SYSTEM

Conferences in Toledo Fail of Results—Men Insist on Right to Wear Union Button

Not a car of the Toledo Railways & Light Company was operated on March 29. In the afternoon President F. R. Coates of the company talked with Henry L. Doherty, chairman of the board, in New York over the telephone. Mr. Doherty said that there are so many conditions to be considered in connection with the strike that he could do nothing by telephone. On the same day shop men quit work when told that they must take off the union buttons.

A conference at the Council Chamber called on March 29 by Mayor Milroy was attended by city officials, company officials and representatives of the union. Mr. Coates stated that the men could operate the cars temporarily pending an adjustment of the dispute if they would do so without their buttons. Organizer Edward McMorrow asserted that other differences could be arbitrated, but that the men would not give up their buttons. He said that any attempt by the company to operate cars would be followed by calling out the men in all other departments.

Mr. Doherty arrived in Toledo on March 30 and went into a conference with the company officials.

The first conference between Mr. Doherty and the representatives of the union was held in the Council Chamber on the afternoon of March 30. Mr. Doherty reviewed the railway franchise controversy. The company wished to be fair to the people of Toledo. The Milroy franchise committee had informed him that the people would be satisfied with nothing short of municipal ownership. Although he disbelieved in municipal ownership, Mr. Doherty told the committee that he and the company would co-operate with it in bringing about any solution that might be decided upon. He said that the committee asked the company to do nothing about plans for organizing the men, and that it had respected the request. He supposed a similar request had been made of the men, and that both sides were to leave matters in statu quo to avoid any friction and labor trouble that might impede the franchise settlement.

Mr. Doherty characterized the action taken as enforced organization upon men who did not want it, and said that he requested at that time that no one be coerced into joining the union. He was opposed to the closed shop idea and he felt that no attempt should have been made to organize the men while efforts were being made to secure an agreement on a franchise. He had promised the men an increase in pay as soon as a settlement on the franchise could be reached. In closing he said he had hoped to deal with the men and not some one who has no interest in Toledo.

John Quinlivan, business agent of the Central Labor Union, objected to Mr. Doherty's statement that wearing the union button would be a discrimination against the men who were not members of the union. He insisted that the men could not go to work even temporarily without their buttons and said the people of Toledo were back of the men. Organizer Edward McMorrow said the Amalgamated Association had kept hands off while the franchise question was under discussion. He declared that he went to Toledo at the request of the men; that none of the non-union men would be harassed, and that all grievances upon which an agreement could not be reached could be submitted to arbitration. Mr. Doherty said he was willing to arbitrate other matters as soon as the button question had been settled. Mr. McMorrow then declared that the men would insist on wearing the buttons, which was a matter of personal liberty. Adjournment was taken until March 31 without any material progress having been made.

The conferences between the officers of the company and representatives of the men on March 31 also were futile. Neither side would yield on the matter of the men wearing the union buttons. Illness kept Mr. Doherty away from the conferences a portion of the time.

A conference called for 7 o'clock the evening of April 1 was postponed because of the illness of Mr. Doherty, who was compelled to seek his bed under a physician's advice. Another conference set for the afternoon of April 2 was adjourned because Mr. Doherty could not be present.

Mr. McMorrow announced on April 2 that the motormen and conductors of the interurban lines entering the city were ready to strike in sympathy with the so-called locked-out men at a moment's notice.

Following a conference between the company officials and representatives of the men on the forenoon of April 3, City Solicitor Commanger filed in the Federal District Court an amended and supplemental answer and cross-bill to the answer of the Toledo Railways & Light Company, and its own answer in the suit filed by Doherty & Company something like two years ago, asking for a receiver. In this legal paper the city claims to be a creditor of the company to the extent of $119,600 for paving and $485,250 for rental of the streets over which the company has operated since its franchises expired. Judge Killits, in permitting the city to file the petition, said that there were only two interests for the court to consider, the preservation of the company's property and the convenience of the public. He said that if a receiver was appointed, the court would take charge of all the property of the company.

Mr. Doherty appeared before Judge Killits at 10 o'clock on April 5 and asked that the company be granted an extension of time until April 6 to file its answer. The request was granted.

Further progress was made in the consideration of the tentative contracts on April 6 and another conference was scheduled for April 7. Judge Killits announced that if an agreement was not reached by April 8 Capt. John Craig, former president of the Toledo Shipbuilding Company, would be appointed receiver of the railway to operate the road.

At the office of Mr. Doherty in New York it was stated that there was no particular significance to the application by the city of Toledo for a receivership. The property was thoroughly solvent and had no outstanding obligations which it was not able to meet. The fact that the company had not been operating any cars since the middle of last week was being used as the basis for the city's receivership application. From another source it was pointed out that as the city maintains that the company has no franchise it cannot be compelled to operate except at its own discretion.

DALLAS ELECTION RESULTS

The voters of Dallas, Tex., at the election in that city on April 4 adopted all the propositions submitted to them relating to the lighting and traction problems. These propositions do the following:

1. Authorize the city to negotiate indeterminate franchises; permit franchises either upon a 4 per cent gross production tax basis or for service at cost, and authorize the city to buy the properties aften ten years or require their sale to another licensee.
2. Permit the consolidation of all the street railway systems in Dallas.
3. Approve of model service-at-cost franchise, which the city will negotiate with the street railway.
4. Approve of service-at-cost franchise for the electric lighting company.
5. Sanction the issuance of $500,000 of bonds for a municipal lighting plant.

The service-at-cost franchises are based on the report of E. W. Bemis and require service at cost, plus 7 per cent profits, based on valuation figures contained in the report submitted by Mr. Bemis. The valuation for the consolidated street railways is $4,790,124 with $48,000 additional as working capital and $150,000 for interest charges.

Stone & Webster officials at Dallas declined to discuss the situation. They referred to their statements prior to the election. Charles F. Wallace at that time said the company would not accept the model franchises. The general opinion is that litigation will follow.

MR. GROUT BEFORE NEW YORK COMMITTEE

Edward M. Grout, formerly comptroller of the city of New York, one time law partner of ex-Mayor William J. Gaynor, was the only witness examined by the Thompson legislative committee on March 31. Mr. Grout was questioned at length regarding his services to the Interborough Rapid Transit Company during the subway negotiations of 1911, for which he asked $25,000 and was paid $17,500. He said he felt he had fully earned the money, as he held many conferences with company and city officials for about two months.

Senator Thompson, chairman of the committee, said on March 31 that in its final report to the Legislature of 1917, the committee would recommend the dissolution of the dual contracts between the city and the Interborough and Brooklyn Rapid Transit companies.

On March 31 the bills carrying out the recommendations of the Thompson committee were reported favorably by the Senate public service committee. The measures, which include one to place control of subway construction with a rapid transit commission, were advanced to the order of final passage.

The Interborough Rapid Transit Company was notified on March 30 by the Public Service Commission that it must furnish it with much fuller details of the items charged by the company to its Account 332, "other suspense," and especially with information as to the accounts to which each of these items has been actually carried.

NEW TOLEDO FRANCHISE SETTLEMENT PLAN

The sub-committee of the committee appointed by Mayor Milroy in November, 1915, to devise some plan of settling the Toledo franchise matter reported on March 31 to the committee of the Council on street railway settlement. Many public hearings were held by the sub-committee, which says that the so-called Dotson ordinance was voted down by the people because they did not believe it would finally settle the matter and that its passage might prevent rather than bring about final municipal ownership of the railways. In this connection the sub-committee says:

"Any proposed settlement that does not make it easily possible for the people to have public ownership when the laws permit it and the people are ready for it would be no settlement at all, but would mean instead a continued controversy until such final settlement was achieved."

The committee says that in considering various plans it was agreed that before any plan was submitted to the voters there should be a valuation of the street railway property. The committee told Mr. Doherty, chairman of the board of the Toledo Railways & Light Company, that the people of Toledo wanted public ownership of the street railway system. In this connection the sub-committee reports that Mr. Doherty was very frank with its members.

The committee then presents a bare outline of a plan of settlement. It provides that the company shall separate its railway property from its other property and that an opportunity shall be afforded to Toledo citizens at once for community ownership of the railways, with municipal ownership as the ultimate goal. This plan will be summarized in the ELECTRIC RAILWAY JOURNAL for April 15.

TRANSFER OF FUNDS FOR OVER-EXPENDITURES ALLOWED

A resolution presented by Councilman J. W. Reynolds was adopted by the City Council at Cleveland, Ohio, on the evening of April 3, authorizing the Cleveland Railway to transfer $253,000 from the interest fund at once, to apply on the over-expenditures and deficits that have been accumulated through the past several years. The remainder of the amount will be taken care of by small monthly transfers. The same resolution denied the company's request for an increase in the allowance for the maintenance and renewal fund.

Fielder Sanders, street railway commissioner, made a statement to the street railway committee preceding the Council meeting to the effect that there may be additional over-expenditures this year, but that he will know by the end of the year whether an increase in the maintenance allowance is necessary.

Mayor Harry L. Davis and some of the other city officials were in Columbus on April 4 to consult with the State Tax Commission relative to a compromise settlement of the tax valuations placed on the property of the Cleveland Railway for 1913, 1914 and 1915. They range from $2,500,000 up to $24,000,000, and suits were filed each year to restrain the collection of the taxes on this basis. The City Council has authorized a settlement on the basis of a tax value of approximately $20,000,000 for 1913 and 1914 and $21,500,000 for 1915. The taxes held up by the suits now aggregate more than $1,000,000.

On order of Mr. Sanders the company is checking the destination of patrons who board the cars in East Cleveland. This city has threatened to bring suit to enforce better service, but just what the commissioner expects to do with this data is not known.

FUNDS LACKING FOR SEATTLE VALUATION

The State Public Service Commission of Washington has advised members of the City Council of Seattle that there are not sufficient commission funds on hand to complete the valuation of the properties of the Puget Sound Traction, Light & Power Company, undertaken last year. This valuation may be necessary as a basis for the hearing on the petition of the company for relief from franchise obligations, which include paying 2 per cent of the gross earnings, paving between tracks, etc. The company holds that inasmuch as the commission interfered with what the company declares were franchise rights in the Alki and Faunteleroy routing matters, the commission has the power to relieve the company of such franchise provisions as work a hardship on the company.

Whether the city of Seattle will require a valuation to support its claims that the franchise requirements shall stand, regardless of the net return of the company, is a matter that must be definitely settled immediately. The valuation of the property of the company by the commission was undertaken more than a year ago, but the commission was unable to complete it, because of lack of funds. On advice of Corporation Counsel Bradford, an appropriation of $5,000 was made by the City Council to assemble the valuation data of the commission for use in the hearing. Corporation Counsel Caldwell, recently elected, has under consideration a legal question whether a valuation will be necessary except in litigation involving the sale of 4-cent tickets and school tickets. At the hearing before the commission the city will contend that the commission is without power to alter franchise agreements. Early in the year Assistant Corporation Counsel Ralph S. Pierce filed a motion with the Public Service Commission to dismiss the request of the company for relief from franchise obligations which it considered unduly burdensome. He contended that the commission was without authority to act in a matter involving franchise agreements. This motion was denied by the commission. The city of Seattle has not filed an answer to the complaint of the company.

$171,000,611 TRANSIT CONTRACTS OUTSTANDING

March 19 was the third anniversary of the signing of the dual system rapid transit contracts by the Public Service Commission for the First District of New York. In the three years that have elapsed the commission has awarded construction and finish contracts aggregating $110,660,021. Before the contracts were signed it had awarded contracts in the amount of $60,340,789, so that the total amount of contracts outstanding Feb. 1, 1916, was $171,000,811. In the last three years the commission has also awarded miscellaneous contracts for rails, ties and other materials aggregating $4,661,714, so that the grand total of city contracts is $175,662,525. The city, however, is not pledged for the entire amount, as there is included in it a certain percentage of the contributions made by the two companies toward the cost of construction, namely, $58,000,000 by the Interborough Rapid Transit Company and about $14,000,000 by the New York Municipal Railway Corporation. Under the dual system certificates for the third-track and extension of the elevated railroads both companies have awarded construction and equipment contracts aggregating fully $40,000,000. It is safe to say, therefore, that the total amount of construction contracts already awarded on the dual system aggregates about $215,000,000. The construction work is divided into eighty-nine contract sections. Of these seventy-five have been placed under contract, and plans for the remaining fourteen are nearly completed. Bids for several of these will be invited within the next six weeks, and before the end of the year it is expected that all contracts will have been awarded.

STRIKE ON BAY STATE STREET RAILWAY

The refusal of the Bay State Street Railway to reinstate Conductor John J. Martin of the Woburn division resulted in a strike being declared on the division by the local branch of the Amalgamated Association at midnight on March 31. Service in Woburn, Winchester, Medford, Lexington, Stoneham, Reading and Wilmington was involved. President Sullivan of the company issued a statement to the effect that Conductor Martin was discharged for admitted failure to operate a hand-thrown block signal, following a series of infractions of the rules. He pointed out his willingness to arbitrate the matter under the terms of the agreement with the union. The Amalgamated Association, however, refused to arbitrate the real question at issue, but confined its willingness to arbitrate to Martin's last violation of the rules. The company notified the State Board of Conciliation and Arbitration of the facts at the outset of the strike and requested the board to act in the matter.

The company made no attempt to operate cars on the Woburn division during the week. On April 4 President Sullivan issued a statement reiterating the company's willingness to arbitrate the difference of opinion on arbitration existing between itself and the union. The discharge occurred because the conductor "was a danger to the public." The company also set forth its willingness to reinstate Martin if the arbitrators find that he was discharged because of his union activities. The State Board of Arbitration sent a letter to the company and its striking employees recommending that the broad question of whether or not the company was justified in discharging the man should be arbitrated in accordance with the agreement existing between the parties.

The strike was declared off and service resumed on the division on April 6, following a conference of the company and union officials at the office of the State Board of Conciliation and Arbitration. It was agreed to arbitrate the case upon the basis of the reasons given for the discharge of Conductor Martin by Superintendent Donovan of the Woburn division. Public sessions of the arbitration board will begin in a day or two, one member to be chosen by the company, one by the union, and the third by these two.

Massachusetts State Ownership Bill Rejected.—By a vote of 128 to 82, with seven pairs, the Massachusetts House has rejected the bill providing for a referendum as to the acquisition and operation of street railways by the State.

New Working Terms Asked in Cincinnati.—The employees of the Cincinnati (Ohio) Traction Company have made a demand on the company for an increase in wages and a shortening of the time of service to secure the maximum rate of wages. The present wage agreement between the company and its men expires on June 30.

Brooklyn Tax Controversy Settled.—The Brooklyn (N. Y.) Rapid Transit Company will pay into the city treasury $2,902,062 as the result of an arrangement brought about by the Corporation Counsel and Controller Prendergast on the recommendation of Attorney General Woodbury and the State Tax Commission. The payment will bring about a settlement of litigation over the company's special franchise tax.

Perpetual Injunction Asked to Prevent Municipalization.—The Merchants Loan & Trust Company of Chicago, Ill., has asked for a perpetual injunction restraining the municipality of Menasha, Wis., from acquiring the equipment of the Wisconsin Traction, Light, Heat & Power Company. The trust company is trustee for $350,000 of mortgage bonds of the company operating the railway.

Elevated Extension Started at Boston.—Work has begun upon the construction of an extension of the rapid transit lines of the Boston (Mass.) Elevated Railway from Sullivan Square terminal station toward Malden. The line will be elevated and double-tracked from Sullivan Square to Everett. It has not been decided whether the portion of the line from Everett to Malden will be elevated, surface or underground construction. The Mystic River will be crossed by a new steel and concrete bridge.

New York Constabulary Bill Amended.—The Senate of New York on April 1 amended the State constabulary bill, advocated by Governor Whitman, by cutting in half the appropriation of $500,000 and the proposed number of the new police. The bill as it stands now provides for two troops of forty-five men each. The system is to be modeled after that of the State of Pennsylvania. The National Guard would not be called upon until the stage where the constabulary and the local police found the situation beyond their control.

Increase in Wages in St. Louis.—The United Railways, St. Louis, Mo., has issued a statement announcing an increase of 1 cent an hour in the wages of 3000 employees, or approximately $100,000 a year. Heretofore conductors and motormen have drawn 23 cents an hour for the first year's service. The new rate will be 24 cents. After men have been in the company's service one year they will be paid 25 cents. Heretofore the rate has been 24 cents. The rate increases 1 cent an hour each year for five years, when the pay reaches 28 cents, the maximum.

Washington Valuation Nearing Completion.—Charles W. Kutz, chairman of the Public Utilities Commission of the District of Columbia, says that the valuation of the public utilities of the District which has been under way for some time will probably be completed by June 1. The public hearings will then be announced. Recently a resolution was adopted by a local civic body calling upon the commission to order the consolidation of the Capital Traction Company and the Washington Railway & Electric Company. Mr. Kutz said that this was beyond the power of the commission to do.

New York Subway Laborers Strike.—The claim of a new laborers' and timbermen's union for recognition and a simultaneous demand for an increase in wages, regular weekly payment and strict adherence to the eight-hour law have seriously affected construction work on New York City's new dual subway system. On March 1, 12,093 men were employed daily in construction on the subways, of whom, it is estimated, the classes involved in the strike number 7000. It is said that, altogether, 5000 men had quit work by April 5. The contractors claim that the prices at which the work was let will not permit them to grant wage increases.

Dr. Steinmetz on Commission Control.—The first of two articles on public questions which Dr. Charles P. Steinmetz will contribute to *Collier's* appears in the issue of that paper for April 8. Dr. Steinmetz sees in the present system of government regulation of corporations a step toward the taking over of such corporations by the public, at first, possibly, only so far as their management is concerned. As this process occurs he believes government service will attract men of ability to manage these enterprises and that the final result will be industrial socialism as represented by the national ownership of the means of production and transportation.

Abolition of Boston Transit Commission Favored.—Abolition of the Boston (Mass.) Transit Commission is favored by the special legislative committee on State commissions, according to an informal vote in executive session. The committee will probably recommend a bill which also abolishes the Boston Port Directors and the Massachusetts Harbor & Land Commission. In place of these boards it is planned to establish a Metropolitan Commerce & Transportation Commission to succeed the transit board and a Waterways & Public Lands Commission to supersede the Harbor & Land Board. A conference with Governor McCall will soon be held relative to the functions of the Public Service Commission and the Gas & Electric Light Commission.

Seattle Municipal Railway Deficit Problem Discussed.—The utilities committee of the City Council of Seattle, Wash., of which R. H. Thomson, former city engineer, is chairman, at a recent meeting discussed ways and means of escaping an annual loss of about $40,000 on the operation of the Seattle Municipal Railway. It was generally agreed, first, that the extension of Division "A" to Ballard would not bring in enough additional revenue to put Division "A" on a paying basis, unless an extension to some point south of the present terminus at Pine Street was provided; and, second, that the proposed extension by common user rights to Jefferson Street at the new Seattle-King County building would not be sufficient to pay the additional cost of operation of that distance, unless the extension to Ballard is made.

New Working Conditions Asked in Buffalo.—Demand for an increase in wages for platform men, electricians, carhouse men and other employees affiliated with the Amalgamated Association of Street & Electric Railway Employees was served upon officials of the International Railway, Buffalo, N. Y., on April 1. The company has twenty-eight days in which to reply. While neither side will discuss the nature of the demands, it is understood that the men in the company's service the first year have asked for the biggest increase, which is believed to amount to almost 20 per cent. A change in hours of labor so that platform men will not be required to have their shifts too far apart and a change of other conditions are also asked for. The present wage scale has been in effect since the strike of 1913. At that time a three-year agreement was signed.

Boston Elevated Wages Discussed.—Press accounts from Boston, Mass., state that the local branch of the Amalgamated Association has formulated demands for presentation to the Boston Elevated Railway relative to the expiration of the existing wage agreement on May 1 next. It is said that the men will ask 40 cents an hour for platform work, a nine-in-eleven hour day, time-and-one-half for overtime, 60 cents an hour for snowplow work, and two weeks vacation with pay, annually, for motormen, conductors and other employees. The present maximum pay is 32 cents an hour on surface cars and 34 cents on the rapid transit lines. Neither the officials of the company nor of the union were prepared early in the week to make public the basis of negotiations. It has been estimated that the award of the Storrow arbitration board increased the wages of the union employees by about $480,000 a year, dating from May 1, 1913.

New York Commission to Hold Departmental Conferences.—At the suggestion of Chairman Oscar S. Straus, the Public Service Commission for the First District of New York has begun the holding of departmental conferences in the offices of the commission. The first conference was held in the chairman's room on March 28, and it was decided to hold similar conferences every two weeks. The first conference was attended by all the commissioners, the chief engineer, counsel, assistant counsel, electrical engineer, engineer of subway construction, deputy engineer of subway construction, real estate expert, secretary of the gas and electric bureau, the gas engineer, and the secretary of the commission. The conferees spent two hours in exchanging views upon problems under consideration by the commission, and at the close of the meeting the chairman expressed himself as gratified with the result and hopeful that a continuation of such consultations would result in better co-ordination of the work and more effective co-operation among the different departments and bureaus.

All Composite Cars Withdrawn from New York Subway.—The time within which the Interborough Rapid Transit Company, New York, N. Y., was to remove the 478 composite cars from the subway expired on April 1. A report from the engineers of the Public Service Commission for the First District stated that all such cars have been removed, that the car trucks have been fitted with new all-steel car bodies, and that all but six of the converted cars are in operation in the subway or ready for operation. They have been introduced gradually as they were turned out of the shops. The six in question would have been completed but for the delay in receiving certain parts from the manufacturers. The original order for the removal of the cars and their replacement with cars of all-steel construction was adopted on Jan. 12, 1915. The company requested the privilege of retaining the heavy trucks and fitting them with new all-steel car bodies. This was agreed to by the commission, which subsequently gave the company the right to mount the composite car bodies upon lighter trucks and use them for operation upon the elevated railroads.

PROGRAMS OF ASSOCIATION MEETINGS

Railway Materials Association

The annual convention of the Railway Storekeepers' Association will be held at the Statler Hotel, Detroit, Mich., on May 15, 16 and 17. The annual meeting of the Railway Materials Association will be held at the same place at the same time.

Bureau of Standards Conference

At the invitation of the technical committee of the Affiliated Engineering Societies of Atlanta, Ga., the Bureau of Standards will hold a conference in that city from May 2 to 4 for the purpose of discussing the work of the bureau. A large attendance of city electricians, engineers of public utility companies and others interested is expected from Georgia and the neighboring States and other parts of the country.

The conference will occupy three days. The first day, May 2, will be devoted to the consideration of the National Electrical Safety Code. At this session representatives of the Bureau of Standards will outline the work that has been done on the code and give a statement of its principal features and the main changes that have been made in the course of its last revision, after which a general discussion of the code will be held.

At the second session, on May 3, an account of the work of the Bureau of Standards on electrolysis prevention will be presented, including the laboratory researches and field studies and surveys that have been made, and giving a discussion of the proper methods of procedure in making electrolysis investigations and in the mitigation of electrolysis troubles. This paper will also be followed by an open discussion.

At the third session, on May 4, the subject of grounding of low voltage light and power circuits will be discussed.

The chief purpose of the conference is to bring the cities and the public utility corporations of the South into closer touch with the work of the Bureau of Standards in connection with public utility problems. All persons interested in the subjects to be discussed are invited to attend the conference.

Southwestern Electrical & Gas Association

An attractive program has been prepared for the railway meetings at the annual convention of the Southwestern Electrical & Gas Association which is to take place at the Hotel Galvez, Galveston, Tex., on May 17, 18, 19 and 20. The railway sessions will be in charge of the street and interurban committee of the association and will be held on the afternoon of May 17 and the morning of May 18. The following program of papers and discussions was tentatively adopted by the committee at a meeting held in Dallas on March 24.

"Practicability of One-Man Cars and Their Operation," by D. R. Locher, general manager of the Corpus Christi Railway & Light Company; the discussion to be opened by W. W. Holden, W. A. Sullivan and W. L. Wood, Jr.

"Coasting Recorders, Their Effectiveness in Reducing Power Consumption and Operating Costs," by V. W. Berry, general superintendent of the Northern Texas Traction Company; the discussion to be opened by G. G. Morse and R. T. Sullivan.

"Practical Methods of Paving, as Applied to Street Railways," by W. M. Archibald, superintendent motive power of the Houston Electric Company; the discussion to be opened by W. V. Neal and C. H. Nandell.

"Scientific Selection of Employees," by P. W. Gerhardt, superintendent of transportation of the Dallas Consolidated Electric Street Railway; the discussion to be opened by Alba H. Warren and E. J. Emerson.

"Economical Maintenance of Cars, City and Interurban," by Fred L. Bennett, master mechanic of the Houston Electric Company; the discussion to be opened by M. B. Osborne, H. M. Smith and W. Silvus.

"Methods of Attracting and Developing Interurban Traffic," by J. P. Griffin, general passenger agent of the Texas Traction Company; the discussion to be opened by H. T. Bostwick and Rex Frazier.

Financial and Corporate

ANNUAL REPORTS

Public Service Corporation of New Jersey

The statement of income, profit and loss of the Public Service Corporation of New Jersey, Newark, N. J., for the twelve months ended Dec. 31, 1915, follows:

Operating revenue of subsidiary companies	$37,471,228
Operating expenses, including amortization charges and taxes	22,094,678
Operating income	$15,376,550
Non-operating income	419,073
	$15,795,623
Income deductions of subsidiary companies (bond interest, rentals and miscellaneous interest charges)	12,209,215
	$3,586,408
Public Service Corporation income from securities pledged (exclusive of dividends on stocks of operating companies) and from miscellaneous sources	$2,437,874
Less expenses and taxes	86,065
	$2,351,809
	$5,938,217
Public Service Corporation income deductions	3,966,965
Net income	$1,971,252
Appropriation accounts of subsidiary companies:	
Amortization of new business expenditures prior to Jan. 1, 1911	$40,330
Adjustments of surplus account	3,100
	$43,430
	$1,927,822
Appropriation accounts of Public Service Corporation (exclusive of dividends)	81,517
Net increase in surplus	$1,846,305

The annual report of the company states that it had a good year. During the early part of 1915 the increases in the revenues of the subsidiary companies were all small, owing to the continued business depression and the European war. The properties quickly responded, however, to returning prosperity, and the increases in the latter part of the year were healthy. The operating revenue of the subsidiary companies reached a total of $37,471,228, an increase for the year of $1,781,395 or 5 per cent. In view of the substantial increase in net earnings and the very large additional amount set aside for amortization, the directors in December placed the stock upon a 7 per cent basis.

The operating revenues for the three major subsidiaries and their affiliated companies for 1915, with the amount of increase over the previous year and the percentage of increase for the year, are as follows:

	1915 Operating Revenues	*Amount of Increase Over 1914	Percentage of Increase
Public Service Railway Co.	$16,569,443	$259,188	1.59
Public Service Electric Co.	10,425,852	1,132,190	12.18
Public Service Gas Co.	10,475,933	390,017	3.87

*The increases are based on a reclassification of 1914 accounts to compare with 1915 figures, a change in classification having become effective Jan. 1, 1915, by order of the Board of Public Utility Commissioners.

From the foregoing figures it will be seen that the significant result of the year's operations was the large increase in the electric division, the gross business of which for the first time nearly equaled that of the gas company. The railway division, though providing the largest share of the total operating revenues, showed the smallest increase in both amount and percentage. The revenue passengers in 1915 totaled 313,923,363 as compared to 310,308,660 in 1914, an increase of 3,614,703 or 1.1 per cent. This compares with an increase of 1,323,420 revenue passengers or 0.4 per cent in 1914 over 1913. In 1915 the transfer and free passengers increased 3,529,423 or 3.5 per cent as compared to 1,543,389 or 1.6 per cent in 1914, so that the increase in total passengers was 7,144,126 or 1.7 per cent in 1915 and 2,866,809 or 0.7 per cent in 1914. Thus the percentage of passengers using transfers increased from 21.2 per cent to 21.5 per cent, while the average fare per passenger fell from 3.83 cents to 3.82 cents. The revenue from transportation decreased from 30.763 cents per car mile to 30.540 cents per car mile.

In regard to jitneys in the corporation's territory it is said that these first appeared in the spring in Camden and later in Newark, Hoboken and Jersey City. A few jitneys were tried in other cities served by the railway, but they were inconsiderable in number or were withdrawn after a short term. In the cities where they are still operating they are doing so in diminished numbers, many operators finding the industry unprofitable. The jitney movement, however, is said to have caused a substantial loss of revenue to the railway, but it is believed that within a reasonable time there will be proper regulation of these vehicles.

No comparative figures are presented for maintenance expenses during the year, but it is said that the amount, exclusive of ordinary maintenance, set aside for amortization was $2,219,129. Adding to this the amount set aside for the sinking fund, under the terms of the mortgage securing the issue of the general mortgage bonds of the corporation, makes a grand total set aside during the year for amortization of properties and redemption of securities, of $2,428,629. Taxes for 1915 amounted to 2,316.966, an increase of $114,411 or almost 0.5 per cent. Fire insurance carried as of Dec. 31, 1915, amounted to $30,219,679, an increase of $1.209,855 over 1914. Premiums for 1915 amounted to $102,700, a decrease of $108. The average rate of insurance for the year was 34.0 cents per $100 of insurance, as compared to an average rate of 35.4 cents for 1914.

The total expenditures of the welfare department for insurance, sick benefits, pensions and expenses for the year were $76,105, a decrease of $3,689. The decrease in insurance is accounted for by the fact that only fifty-six deaths occurred among the employees in 1915, as compared to sixty-seven in 1914. Illness among the employees was also less by 101 cases. The cost per case averaged $20.67 as compared to $21.83 in 1914. The cost of accidents arising under the workmen's compensation act, including expenses, was $59,487 divided as follows: total payments as required by act, $41,790; additional payments over and above those required by act, $7,223, and expenses of department, $10,473. The total amount spent by the railway claim department, including its own expenses for the year, was $540,074 or 3.41 per cent of the gross passenger receipts. In 1906, when the receipts of the railway were much smaller than they are now, the expenditures were $851,283 or 8.64 per cent of the gross passenger receipts.

New rolling stock added to the railway equipment during the year included thirty closed passenger cars, and twenty single-end double-truck open car bodies, which have sixteen benches, with a seating capacity of ninety-six persons per car. The company built 7.248 miles of track extensions during the year; 16.590 miles of track were reconstructed with the same rail, and 25.628 miles were reconstructed with new rail. The total railway mileage is now 882.266 miles. The net expenditures charged to capital accounts for the railway division during 1915 were $4,605,355, this comparing with $2,881,199 for the electric division and $814,666 for the gas division.

West Jersey & Seashore Railroad

The total operating revenues of the West Jersey & Seashore Railroad, Camden, N. J., for the year ended Dec. 31, 1915, amounted to $6,942,485, an increase of $469,886 or 7.3 per cent for the year. Practically all of this increase came from increased freight revenues. Passenger revenue decreased $37,928, or 0.9 per cent, chiefly on account of the general depression in the early months of the year and unfavorable weather conditions. The operating expenses totaled $5,435,685, an increase of $258,123, or 5 per cent, principally owing to increased maintenance charges. Transportation expenses were slightly reduced through efficiency in operating methods, while general expenses increased on account of federal valuation work and employees' pensions.

The benefits obtained from increased traffic and improved operating results, however, were practically nullified by the extraordinary increase in taxes and the reduced income from leased roads, so that the gross income of $1,220,818 showed an increase of only $56.016. The increase in net income was further cut to $18,825 by the rise in income deductions. The railway tax accruals at $419,758 reflected an increase of $86,614, or 26 per cent, on account of an increase in the assessed valuations in New Jersey and the imposition of a higher rate of taxation by that State. The taxes paid were equivalent to 6.05 per cent of the total revenues, and 4.31 per cent on the capital stock.

The income from leased roads amounted to $59,769, a decrease of $56,258, or 48.5 per cent. This was caused by the serious reduction in the receipts from the Atlantic City & Shore Railroad, the operator of the company's Atlantic City & Longport trolley line, on account of jitney operation on Atlantic Avenue, Atlantic City. That line and its equipment represent a large capital outlay, and in addition the West Jersey & Seashore Railroad and the Atlantic City & Shore Railroad have made substantial contributions for improving and maintaining Atlantic Avenue through Atlantic City and Ventnor. Both companies are heavy taxpayers, and their operations and expenditures make them material factors in the prosperity of the State and in preserving business and property values in Atlantic City and the adjacent municipalities. It is felt, therefore, that the Atlantic City & Longport trolley line should be entitled to such equitable regulation of the jitney traffic in Atlantic City as will enable the operating company to fulfill its duty to the public, through the continuance of a frequent and high standard of service on the Atlantic Avenue line, and as well protect the investment of the West Jersey & Seashore Railroad therein. The unjustly continued delay in instituting such reasonable regulation is said to be unwise from the point of view of public safety, and must inevitably prove disadvantageous not only to the companies but to the municipalities.

Lake Shore Electric Railway System

The comparative statement of income, profit and loss of the Lake Shore Electric Railway System, comprising the Lake Shore Electric Railway, the Lorain Street Railroad, the Sandusky, Fremont & Southern Railway, the People's Light & Power Company and the Bellevue Illuminating & Power Company, for the calendar years of 1914 and 1915 follows:

	1915	1914
Gross earnings	$1,387,143	$1,427,957
Operating and taxes	898,136	890,813
Operating income	$489,007	$537,144
Interest paid	432,203	426,659
Net income	$55,804	$110,485

The gross earnings of the Lake Shore Electric Railway, Cleveland, Ohio, for 1915 were $1,097,042, a decrease of 2.07 per cent as compared to 1914, mostly on account of the smaller passenger revenue. The operating expenses and taxes totaled $719,060. This amount represented an increase of about 2.2 per cent, brought about in the main by higher power plant expenses and higher taxes and general expenses. Other income remained the same at $25,000, but interest increased 2 per cent, to $336,444, so that the net income for 1915 at $66,537 showed a loss of more than 40 per cent. The gross earnings per car-mile in 1915 were 32.63 cents, a decrease of 0.52 cent; the operating expenses and taxes per car-mile, 21.39 cents, an increase of 0.57 cent, and the net earnings per car-mile 11.24 cents, a decrease of 1.09 cents. The passenger traffic decreased from 5,715,083 to 5,210,750. The accompanying table presents some interesting comparative figures for the separate divisions of the Lake Shore Electric Railway:

LAKE SHORE ELECTRIC RAILWAY

Earnings per Car-Mile

Division	1915	1914	1913	1912
Cleveland	35.65	35.87	37.38	34.28
Toledo	38.25	37.52	38.61	37.03
Sandusky-Norwalk	31.97	36.93	34.89	32.01
City lines	15.28	17.13	16.55	15.07

Earnings per Mile of Road

Division	Miles	1915	1914	1913	1912
Cleveland	60.44	$8,677	$8,853	$8,927	$8,307
Toledo	62.25	6,858	6,785	6,795	6,491
Sandusky-Norwalk	16.30	3,209	3,727	3,542	3,389
City lines	11.14	8,377	9,168	8,891	8,178
	150.13	$7,307	$7,462	$7,456	$7,011

The gross earnings of the Lorain (Ohio) Street Railroad for 1915 were $150,152, a decrease of 13.2 per cent, but the operating expenses and taxes totaled $104,126, a decrease of 10.6 per cent, so that the net earnings of $46,026 represented a decrease of 18.7 per cent. The net amount after the deduction of fixed charges was a deficit of $18,474, as compared to $7,879 for the preceding year. The passenger traffic fell off from 2,937,644 to 2,543,530. The gross earnings of the Sandusky, Fremont & Southern Railway at $76,687 were a decrease of 2.3 per cent, while the operating expenses and taxes increased 3 per cent to $54,832. The net earnings amounted to $21,855, a decrease of 13.6 per cent. The net result for the year was a deficit of $10,395 as compared to $6,952 in 1914. The number of passengers carried showed a decrease from 322,605 in 1914 to 299,746 in 1915.

BIRMINGHAM SUBURBAN LINE SALE DISCUSSED

General Opinion Favors Purchase by Birmingham Railway, Light & Power Company, with Reservation for Future Municipal Purchase

The statement made recently in regard to the proposed purchase of the Birmingham, Ensley & Bessemer Railway by the Birmingham Railway, Light & Power Company, Birmingham, Ala., has been very generally discussed in the city and the suburbs. While the consensus of opinion seems to favor the acquisition of the line by the Birmingham Railway, Light & Power Company, with a reservation on the part of the city to take the line over at any time within a given number of years, two of the members of the city commission have announced their opposition. Farney Johnston, attorney for the Birmingham, Ensley & Bessemer Railway, held a conference with the city commissioners, which gave rise to the report that the city was again contemplating the purchase of the lines. In statements issued after the conference, Commissioners Weatherly and Barber announced that the Birmingham Railway, Light & Power Company would not be allowed to acquire the line.

Mr. Johnston, however, is quoted as follows:

"The reorganization of the Tidewater will probably be completed by May 1. I think the company will remain in the hands of private owners after the plans are completed. Of course there has been some talk about the city of Birmingham taking over the property and operating the lines, but I do not consider that at all probable. There is some doubt about the legal right of the city to take that action. My recent conference with the city commissioners was largely of a routine nature regarding details in the affairs of the company."

F. S. Morris, Philadelphia, Pa., a member of the firm that financed the Birmingham, Ensley & Bessemer Railway, is said to be of the following opinion:

"If the city of Birmingham will take the line over on the basis of 50 cents on the dollar or can get any company to do the same, it would be entirely satisfactory to us. We have been trying for some time to get a purchaser, and it was only after hard and diligent work that we were able to get this offer from the Birmingham Railway, Light & Power Company. Street railway lines in the United States are not considered now to be good investments unless they are operated in connection with light, power and gas systems. Many things have happened in recent years to beat down the value of street railway properties. The Tidewater line pays out 75 per cent of its receipts for operating expenses alone.

"Under the terms of the proposed sale to the Birmingham Railway, Light & Power Company, the city can retain its right to buy the property at any time within an agreed number of years at the very low price now offered, without interest and without standing any of the losses which might have occurred in operating the system in the meantime. It seems to me that this meets every need and every requirement of those who oppose the sale on the ground that the city should own the utilities. This will give the city time to adjust its finances and complete the organization which will certainly be necessary before the utilities could be operated. For the city to attempt to operate the Tidewater line alone at this time would simply be a useless drain on the taxpayers of the city. If a corporation is unable to pay any interest on the bonds, how can the city expect to issue bonds, buy the line, operate it and pay the interest on those bonds?"

RETURNS FOR MONTANA LINES

The report of the Montana Board of Railroad Commissioners, which is *ex-officio* the Public Service Commission of that State, contains detailed figures for passengers, operating revenues, operating expenses and return on investment of Montana street railways for the year ended June 30, 1915. These figures are presented in part in the accompanying table. For combined light and railway properties only the transportation data are given. No explanation is given as to how "return" on investment is determined, but the "investment" seems to be the cost of plant and equipment and materials and supplies, while "return" is operating revenues less the figure given as "operating expenses."

STATISTICS FOR ELECTRIC RAILWAYS IN MONTANA FOR THE YEAR ENDED JUNE 30, 1915

Company	Revenue Passengers Carried	Operating Revenue	Average per Passenger	Operating Expenses	Average per Passenger	Return on Investment, Per Cent
Anaconda C. M. Co.....	1,538,089	$77,708	$0.05052	$59,114	$0.03843	6.6
Billings Traction Co....	516,818	26,145	0.05058	32,520	0.06292	..
Butte Electric St. Ry.....	9,057,567	456,936	0.05044	484,088	0.05344	..
Gallatin Valley Ry.....	....	.....	.....	.....	......	..
Helena L. & Ry. Co....	1,706,457	90,694	0.05314	79,913	0.04682	3.0
Montana Power Co.	2,056,054	102,989	0.05009	71,379	0.03471	..
Missoula St. Ry.	1,171,877	74,756	0.06379	71,112	0.06069	0.5

RESULTS UNDER LONDON POOLING AGREEMENT

The reports of the railways working under the pooling scheme proposed by the Underground Electric Railways, London, have been issued. Although the scheme was assented to on Jan. 21 of this year, the agreement took effect from Jan. 1, 1915, so that the whole of the receipts of last year came under this agreement. The five companies concerned are the City & South London, the Central London, the London Electric, the Metropolitan District Railway and the London General Omnibus Company. Their aggregate gross traffic receipts in the past year amounted to £4,924,245, and, including other resources, the aggregate receipts of the companies were £5,481,144. Out of this last total the several companies reserve between them £5,029,778 for revenue liabilities, which include working expenses, prior charges, reserves and other items specified in the agreement. The balance of £451,365 was credited to the common fund authorized under the act, and this common fund was divided among the companies as follows:

Metropolitan District....................	£54,163	12 per cent
City & South London.....................	9,027	2 per cent
London Electric	117,355	26 per cent
Central London	90,273	20 per cent
London General Omnibus..................	180,547	40 per cent

In reply to a suggestion that the fares should be raised on the railways controlled by the Underground Electric Railways, the chairman, at the annual meeting of the company, stated that the adoption of such a policy would encourage competition. The company was frequently attacked on the ground that it was a monopoly, but although it predominated in the railway traffic, it had no monopoly.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y.—The Auburn & Syracuse Electric Railroad has applied to the New York Public Service Commission, Second District, for permission to issue and sell $450,000 of short-term notes.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The sale of the Chicago & Milwaukee Electric Railroad in Wisconsin and Illinois, which was ordered by the court for April 1, has been advanced to May 1 by Judge Landis.

Georgia Railway & Power Company, Atlanta, Ga.—James D. Robinson has succeeded the late Thomas Egleston on the board of directors of the Georgia Railway & Electric Company, and Mell R. Wilkinson has been elected to fill the vacancy in the Georgia Railway & Power Company.

Mountain Railway, West Orange, N. J.—The rails of the Mountain Railway were sold at public auction on April 3 to the Federal Iron & Steel Company, Newark, for $1,625 to cover unpaid taxes. Some time ago this company bought the overhead equipment, tools and two cars.

Orleans-Kenner Electric Railway, New Orleans, La.—The Bellevue Farms Land Company, Lethbridge, Can., has applied for the appointment of a receiver of the 12.5-mile Orleans-Kenner Electric Railway. The land company, which is a creditor of the railway for $3,099, contends that the payment made to Johnson & Company for the construction of the road was excessive. The firm is said to have received $250,000 of bonds of the railway and $247,000 of common stock. A. S. Bowman has also brought suit for the recovery of eighteen shares of stock of the railway, which he claims he loaned to Johnson & Company. He says that these shares are particularly valuable in that they represent the balance of power between majority and minority interests and expresses the belief that they are desired by Johnson & Company in connection with an effort to transfer control of the company to Bertron, Griscom & Company, New York, N. Y., which interests are identified with the New Orleans Railways & Light Company.

Public Service Corporation of New Jersey, Newark, N. J.—Articles of dissolution have been filed by the Public Service Building Company with the Secretary of State of New Jersey. The company was incorporated on Dec. 23, 1913, with an authorized capital stock of $200,000 for the purpose of making cars and undertaking other minor construction work in the interests of the Public Service Corporation of New Jersey.

Seattle, Renton & Southern Railway, Seattle, Wash.—John C. Higgins of Higgins & Hughes, counsel for Augustus S. Peabody, trustee for bondholders, and Peabody, Houghteling & Company, Chicago, Ill., have submitted a plan for the reorganization of the Seattle, Renton & Southern Railway to Judge A. W. Frater of the King County Superior Court. According to Mr. Higgins the bondholders propose to bid the property in on May 1, when it is sold under foreclosure under Judge Frater's order. The road has been in the hands of receivers Scott Calhoun and Joseph Parkin since the summer of 1912.

United Railroads of San Francisco, San Francisco, Cal.—In response to the recent declaration by Jesse W. Lilienthal, president of the United Railroads of San Francisco, that his company was prepared to consider an offer from the city for its entire street railway system, the Board of Supervisors, it is reported, has begun work on a plan of purchase to be submitted soon.

West Penn Traction Company, Pittsburgh, Pa.—Out of the $5,295,000 cash deposited with the Equitable Trust Company, New York, N. Y., a part of the proceeds of the sale of $8,500,000 of West Penn Power Company first mortgage bonds, to be used in retiring first mortgage bonds of the West Penn Traction Company, the trust company has bought $6,620,000 of the bonds at an average price of 80, leaving $5,465,500 outstanding. The purchased bonds will be retired. The outstanding bonds were issued for 90 per cent of the cash cost of property, and in addition to the property security have also deposited behind them the entire common stock of the West Penn Railways and $2,300,000 of its second mortgage bonds. The entire common stock of the West Penn Power Company, now showing earnings of approximately 6 per cent, is owned jointly by the West Penn Traction Company and the West Penn Railways. It is stated that the recent financing by the West Penn Power Company cares for all requirements over a long period of both the electric railways and the electric lighting and power companies.

Winnipeg (Man.) Electric Railway.—F. M. Morse, secretary and treasurer of the Winnipeg Electric Railway, has issued the following notice in regard to the omission of the dividend: "At a meeting of the board it was decided that, owing to the financial situation, the practice of declaring a quarterly dividend should be discontinued for the present. In this connection I would say that the business of the company is showing an improvement, and for the current quarter the net earnings have been sufficient to provide for all accrued fixed charges and also a sum that would have been sufficient to enable the company to declare a moderate dividend for this quarter. The directors feel that at this time, in order to conserve the company's interests, a dividend should not be declared payable for the present quarter, and that the matter of further dividends for the year will be considered and dealt with at a later date."

DIVIDENDS DECLARED

Boston (Mass.) Suburban Electric Companies, quarterly, $1, preferred.

Citizens' Traction Company, Oil City, Pa., quarterly, 75 cents, preferred.

Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.

Ottawa (Ont.) Traction Company, quarterly, 1 per cent, preferred.

Ottumwa Railway & Light Company, Ottumwa, Iowa, quarterly, 1¾ per cent, preferred.

Springfield & Xenia Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Virginia Railway & Power Company, Richmond, Va., 1½ per cent, common.

Youngstown & Ohio River Railroad, Leetonia, Ohio, quarterly, 1¼ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.					
1m., Feb., '16	$62,406	*$34,185	$28,221	$17,779	$10,442
1 " " '15	60,380	*29,465	30,915	17,636	13,279
12 " " '16	791,812	*409,036	382,776	212,841	169,935
12 " " '15	782,428	*375,208	407,220	209,492	197,728
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.					
1m., Feb., '16	$96,183	*$59,764	$36,419	$28,570	$7,849
1 " " '15	77,848	*54,430	23,418	28,941	†5,523
12 " " '16	1,125,769	*736,168	389,601	356,898	32,703
12 " " '15	1,056,377	*701,346	355,031	342,837	12,194
COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO					
1m., Feb., '16	$280,700	*$165,534	$115,166	$44,375	$70,791
1 " " '15	248,596	*149,014	99,582	38,727	60,855
12 " " '16	3,167,944	*1,871,698	1,296,246	484,332	811,914
12 " " '15	3,071,080	*1,873,923	1,197,157	476,085	721,072
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.					
1m., Feb., '16	$1,362,995	*$709,410	$653,585	$408,330	$245,255
1 " " '15	1,140,832	*594,403	546,429	362,301	184,128
12 " " '16	14,977,054	*7,978,108	6,998,946	4,603,102	2,395,844
12 " " '15	14,026,762	*7,525,642	6,501,120	4,244,490	2,256,630
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.					
1m., Feb., '16	$198,398	*$128,085	$70,313	$65,761	$4,552
1 " " '15	182,301	*107,797	74,504	62,494	12,010
12 " " '16	2,671,434	*1,539,328	1,132,106	798,964	333,142
12 " " '15	2,537,562	*1,450,770	1,086,792	756,881	329,911
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.					
1m., Feb., '16	$227,472	*$136,706	$90,766	$61,802	$28,964
1 " " '15	187,792	*113,323	74,469	61,896	12,573
12 " " '16	2,529,856	*1,511,278	1,018,578	754,790	263,788
12 " " '15	2,581,426	*1,564,943	1,016,483	724,108	292,375
FT. WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.					
1m., Jan., '16	$139,795	$84,122	$55,673	$55,016	‡$883
1 " " '15	152,083	83,281	68,802	55,073	‡14,048
KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.					
1m., Jan., '16	$69,029	$34,857	$34,172	$20,317	‡$18,013
1 " " '15	62,078	33,946	28,132	19,857	‡12,676
7 " " '16	509,145	258,444	250,701	142,607	‡120,845
7 " " '15	491,370	260,337	231,032	138,343	‡108,251
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.					
1m., Feb., '16	$50,574	*$39,292	$11,282	$16,085	†$4,803
1 " " '15	45,960	*35,105	10,855	15,578	†4,723
12 " " '16	745,820	*481,350	264,470	190,732	73,738
12 " " '15	687,556	*465,713	221,843	186,888	34,955
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.					
1m., Feb., '16	$185,318	*$109,648	$75,670	$42,897	$32,773
1 " " '15	169,450	*101,726	67,724	41,712	26,012
12 " " '16	2,171,809	*1,336,133	835,676	512,838	322,838
12 " " '15	2,233,329	*1,314,551	918,778	495,336	423,442
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.					
1m., Feb., '16	$409,331	*$253,092	$156,239	$181,166	†$24,927
1 " " '15	437,854	*247,296	190,558	182,551	8,007
12 " " '16	5,448,097	*3,075,752	2,372,345	2,206,371	165,974
12 " " '15	6,079,892	*3,235,308	2,844,584	2,189,429	655,155
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO					
1m., Jan., '16	$318,315	*$182,566	$135,749	$67,288	‡$68,716
1 " " '15	249,363	*155,578	93,785	55,390	‡38,551
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.					
1m., Jan., '16	$488,780	$218,142	$270,638	$147,106	‡$131,091
1 " " '15	436,196	205,144	231,052	137,720	‡99,508
7 " " '16	3,274,747	1,526,094	1,748,652	1,004,654	‡802,048
7 " " '15	3,068,902	1,467,164	1,601,737	948,283	‡700,384

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

YOUNGSTOWN JITNEY ORDINANCE UPHELD

The Court of Appeals of Ohio has upheld the right of the city of Youngstown to demand a $5,000 bond of jitneys and otherwise to regulate them. The case was that of John B. Evans against the city of Youngstown. In June of last year the city of Youngstown passed a jitney ordinance, requiring licenses from those who operate motor vehicles for hire in the way generally understood by the word jitney. The plaintiff brought action to enjoin the city from enforcing the ordinance against himself and the other members of the Youngstown Street Bus Protective Association.

The ordinance contained a provision requiring a person who is operating a jitney to take out insurance in the sum of $5,000 to protect the city and for the benefit of those who might be injured by the operation of the jitney. The ordinance also provided for the payment of a license fee of $25. It was urged that this latter charge was so in excess of any expense or costs of issuing a license that it became a special tax. It was also urged that the city had what is known as a taxicab ordinance; that the plaintiff and those for whom he brought the action had complied with the provisions of this taxicab ordinance and had a right to operate a taxicab; that the jitney ordinance was in violation of this taxicab ordinance, and that if the owners were required to comply with the jitney ordinance it would be a violation of the contract entered into with the city under the taxicab ordinance.

Taking up first the provision which required a bond in the sum of $5,000 the court referred to the previous decisions of the Supreme Court upholding a similar ordinance in the village of Independence where the sum of $10,000 was fixed as a provision for operating a jitney in that village. The provisions in the ordinance in that case were somewhat different in form from the ones in Youngstown, but a bond of $10,000 was sustained in that case. The Court of Appeals expressed the opinion that so far as an ordinance requiring a bond of $5,000 was concerned the Supreme Court had settled that question in favor of the city. It also felt it could not say the fee of $25 was excessive. With respect to whether the ordinance was in conflict with the taxicab ordinance, the Court of Appeals said:

"The City Council acts in two capacities, one legislative and the other contractural, providing for these ordinances. Now, it is a well-known rule that Council cannot be stopped from legislating in the future, so that if this legislation as to the jitney ordinance is in violation of the former ordinance, the remedy would be by injunction. They could not stop the enforcement of future legislation. The city could not violate its contract any more than an individual, but if it does, its liability would only be that of any other person who violates his contract. The city could not be enjoined from passing and enforcing future legislation because, perchance, it might conflict with contractural relations under a former ordinance. We think the city had a right to enact this ordinance and judgment is in favor of the city."

COMMISSIONER WHITNEY DISCUSSES TRAFFIC STANDARDS

Travis H. Whitney of the Public Service Commission for the First District of New York, in an address which he made in Brooklyn recently, said:

"This commission is practically the only commission in the country to which passenger service is relatively important. Elsewhere, and particularly with railroads, income and competition cause fairly good passenger service with little attention required of commissions. Freight service and rates are of more importance to them. Here congested population and intensive travel make passenger service a vital issue. The law requires 'adequate service.' What are the standards or the measure by which it may be determined that adequate service is being rendered, that is, measured so that proof may be conclusive before a court, of a violation of an order?

"I am not trying to shift the great responsibilities I have assumed, but I do want to urge the importance of disinterested and intelligent study of the work of a board such as this. Public officers who are trying to do their full duty are, I hope, anxious to have enlightened criticism. I know I am one who wants his public actions scrutinized.

"The public of a great city, if it deserves home rule, should be capable of doing its own investigating, contemporaneous with the actions of its officials and of applying the necessary remedies if such actions are wrong, and not wait to be shocked by post mortem headlines. So far as this commission is concerned its meetings are public, its minutes and reports are printed and are distributed on request. Its records are available and assistance will be rendered to any who desire to study its work."

COMPANY PUBLICATION AT WILKES-BARRE

The Wilkes-Barre (Pa.) Railway has begun the publication of *The Optimist*. It is 4½ in. wide by 6 in. high, and contains twelve pages and cover. *The Optimist* is published "every little while." The whole thing is exceedingly well done. A sermon is a sermon. It may be in the polished periods of a Channing or the slang of a George Ade or a Billy Sunday. Here is one from *The Optimist*, fashioned after Ade and entitled, "The Citizen Who Got the Wrong Hunch," which deserves to go the rounds of the railway employees' publications:

"Once upon a time there was a Citizen who had a Good Job.

"He owned a little home, with a Batch of Flowers in Front and a back yard where his Wife raised Vegetables and the children raised Cain.

"In summer time he had the Good Air and in winter time he stood inside a warm car when the weather was Rough Stuff.

"Twice a month the Filthy Lucre came in regularly, and whenever the Kiddies Wanted new shoes there was Never a Kick.

"Altogether he was Pretty Happy and didn't think the Idle Rich had so much on Him.

"But one day there came along a Professional Mixer of Eighteen Assorted Kinds of Trouble for which he got Good Pay.

"S'here,' said the Professional Mixer, 'I need a Strike.'

"'I don't," said the Citizen.

"'What's that got to do with it?' said the P. M. and he called a meeting of the L. D., Counted the Ballots and the Merry War was on.

"Two months later the Citizen was Hanging Up the Grocer and when His Wife Wanted a New Pair of Shoes he told her she Had Better remember that He was a Member of the Union.

"Moral: When in doubt, use your brains."

JITNEY BUS BONDING LAW UPHELD

Judge Mark A. Fullerton of the State Supreme Court, at Olympia, Wash., on March 29, held constitutional the jitney bus bonding law, passed by the 1915 legislature and upheld the conviction of the Seattle Taxicab & Transfer Company of a gross misdemeanor for its failure to obtain an indemnity bond of $2,500 as required by the law. Chief Justice Morris and Judges Mount, Chadwick and Ellis, concurred. The law is applicable to jitneys operating in cities of the first and second classes. The Supreme Court's decision affirms a decision by Judge Dykeman of the King County Superior Court at Seattle. Several assignments of error were submitted to the court by the appellant, the Seattle Taxicab & Transfer Company. The company insisted that the jitney bus law violated both the State and Federal constitution. The court, after reviewing all objections, upholds the law in every particular. The Taxicab Company contended that the law was unconstitutional. Discrimination was the main ground of the attack relied upon by the appellant, although particular attention was directed to the fact that street cars were exempt from its provisions. The Supreme Court says there are just grounds for the distinctions. In this connection the court said:

"Street railways must operate on fixed tracks, and expend large sums on visible and tangible rights, and they must make preparations for payment of damages, while the motor vehicle may represent the entire capital of the operator. This justifies the bond of indemnity not required of street cars."

JITNEY CRISIS IN LONG BEACH

Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., told a large gathering of traffic men at Long Beach recently that it is now up to the people of the cities in which the company operates to choose between the auto bus and the electric railway. He was quoted in part as follows:

"Your Long Beach city lines have fallen to the point where they do not only fail to pay ordinary operating expenses, but they do not even pay transportation expenses, that is, the power to move the cars over the tracks. Some of your tracks have disappeared, and others must go. It is up to the people of Long Beach to decide. If you want the Pacific Electric Railway to continue to maintain a system in this city you should impose the same conditions with regard to franchises, taxes and street regulation that are enforced upon the present railway lines on our present common carrier competitor. We have continued operations against this unequal competition without complaining, feeling that when it was fully understood by the people you would choose between the two, and choose justly, and without unfair discrimination. A crisis has been reached; the issue is before you."

JOINT TROLLEY AND AUTOMOBILE FREIGHT RATES AT LOUISVILLE

The Louisville & Interurban Company, Louisville, Ky., will shortly announce a joint rate involving its Louisville-Shelbyville line and an automobile freight truck line which will extend the freight service of the company into a rich territory lying beyond the railway. It is the expectation of R. H. Wyatt, general freight agent of the company, that service will begin on or about April 15, and he is preparing to file the tariffs very shortly.

A 4-ton service truck has been ordered and stations have been provided for at Mount Eden, Van Buren, Southville and other points on the route and stops will be made daily by the truck to take on and discharge freight. It is expected that the one truck will serve at the outset, and it will carry, it is stated, from 8000 lb. to 10,000 lb. of freight on each trip. Rates are to be based, in a general way, on mileage, with a low rate on the railway from Louisville to Shelbyville. The section to be served is an excellent fruit, diversified farming and dairying region, but heretofore all the freighting has been done by horse-drawn wagons, out of Shelbyville, Taylorsville or Lawrenceburg.

Hearing on Interstate Rates in St. Louis.—A public hearing on the proposed increase in rates by the Illinois Traction System between St. Louis and Granite City will be held in St. Louis on April 21 at the Planters Hotel before the Interstate Commerce Commission.

Massachusetts Northeastern Fare Increase Suspended.—The Massachusetts Public Service Commission, following a conference with the New Hampshire Public Service Commission, has suspended until July 1 the proposed increase in fares on the Massachusetts Northeastern Street Railway, which was to have gone into effect on May 1. The New Hampshire board also suspended the increase.

Skip Stop in Newark on April 10.—The trial of the skip-stop plan by the Public Service Railway, Newark, N. J., will be begun on April 10 on the company's Bloomfield line between Branch Brook Park and Caldwell. The original plan was to start the service on April 1. The trial period will be for sixty days. The service is to be established on recommendation of the Board of Public Utility Commissioners and on request of residents along the line.

Through Service Ordered for East Boston.—The Massachusetts Public Service Commission has ordered the Boston Elevated Railway to restore through service in the East Boston tunnel to and from Jeffries Point, effective April 8. With the opening of the Cambridge Street extension of the tunnel recently a shuttle service between Maverick Square and Jeffries Point was inaugurated, and a public hearing was given by the commission to petitioners for the resumption of the former service.

Discussion in Trenton on Adequate Service.—At a conference on March 24 the adequacy of the service furnished by the Trenton & Mercer County Traction Corporation, Trenton, N. J., was discussed. The City Commissioners and City Counsel Bird represented the city and Rankin Johnson, president, and former Judge Macpherson, counsel, represented the company. Another conference is to be held. The question seems now to have resolved itself into one as to whether the courts should pass upon the no-seat-no-fare ordinance or whether the Board of Public Utility Commissioners should prescribe the service regulations.

Stoughton Fare Petition Heard.—On March 29 the Public Service Commission of Massachusetts heard the petition of the Bristol & Norfolk Street Railway, Randolph, Mass., for permission to increase its fares from 5 cents to 6 cents. The road is a single track line 6.318 miles in length, and operates between Stoughton Square in Stoughton and Holbrook Square in Randolph, with a branch line in the summer to Glen Echo Park. The main line of the road is divided into two zones with a fare of 5 cents on each zone. Free transfers are furnished during the summer to the branch line to the park. The commission reserved decision.

Tickets and Badges Discontinued in Kansas City.—The series of seven different sorts of tickets for sale and complimentary, and the metal badges heretofore carried by employees of the Kansas City (Mo.) Railways are to be called in by the company, and only two forms of tickets or passes will be issued hereafter. These will be a car pass for about twenty department heads, and single tickets for laborers and for general office employees. Each of the latter classes will get free transportation to and from work. The company will no longer sell tickets. These tickets have been sold for 5 cents each, no reduction for quantities, to the public.

Chamber of Commerce Takes Vote on One-Man Cars.—A referendum vote taken by the Board of Commerce of Lockport, N. Y., among merchants and manufacturers in that city was almost unanimous in favor of having the City Council withdraw its objections to one-man cars on the Lockport local lines in return for the construction by the International Railway, Buffalo, N. Y., of a new freight and passenger terminal in the business section. The Council adopted an ordinance requiring two men as a crew on all local cars, but an injunction was obtained by the company and the case is pending in the courts. It is expected that the Council will reconsider its action of several weeks ago and accept the offer of the company.

Decision Reversed on New Orleans Jitney Ordinance.—The State Supreme Court of Louisiana in a decision after rehearing the case brought to test the validity of the New Orleans jitney ordinance has reversed the decision rendered by the court last November on the original appeal and held the ordinance to be valid. The ordinance required a $5,000 indemnity bond, signed by a surety company, for each machine operated. The justices stood three to two for upholding the ordinance, the same majority by which the measure was held void last November. Justice Provosty, who wrote the opinion against the ordinance in the original hearing, signed the recent majority decision. He stated further consideration of the case caused his change in opinion.

Arranging for Syracuse Conference on Safety at Grade Crossings.—Edward G. Connette, president of the International Railway, Buffalo, N. Y., has been appointed chairman of the committee on the physical surrounding of crossings for the conference for greater safety at railroad crossings to be held in Syracuse. Edgar J. Dickson, vice-president of the company, is on the committee for fixed signs and signals. Bert L. Jones, vice-president and general manager of the Niagara Gorge Railroad, is a member of the publicity and education committee. Mr. Connette is also a member of the executive committee. The appointments were made by Seymour Van Santvoord, chairman of the Public Service Commission for the Second District. The date for the conference has not been set.

Accidents in New York in March.—The National Highways Protective Society reports that twenty-two persons were killed by automobiles in the streets of New York in March. Twenty-nine were killed by vehicles in the city, six by trolleys, and one by wagon, compared with twenty-one by automobiles, four by trolleys, and five by wagons, in March, 1915. In the first quarter of the present year eighty-five persons were killed by vehicles in the streets of New York, fifty-eight by automobiles, sixteen by trolleys, and eleven by wagons. Of the total, thirty-three were children. In the corresponding period in 1915, eighty-eight persons were killed, thirty-nine of whom were children. In New York State, outside the city, last month ten persons were killed by automobiles, four by trolleys, and one by wagon, compared with nine by automobiles, two by trolleys, and one by wagon, in March, 1915. In New Jersey, seven persons were killed by automobiles, one by trolley, and two by wagons in March.

Floods Interrupt Service in Buffalo.—Flood conditions in the South Park and Kensington sections of Buffalo, N. Y., played havoc with the schedules of local lines of the International Railway operating in the flood district. Water on many of the streets was 5 ft. deep, necessitating the abandonment of schedules on some lines and the operation of a snowplow attached to a trailer through the deep water on other lines. The high water in the Buffalo River and the ice jams almost completely carried away the Bailey Avenue bridge, so that for two days the Lackawanna cars were withdrawn from service. Swan-Abbott cars are being routed over other streets until the bridge can be replaced. More than 20 miles of streets were under water, but the property damage was not heavy. The Seneca Street carhouse of the International Railway on the banks of the river was not reached by the high waters. The near-side type of pay-as-you-enter cars of the company could not operate through the deep water, and trailers attached to a snowplow were used on the Hoyt-Seneca line.

Responsibility of Trainmen Recognized.—The removal of the "Please report" signs from the cars of the Kansas City (Mo.) Railways has met with enthusiastic approval of the trainmen. The suggestion for the removal was made by the welfare department of the company on the ground that the signs were a slur upon the character of the men. It was instantly acceded to by President Philip J. Kealy. The signs asked patrons please to report to the general offices any incivility or misconduct of the employees. Often as many as seventy-five complaints were received in a day, but investigation disclosed that few were justified. Not only was a great deal of time consumed in listening to and investigating complaints, but there was a constant uneasiness on the part of the trainmen over the result of their judgment in handling delicate situations. As soon as the signs were removed, letters began coming in to the welfare department and the officials, expressing the appreciation of the trainmen at being put on their own responsibility.

Electric Line Increases Freight Shipments.—The Kansas City-Western Railway, Kansas City, Kan., has had a large increase in its freight business since June 25, 1915, when it reduced its rate about 8 cents a hundred, leveling them to the steam road rates. While the largest part of the company's freight business is normally farm produce, reaching its maximum in the summer, there is a steadily increasing volume of freight from the jobbing houses and manufactories of Kansas City to the retail dealers of Leavenworth and other towns on the line. The company runs two trains a day. Each consists of a freight car and a box-car trailer. These trains touch Third Street and Grand Avenue, Kansas City, Mo., and Fourth and State Streets, Kansas City, Kan. The early train leaves Kansas City at 5.30 a. m., picking up milk on its return. The second train leaves at 11.30 a. m., and takes merchants' orders for current day delivery. In summer the volume of freight runs to 750,000 lb. a month. Many heavy freight orders are handled by special arrangement on flat cars. A recent shipment of this kind consisted of fourteen carloads of material for a large building in Kansas City, Kan., brought from Leavenworth. The company operates 45 miles of line. Its equipment at the present time for handling freight consists of twelve cars.

Personal Mention

Mr. G. F. Roach has been appointed superintendent of overhead lines for the Ogden, Logan & Idaho Railway, Ogden, Utah.

Mr. H. A. Genung has been appointed chief engineer of the St. Paul Southern Electric Railway, St. Paul, Minn. He will direct construction work on the proposed line south of Hastings.

Mr. N. S. Wiltsie, trainmaster of the Salt Lake & Ogden Railway, Salt Lake City, Utah, in addition to this position, has been appointed trainmaster of the Ogden, Logan & Idaho Railway.

Mr. W. H. Dinsmore has been appointed traffic superintendent of the Vancouver city and suburban lines of the British Columbia Electric Railway, Vancouver, B. C., to succeed Mr. James Hilton, resigned.

Mr. J. M. Read, superintendent of transportation of the Ogden, Logan & Idaho Railway, Ogden, Utah, in addition to his other duties, has been appointed superintendent of transportation of the Salt Lake & Ogden Railway.

Mr. J. J. Macdonald has been appointed superintendent of the St. Paul Southern Electric Railway, St. Paul, Minn., to succeed Mr. K. A. Schaller, resigned. Mr. Macdonald was formerly with the Great Northern Railway.

Mr. E. E. Eysenbach, formerly general manager of the San Antonio (Tex.) Traction Company and of the San Antonio Gas & Electric Company, has been appointed general manager of the Hartford (Conn.) City Gas Light Company.

Mr. Frank S. Washburn has resigned as chairman of the board of Alabama Power Company and as a director of the company and also as a director of Alabama Traction, Light & Power Company, New York, N. Y., and its subsidiaries. It is understood that this action was taken by Mr. Washburn because of press and other business.

Mr. Almoth W. Hoff has been appointed secretary to Mr. Travis H. Whitney of the Public Service Commission for the First District of New York. Mr. Hoff is a lawyer and since 1911 has been a member of the Assembly, for the last two years being chairman of the cities committee. During that time he introduced and secured the passage of a number of bills at the request of the commission.

Mr. B. H. Meyer has been elected chairman of the Interstate Commerce Commission for one year, effective on March 17, 1916. This is in accordance with the practice of the commission made effective a few years ago, that the term of the office of the chairman of the Interstate Commerce Commission shall be for one year and that the office shall be filled from year to year in the order of seniority of service. Chairman Meyer was appointed to the commission in 1911 and his term will expire on Dec. 31, 1917.

Mr. James Hilton, for more than four years traffic superintendent of the Vancouver city and suburban lines of the British Columbia Electric Railway, Vancouver, B. C., has resigned. Mr. Hilton began his railway career with the Montreal Street Railway in 1897. In 1908 he was appointed superintendent of the Third Avenue Division of the Third Avenue Railway, New York City, from which position he resigned in October, 1911, to become connected with the British Columbia Electric Railway. A handsome walrus-hide traveling bag and silver cigar case from the officials and a gold watch from motormen and conductors were presented to Mr. Hilton on the occasion of his leaving the company. Before again entering business Mr. Hilton intends to hunt in the interior of northern British Columbia.

Mr. Louis H. Palmer has been appointed general superintendent of the Eastern Pennsylvania Railways, Pottsville, Pa., by Capt. W. B. Rockwell, manager. The J. G. White Management Corporation are the operating managers of the property. Mr. Palmer was a member of the class of 1902 at Williams College. From 1901 to 1906 he was employed in the operating department of the Central Railroad of New Jersey at Jersey City. He entered the service of the Metropolitan Street Railway, New York City, in the fall of 1906 as a clerk in the office of Mr. Oren Root, vice-president and general manager. In April, 1908, he was appointed assistant to the general manager for the receivers of that company, and in April, 1909, was made superintendent of transportation. He resigned from the Metropolitan Street Railway in November, 1912, to join the organization of Harrison Williams. In June, 1915, Mr. Palmer went to Baltimore, Md., to do some special work for the president of the United Railways & Electric Company. It is from this position that he has resigned to become connected with the properties at Pottsville. He served the American Electric Railway Transportation & Traffic Association as a member of the rules committee for several years and as chairman of that committee in 1914; as chairman of the committee on subjects in 1914 and 1915; as chairman of the committee on standards in 1915 and 1916, and as a member of the executive committee in 1916.

Mr. George Henry Payne was recently appointed assistant to the vice-president and general manager of the Wilkes-Barre (Pa.) Railway, in which capacity he is in charge of advertising, public statements and relations with the public. Mr. Payne is an author, lecturer, journalist and member of the firm of Oakman & Payne, architects. He was born in New York City in 1876 and was educated in the city public schools, later attending the City College and the New York University Law School and pursuing special courses at the College of Pharmacy. When he was eighteen years old he entered newspaper work as a contributor to the *Commercial Advertiser* of New York. He has always been interested in politics, and in 1897 took a prominent part in opposing the so-called Remson gas bills. He then went to Europe as correspondent for the *Saturday Evening Post* and brought out a volume of fiction called "A Great Part and Other Stories." In 1908 he ran for the Assembly in New York and in 1911 managed the literary bureau for Mr. Henry L. Stimson, then Republican candidate for Governor of New York. Previously he had been made political reporter for the New York *Evening Post*. In 1912 he was one of the campaign managers for Col. Theodore Roosevelt. Later he joined the staff of the New York *Evening Mail* as its Albany correspondent. Mr. Payne is the author of "The Child in Human Progress," a volume of 400 pages, said by the New York *Times* to be an interesting and important contribution to human history on its social side. At present he is delivering a series of lectures on "The History of American Journalism" for the Board of Education of New York City.

NEW PHILADELPHIA TRANSIT REPORT PRESENTED

William S. Twining, director of city transit of the city of Philadelphia, Pa., presented on March 29 to the Select and Common Council of the city his first report on the rapid transit problem there, together with an analysis of the plans proposed for its solution with suggested methods for their improvement. He said that the report was needed primarily in order to explain his motives and purposes in suggesting changes in the details and the financing of the plan for transit development now before the public popularly known as the Taylor plan, and also to make clear some of the technical and financial features of that plan and to advise the City Councils as to what methods of executing the plan he considered were rational and businesslike.

Mr. Twining said that his report was not to be considered in any way as either a personal or political attack or a criticism of plans originated under the former administration. It was made only to serve the best interests of the city. While in the report a program of construction was advised which called for the authorization at this time of only $35,000,000, Mr. Twining felt that the determination of the amount that should be authorized was a matter that rested entirely with the citizens and their representatives in the Council. As all plans must by law be submitted to and finally approved by the Public Service Commission he suggested that in order to avoid delay the commission be requested to review the situation and render a decision as to the details as soon as possible.

On April 3 the finance committee or Councils approved an amendment to the loan bill providing for the main features of the Taylor system, thus rejecting the modifications suggested by Mr. Twining.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Birmingham Interurban Development Company, Birmingham, Ala.—Incorporated to construct an electric railway from Birmingham to the Warrior River and Jasper, via Dora and Cordova. Capital stock, $5,000. Officers: W. A. Spencer, Wylam, president; A. S. Preston, Jasper, vice-president, and W. W. Shortridge, Birmingham, secretary. [July 10, '15.]

***Ashland-Greenup Traction Company, Ashland, Ky.**—Incorporated to construct a line to connect Ashland, Russell and Greenup, 11 miles. Capital stock, $3,000. Incorporators, William L. Bybee, B. E. Tate and S. S. Willis, Ashland.

FRANCHISES

Oakland, Cal.—The San Francisco-Oakland Terminal Railway has asked the Council for permission to construct an extension of its Twenty-second Street line from Broadway through private property to Webster Street to connect with its Grand Avenue line.

Tampa, Fla.—The Tampa Electric Company has asked the Board of County Commissioners for a franchise to construct extensions into a number of subdivisions that are adjacent to the city of Tampa.

***Chicago, Ill.**—The Chicago, Fox Lake & Northern Electric Railway has made application to the Illinois Public Utilities Commission for a certificate of convenience and necessity to construct and operate an electric railroad from the end of the Ravenswood branch of the Northwestern Elevated Railroad in the northwestern part of Chicago, to Palatine, Ill., by way of the villages of Arlington Heights and Des Plaines.

Rockford, Ill.—The Rockford City Traction Company has asked the Council for an extension of its franchise.

Sinking Spring, Pa.—The Reading & Denver Street Railway has asked the Council of Sinking Spring for a fifty-year franchise to construct a line beginning at the western borough limits, extending on Commerce Street to the east end. The company proposes to construct a line from Reading to Denver, via Sinking Spring and thence to Ephrata. [July 24, '15.]

TRACK AND ROADWAY

Pacific Gas & Electric Company, Sacramento, Cal.—John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, recently appeared before the Railroad Commission of California and stated that the differences between the company and the property owners on J Street had been amicably adjusted and that the company is now ready to proceed with the extension of its line on that street. Mr. Britton stated that last year the company spent approximately $200,000 on its system in Sacramento and he has asked for an appropriation of $100,000 for further improvements.

Bay Shore Railroad, San Diego, Cal.—The contract for the construction of this company's proposed line on Mission Beach has been let to the Coronado Beach Company, and it is expected that the line will be ready for operation by June 1. The new line will be 2½ miles long and will extend along the beach from Bacon and Voltaire Streets, Ocean Beach, to the extreme end of Mission Beach. It is stated that the new line will be operated in connection with the Point Loma Railroad. [July 19, '15.]

Wilmington (Del.) City Railway.—This company will construct an extension along Fourth Street from East Fourth Street west of Pine Street to the wharf of the Wilmington Steamboat Company; also an extension on Fourth Street from East Fourth Street east of Church Street to the approach of the Third Street bridge.

Alton, Granite & St. Louis Traction Company, Alton, Ill.—This company will reconstruct the tracks on its East Broadway line, Alton. A new concrete foundation, new ties and new rails will be used.

Lee County Central Electric Railway, Amboy, Ill.—Plans are being contemplated by this company for the construction of an extension from a switch 2 miles west of Middlebury to Ashton.

Aurora, Mendota & Western Traction Company, Aurora, Ill.—It is announced that this company will build a line from Mendota to Plano, and it is said that there will be no further legal action by the Aurora, Elgin & Chicago Railroad to prevent the construction of the line. [March 4, '16.]

Union Traction Company, Anderson, Ind.—Thousands of ties have been distributed over the lines of this company, more than 1000 having already been replaced, and extensive relaying will be inaugurated.

***Columbus, Greensburg & Richmond Railway, Indianapolis, Ind.**—It is reported that plans are being considered to revive the project to construct a line from Columbus to Richmond, via Greensburg and Connersville. August M. W. Kuhn, Indianapolis, president.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—Plans are being made by this company to extend its North Thirteenth Street line to the city limits.

Cumberland & Manchester Railroad, Barbourville, Ky.—The sub-contract for grading 8 miles of this company's proposed line which was recently let to T. J. Anderson has since been given to Dempster & McFarlane, Knoxville. The company plans to construct a line between Barbourville to Manchester, 24 miles. M. E. S. Posey, Barbourville, chief engineer. [March 18, '16.]

United Railways & Electric Company, Baltimore, Md.—Plans are being considered by this company for relocating its tracks on Pratt Street between Light Street and Jones' Falls for the benefit of vehicle traffic. The east-bound track will be moved south of the safety islands in the center of the street and the west-bound track north of the islands. Under the present arrangement both tracks are north of the safety islands.

Greenwood, Miss.—The Peoples Interurban Company, Inc., has been organized to make surveys and plans for a proposed interurban railway to connect Greenwood, Schlater, Itta Bena and Black Hawk, to be built for the Southern Finance & Construction Company of Memphis, Tenn. J. H. Parson, Nashville, president. [March 18, '16.]

Kansas City (Mo.) Railways.—Surveys are being made by this company to find the cost of building an additional car line to Independence. The plan is to extend the Fifteenth Street line from its present terminus at Centropolis to Fairland Heights, on the present Independence line, a little more than two miles further east; then to extend the Fairmount Park line east to the north end of the Independence cross-town line. This would make two complete lines from Kansas City to Independence, at an average distance of a mile apart.

United Railways, St. Louis, Mo.—The United Railways has appealed to the Supreme Court from the decision of Circuit Judge George H. Shields upholding the Public Service Commission of Missouri in ordering the company to make extensions of certain of its lines and other improvements to cost about $500,000.

Great Falls (Mont.) Street Railway.—Plans are being made by this company to build extensions to both its north and south side lines.

Missoula-Polson Electric Railway, Missoula, Mont.—The Chamber of Commerce bodies of Missoula and Polson, have decided to organize and incorporate the Missoula-Polson Electric Railway Company, this being the initial step in the proposed construction of an electric line between Missoula and Polson. Committees have been appointed to proceed with the work of promoting the line.

City Electric Company, Albuquerque, N. Mex.—This company has under consideration the construction of an extension on North Fourth Street to serve the district within and beyond the city limits and extending to the United States Indian School.

Brooklyn (N. Y.) Rapid Transit Company.—Work has been begun on the second section of the Jamaica Avenue elevated line between Cypress Hills and Jamaica, by excavating for pillar foundations at Vine Street and Jamaica Avenue. The first section, begun last May, is nearly completed so far as concerns the main part of the structure, which has been carried from Briggs Avenue in Richmond Hill down to the Brooklyn Borough Line. It is expected that this section will be ready for operation in the fall.

International Railway, Buffalo, N. Y.—Construction work on the new Buffalo and Niagara Falls trolley line of the International Railway was brought to a stop a short time ago when it was discovered that the survey in many sections of Tonawanda and North Tonawanda was not accurate. Property owners whose lands adjoin the proposed new line claimed the survey is 12 ft. on their property. The route in the disputed sections is being resurveyed.

Piedmont & Northern Railway, Charlotte, N. C.—This company has announced that it will build a line between Gastonio and Spartanburg, 40 miles, if the increase in revenue is sufficient during the next six months to pay interest on the bonds necessary for the construction.

Northern Ohio Traction & Light Company, Akron, Ohio.—It is reported that this company has reached an agreement with the Pennsylvania Railroad and the Baltimore & Ohio Railroad to construct a $1,000,000 viaduct from the end of North Main Street over the Little Cuyahoga River Valley to North Hill as a shorter route to Cuyahoga Falls.

North Easthope Township, Ont.—The hydro-radial bylaw which was defeated last January will again be submitted to the ratepayers of North Easthope Township.

Southern Oregon Traction Company, Medford, Ore.—The proposition to build an extension from the Jacksonville terminus of the Southern Oregon Traction Company's line to the Blue Ledge mining district, 30 miles, has been submitted to the City Council for immediate action in the matter of appointment of railroad commissions, calling an election and otherwise vitalizing the project. Tentative arrangements agreed upon by both President Bullis, of the Southern Oregon Traction Company, and the city of Medford are as follows: Credit of the city to the extent of $250,000 will be loaned to the Southern Oregon Traction Company for the purpose of constructing the first unit of 15 miles, the company to build a second unit of equal distance and to build the first unit from city of Medford, absolving the city from any cost in building the line.

***Pendleton, Ore.**—Plans are being made to construct an electric railway from Pendleton, Ore., to Walla Walla, Wash., and from Cold Springs Landing through Pendleton to Bingham Springs. C. W. Lefler and E. W. McComas, Pendleton, are interested.

Portland & Oregon City Railway, Portland, Ore.—Plans have been filed with the City Council by Stephen Carver, president of the Portland & Oregon City Railway, showing the proposed extension of the line from Oregon City to Portland. The specifications call for 72-lb. rails on the extension. The line will be rushed to early completion.

Southern Pacific Company, Portland, Ore.—Work has been begun on the electrification of this company's West Side line from Whiteson to Corvallis. The cost is estimated at $800,000, not including the terminals at Corvallis.

Texas Traction Company, Dallas, Tex.—Plans have been completed by the Texas Traction Company for a park and modern swimming pool at Woodlake, a point half-way between Sherman and Dennison, Tex.

Ogden, Logan & Idaho Railway, Ogden, Utah.—To further decrease the running time of the Ogden, Logan & Idaho Railway trains between Ogden and Brigham City and Preston, this company has authorized the construction of 13 miles of new roadbed and track north of Hot Springs. The new track will approximately parallel the present line between Hot Springs and Brigham City, but the new roadbed will be more solid, will have a more even grade and heavier rails will be laid. With the completion of the new roadbed the present line will be used for trains making local stops, the through trains to use the new line, which will be west of the present tracks.

Seattle, Renton & Southern Railway, Seattle, Wash.—The City Council and Scott Calhoun and Joseph Parkin, receivers of the Seattle, Renton & Southern Railway, recently arrived at an agreement regarding the relocation of the company's tracks on Rainier Avenue, between Hanford and Edmunds Streets, where the city is filling the thoroughfare. Messrs. Calhoun and Parkin have agreed to relocate the track, paying the cost of the new rails that will be needed, and the city will pay the cost of filling at points where the new rails are to be placed. The railway company will deed the portion of the right-of-way to be abandoned to the city.

SHOPS AND BUILDINGS

Union Traction Company, Anderson, Ind.—This company has decided to install a filter plant at Broad Ripple Park.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—It is reported that this company is negotiating for the purchase of the creamery building and grounds on the south side of Main Street, near the east city limits of Peru, Ind., as a location for a new carhouse and freight house.

Boston (Mass.) Elevated Railway.—This company will build a tie-treating plant to be located at the general yards of the company at South Boston. The treating cylinder for this plant will be 7 ft. 6 in. in diameter by 51 ft. 2⅜ in. long, so that standard gage cars loaded with ties or lumber may be run into it. There will be two storage tanks for oil and a working pressure tank mounted on scales to record the amount of oil used in each treatment, also the necessary equipment for the operation of the plant. It is expected to have the plant completed about May 1.

Kansas City Railways, Kansas City, Mo.—The Kansas City Railways and the Kansas City Electric Light Company are disposing as rapidly as possible of the buildings and grounds which are no longer essential to operation, or which are now used jointly. There is a value of about $1,500,000 on the property to be sold. One piece is the five-story building at Fifteenth Street and Grand Avenue, where the general offices of both companies are located, the Walnut Street side of which was built only four years ago and houses a substation. The property at Twelfth and Charlotte Streets, until a few years ago used as cable power house and carhouse, is being remodeled for convenient leasing or sale, and the stack is being torn down. The light company has a charging station on this property, which probably will be continued there for a time at least. This property is 124 ft. x 400 ft.

Northern Ohio Traction & Light Company, Akron, Ohio.—It is reported that this company has decided to construct a six-story terminal building on North Main Street, plans for which were completed three years ago.

POWER HOUSES AND SUBSTATIONS

Havana Electric Railway, Light & Power Company, Havana, Cuba.—This company reports that it has placed an order with the Westinghouse Electric & Manufacturing Company for two substation equipments, each consisting of two 1000-kw. rotary converters with O.I.S.C. transformers and switchgear, 13,200 volts a.c. (550-575 volts d.c.), 60 cycles, six-phase, to be erected this year.

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company plans to install a 2500-kw. turbo-generator, 1000 hp. in boilers and a boiler feed pump.

Burlington Railway & Light Company, Burlington, Iowa.—Plans are being made by this company to construct a 45-mile transmission line to connect its plants in Des Moines and Louisa Counties with Burlington.

Interborough Rapid Transit Company, New York, N. Y.—This company plans to construct a new substation 60 ft. x 100 ft., one story high, on River Street, near 162d Street. The cost is estimated at $40,000. George Pegram, 165 Broadway, New York, chief engineer.

Rochester Railway & Light Company, Rochester, N. Y.—This company has awarded a contract to the Port Richmond Iron Works, Philadelphia, for two 16,000-hp. turbines of the vertical-shaft, single-rotary type, to operate under a head of 130 ft. at a speed of 180 r.p.m. These turbines will be controlled by I. P. Morris governors.

Manufactures and Supplies

ROLLING STOCK

Nashville (Tenn.) Traction Company during the recent large fire in Nashville lost three street cars.

Chattanooga (Tenn.) Traction Company has ordered from the Southern Car Company two large center entrance cars.

Omaha & Council Bluffs Street Railway, Omaha, Neb., has started work on the construction of twenty-five cars, for operation by next fall.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., has ordered from the Laconia Car Company two motor freight car bodies and trucks.

Arkansas Valley Interurban Railway, Wichita, Kan., owing to increased passenger traffic, will add several new passenger cars to its equipment.

Iowa Railway & Light Company, Cedar Rapids, Iowa, it is reported, will rebuild a trailer car into a combination passenger, baggage and smoking car.

Chicago & Milwaukee Electric Railroad, Highwood, Ill., has ordered from the Jewett Car Company fifteen all-steel passenger cars, 56 ft. ¾ in. over all.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., has ordered four single-truck center entrance cars from the Southern Car Company.

Scranton (Pa.) Railway, noted in the ELECTRIC RAILWAY JOURNAL of April 1 as expecting to purchase new cars, has ordered ten car bodies from the Southern Car Company.

Altoona & Logan Valley Electric Railway, noted in the ELECTRIC RAILWAY JOURNAL as expecting to purchase five new cars has placed this order with The J. G. Brill Company.

Cleveland, Alliance & Mahoning Valley Railway, Alliance, Ohio, has ordered two center-entrance steel interurban car bodies, 55 ft. over all, from the Jewett Car Company.

Reading Transit & Light Company, Reading, Pa., is renovating a large number of its cars. Forty-one open cars are being supplied with curtains by the Curtain Supply Company.

People's Railway, Dayton, Ohio, reported in last week's issue as being in the market for five new cars, has purchased five cars from The J. G. Brill Company. The order was placed through the American Railways Company, Philadelphia, Pa.

Binghamton (N. Y.) Railway, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1916, as expecting to purchase sixteen new cars, has ordered this equipment from the Cincinnati Car Company, through the W. R. Kerschner Company, New York.

Stark Electric Railroad, Alliance, Ohio, mentioned in the last issue as having ordered three all-steel, center-entrance cars for city service, has placed this order with the Jewett Car Company. The cars will be 42 ft. 6 in. over all. In addition this railway company has ordered from the same car builder two center-entrance steel passenger car bodies, 55 ft. over all.

Northern Ohio Traction & Light Company, Akron, Ohio, which was mentioned in the ELECTRIC RAILWAY JOURNAL of Jan. 22 and March 25 as having recently ordered new cars, now has forty new cars on order. The original order was for ten interurban and fifteen city cars. The new contract calls for fifteen interurban and twenty-five city cars. The new equipment will be divided between Akron and Canton.

TRADE NOTES

Stone & Webster, Boston, Mass., have removed their New York offices from 5 Nassau Street to the Equitable Building, 120 Broadway.

H. N. Bartlett and **John F. Yates** have resigned from the Mitchell-Rand Manufacturing Company, to become president and secretary respectively of the Bartlett-Yates Insulation Company, Inc., 64-66 Murray Street, New York.

Holden & White, Chicago, Ill., have taken over the general sales agency of the Joliet Railway Supply Company, Joliet, Ill., manufacturer of Hartman self-centering center-bearing plates and Perry anti-friction side bearings.

James F. MacMurray, for many years general manager of the Plainfield plant of the Niles-Bement-Pond Tool Company, has resigned from that company and is now connected with the International Arms & Fuse Company, Bloomfield, N. J.

A. D. Fishel, former manager of the distributing transformer section of the supply department of the Westinghouse Electric & Manufacturing Company, has been appointed commercial manager of the Adams Bagnall Electric Company, Cleveland.

Otis & Company, Cleveland, Ohio, has appointed Cyrus S. Eaton as a member of its banking firm. Mr. Eaton is president of the Continental Gas & Electric Corporation and is a director of a large number of utility companies in the United States and Canada.

James W. Moore is now at the head of the Moore Engineering Company, Birmingham, Ala. Mr. Moore was recently connected with the United Gas & Electric Engineering Corporation, and previous to that time with the Birmingham Railway, Light & Power Company, Birmingham, Ala. The firm does engineering work and sells electrical equipment.

Edison Storage Battery Company, Orange, N. J., on March 13-17 held the annual sales meeting of its salesmen and branch office managers at the factory and main office, Orange, N. J. The reports of the various salesmen showed a healthy condition throughout the industry and marked important developments made by the Edison storage battery, particularly in railway train lighting, railway signaling, electric commercial vehicles, electric industrial trucks, electric baggage trucks, electric safety mine lamps, storage battery gathering locomotives, etc.

ADVERTISING LITERATURE

Hazard Manufacturing Company, New York, N. Y., has issued a catalog describing the construction, electrical advantages, insulation resistance and service efficiency of its Keystone railroad signal wire.

NEW PUBLICATION

Holders of Railroad Bonds and Notes: Their Rights and Remedies.—By Louis Heft of the New York Bar. Published by E. P. Dutton & Company, New York, N. Y. 419 pages. Cloth, $2 net.

This is another excellent addition to the increasing number of books on corporation finance. While the book naturally deals with the rights and equities of the holders of railroad securities, it outlines railroad financing in its various phases and analyzes sixty-two different forms of such securities. The fact that the author is a lawyer should not militate against the reading or possession of the book by railway operating officials. For a volume of the kind it is unusually free from legal jargon. The author discusses the rights of security holders of all kinds in consolidations, mergers, receiverships, foreclosures and reorganizations, as well as the rights of such holders against issuing corporations, trustees of mortgages, reorganization committees, etc.

An anonymous communication has been received from a subscriber questioning a statement in the ELECTRIC RAILWAY JOURNAL of March 25, page 622, that the recent order of the Bay State Street Railway for 200 cars was the largest surface car order of this year. Our correspondent contended that the Pittsburgh Railways had ordered 265 cars and that the Cleveland Railway and the Detroit United Railway had also placed large car orders and therefore should also have been included in the list of large orders. In regard to Pittsburgh, we believe that our correspondent's figure includes a large number of cars which were ordered toward the end of 1915, and reported in our statistical issue for Jan. 1, 1916, as 150 motor and fifty trailer city cars and fifteen interurban cars. Similarly, large car orders were placed by the Cleveland Railway and the Detroit United Railway toward the end of last year, although reports show that the Detroit United Railway has also ordered since Jan. 1 fifty trailer and twenty-four interurban cars.

Electric Railway Journal

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NEXT CONVENTION AT ATLANTIC CITY

As this paper is going to press the announcement is made that Atlantic City has been chosen for the 1916 convention of the American Electric Railway Association, which will be held Oct. 9 to 13 inclusive. Important information regarding the convention will be found in the Association News pages.

CUTTING THE GORDIAN KNOT

A novel solution of the Toledo low-fare question is contained in the decision by Judge Killits rendered April 10 in the Federal Court for the Northern District of Ohio, Western Division. It is based on the theory that after a franchise expires the obligations of the company to the city as regards rates of fare disappear just as do the rights of the company to use the streets. Thus released, it can raise its fares, if it wishes to do so, from 3 cents to 5 cents, as it now has been authorized to do in Toledo, and the only remedy which the city has is to order the cars off the streets. This, of course, if it desires, it has a perfect right to do. The decision has been reported only in the daily papers, but as we understand it, it is briefly as follows: Where a contract between two parties has terminated, the question is again thrown open to mutual agreement, but until agreement is reached the rights of each party are simply the primitive ones, in this case the voluntary establishment of rates on the one hand and eviction on the other. Of course the present arrangement is purely temporary, and it is possible it will be attacked by the city. It emphasizes, however, the anomalous situation in Toledo in which a company with a large fixed investment is dependent upon the whim of an outside party for his possession of this property. Broadly speaking, neither side can allow this condition to continue, least of all the city, and it is disgraceful that the city has allowed the question to drag so long.

ONE COMPANY SECTION PER MONTH

For the fourth time in four months the ELECTRIC RAILWAY JOURNAL had, last week, the pleasant duty of chronicling the formation of an American Association company section. If this rate could be maintained, it would be merely a matter of arithmetic to estimate the growth of the movement. Section No. 10 was formed almost exactly four years from the inauguration of No. 1. The year 1912 saw three sections founded, 1913 none, 1914 two, 1915 two and 1916, to date, three. All of the sections are doing good work and, as far as we can judge, there has been no lapse of interest. In commenting upon the formation of company section No. 9, attention was directed to the fact that the membership was more than one per mile of track. The section formed in Hampton, Va., a few days ago started even better, for by the same method of rating there are 1.3 members per mile of track. This may not be an entirely fair basis of comparison, for it is proportionately easier to rally the employees of a small company than those of a large one. However, a mile of track is a natural electric railway unit, and it is a very tangible one. The average number of employees per mile of track throughout the country is seven, and the total trackage is about 47,000 miles. These facts indicate that there is a big field for individual membership, and that if the Hampton rate was applied all over the country there would be 61,000 members, a figure almost staggering in its magnitude. It is less staggering, however, if one judges the future by the present rate of growth.

THE BROOKLYN ARTICULATED CAR

Two seemingly opposite tendencies are to be observed to-day in rolling stock practice. At one end we have the movement toward the small one-man car, and on the other hand there is a tendency toward train operation. In each case, however, the object is the same, namely, to give more service at a lower platform expense. The Brooklyn articulated car described in last week's issue is an example of the latter tendency, for an articulated car is really a train although made up as a permanent operating unit. While the article points out clearly enough that the number of uneconomical single-truck cars in Brooklyn is very small for so large a system, the experiment will be worth all it costs for what the company will gain from it in studies of passenger handling and fare collection. In any event the electric railway industry at large will have reason to be grateful to Brooklyn, for these studies will offer a fine starting point for others. It would be unfair to the articulated car to assume that it must be accompanied by so thoroughgoing a reconstruction and modernization as has been carried out with the Brooklyn unit. The example of Boston shows clearly enough that single-truck cars can be paired in this fashion at a cost far below that of a new car of fairly equal capacity. The management of the Brooklyn system, however, for reasons of general study equipped them exactly as if they were entirely new cars. Therefore, those who wish to look into the articulated car on its merits should judge it only on what it does as an operating unit and then decide whether they need place on their cars the additional devices applied in Brooklyn.

SHOP EQUIPMENT FOR SMALL ROADS

In an inquiry addressed to this journal information has been requested regarding the best layout and shop equipment for an electric railway having twelve passenger cars. There is thus brought up the problem of the size of shop wherein machine tools can be economically installed, because it is more or less obvious that a road having twelve cars can hardly afford to install very much in the way of machinery. It is conceivable that the situation might be such that machine work could be done only by sending it to an outside shop in a distant city under conditions that would involve extraordinarily high charges, but in general the overhead expense involved in the installation of almost any machine tool under the circumstances in question would involve a burden all out of proportion to the cost of work that it would do in the course of a year. This would make its purchase undesirable on economic grounds.

As an example, there might be considered the individual case of a wheel press, provided the cars were equipped with cast-iron wheels. Even assuming that each wheel had a life of, say, two years, thus involving the pressing on and off of four wheels per car per year, the wheel press would be used only forty-eight times during the course of a twelvemonth, or in round numbers for, say, fifty operations.

The wheel press might be purchased for about $1,000, and regardless of the number of operations that were accomplished with it during any period of time, this investment would involve interest at the rate of 6 per cent, and depreciation, obsolescence and repairs at a rate of, say, 8 per cent more, giving a total annual overhead charge of 14 per cent on $1,000, or $140 per year. The labor charge for each operation might be assumed, for the sake of illustration, to cost only 20 cents, and this would involve $10 per year in addition to the overhead charges. This makes a total of $150 for the fifty operations, amounting to $3 per wheel.

It is hardly conceivable that the charge for removal and application of wheels in an outside shop equipped with a press that might be adapted to wheel work could be more than $2, including handling costs. The purchase of a wheel press, therefore, would involve the payment of a premium of $1 per wheel merely for the sake of having the press in the shop. Of course this latter factor has a certain indeterminable value. When work is sent out to be done, there is always involved a delay which may perhaps be costly, and there is always an uncertainty as to just when the completed work will be returned. It is hardly likely, however, that any small road would wish to saddle itself with an annual charge amounting at least to $50, but probably a great deal more, merely to protect itself against the possibility of trouble or expense from this cause as it would in the case under consideration.

The same course of reasoning applies in the case of the engine lathe, shaper and drill press that go to make up what might be called an elementary equipment of tools for machine work, the possibility for the use of each machine being dependent simply on the relation between its first cost and the number of operations performed upon it during the course of a year. In the case of the drill press, perhaps, the low first cost and the great variety of small jobs that can be done upon it make the tool susceptible of use under almost any conditions. A plain upright machine costing $200, for example, might easily be used on an average once each day during the year, and this would involve a burden on each operation of only 8 cents. Without the drill press many of these operations would doubtless have to be done by hand or patched up hurriedly in some way owing to lack of time to send the work out to some near-by machine shop, and this might well involve costs that would make the small burden negligible.

However, the drill press represents an extreme in the list of tools that can be used for a great many small jobs. At the same time, when it is of the plain, upright type, the expense involved in its installation is very small, so that the fixed charges thus involved are not worth a great deal of discussion on economic grounds. But where the larger tools are concerned, and especially where these tools have a restricted use, the small railways might well hesitate before making an installation even though the charges imposed for outside work might appear at first glance to be high.

EARNINGS ARE PICKING UP

An article in our financial column this week shows that sixty-two representative electric railways with $281,000,000 of receipts in 1915 suffered a loss of 1.02 per cent in gross and 0.62 per cent in net as compared with the 1914 results. These figures are better than was estimated would be the case toward the end of last year, but it should be remembered that while the aggregate gross for the companies reporting is about one-half that for all the companies in the country, a number of important districts are missing, because of the large number of companies that do not publish both annual and monthly reports. In fact, the returns are the least plentiful where the reported reductions in the receipts are the greatest, *i.e.,* in the Far West. Could all operating railways have been considered, the decreases would probably have been greater, for the small companies must have suffered more severely than the large ones. In spite of these facts our figures are of value as indicating that at least sixty-two of the most representative companies, owing to improving business in the later months, suffered a less decline in earnings for the year than was anticipated. Furthermore, they indicate that the poor results were not spread over the whole country, for in general the Eastern and Central groups showed gains and only the Southern and Western groups losses.

Some encouragement, therefore, may be found from the year's figures, but even greater encouragement will come from the figures for January, 1916, as compared with January, 1915. These indicate an increase of 8.08 per cent in gross and 14.17 in net, improvements being noticeable for all sections and for almost all companies.

The year 1916 will not in all probability keep up to these figures, for January, 1915, constitutes an abnormally low basis of comparison in determining the percentage increases. Moreover, as regards net earnings, we do not imagine that electric railways are yet fully experiencing the cumulative effect of the present rising cost of materials and labor on account of stored-up materials and wage agreements. If these restrictions are kept in mind, however, we believe it can safely be said that electric railways are beginning to share in the general prosperity resulting from increasing industrial activity and are in a position to show a substantial improvement over 1915.

WAGE INCREASES AND RATES

Two labor questions of nation-wide importance are now awaiting settlement, one relating to the wages of coal miners, the other in regard to the increase of wages asked by a considerable number of steam railroad trainmen. In many respects the two problems are the same. In both, an advance in wages is sought, although the last change in each case was an advance. In both, each side seems well organized. In both, the industry involved is one supplying a necessity, and while it is possible to store coal but not transportation, a serious interruption in either supply would be a national calamity. In both, practically all sections of the country are threatened. With these several points of similarity there is one essential difference. The general assumption in the coal case seems to be that if the employees win their demands for higher wages the employers will pass on the increase in the cost of producing the coal to the public. Indirectly, the public will have to pay the higher wages if they are granted. But with the railroads no such automatic transfer of the burden can be made.

The trouble with the steam railroads is similar to that which the electric railways have to face. The rate-making authority does not necessarily have to take into consideration any increase in the cost of production of the service which the railways have to sell—namely, transportation. The cost of production may continue to go up, as indeed it has done, on both steam and electric lines, higher taxes may be assessed, the cost of capital may go up, but there is no assurance that permission for an increase in rates will follow. Indeed, with the electric lines all of these things have taken place, but as yet there has been no general increase in fares.

We have said before, and we repeat, that regulation should include some system by which rates will be raised promptly with increases in the cost of producing service, just as it should act promptly to reduce rates when profits are excessive. The action need not be automatic. It is better that changes in rates should be made only after a careful study of all the attendant circumstances, and commercially it is desirable that rates should have a certain degree of stability, whereas expenses are bound to vary from year to year and from month to month. But a certain degree of stability does not mean permanency of either a very low or a very high rate when expenses have shown a constant tendency in the opposite direction for a period of years. Under such a condition regulation which does not act might be better termed strangulation.

WHAT KIND OF EDUCATION DO OUR BOYS NEED?

Every reader of this paper who has a son to educate, or who employs young men, or who has a fatherly interest in the young fellows of his acquaintance, will get some food for thought from the article by Prof. A. M. Wilson which appears in this issue. Dean Herman Schneider of the University of Cincinnati has for many years been the champion of the justly so-called "co-operative" plan of education. The fundamental principle of this is that students should work at the same time that they study, alternating the periods of work and study at more or less frequent intervals, say of one or two weeks or more. This blends the atmosphere of shop and classroom and permits the student to earn money systematically.

Many individual students have been carrying out the co-operative principle for themselves from force of necessity. It remained, however, for the University of Cincinnati to work out a feasible scheme for bringing the shops and the school together in the educational scheme. Fortunately the university in this case is located in an industrial center where there is plenty of work to be had in normal times. The task of the teachers was so to plan their curriculum that it would permit the young men to work in the industries continuously enough to make their work worth while. The result was a program which permitted two men alternately to work on the same job so that the work went on like Tennyson's brook, although men came and went.

Naturally, as producing transportation is one of the leading industries in Cincinnati, the Cincinnati Traction Company was asked to lend its aid in furnishing employment to the co-operative students, which it did. In view of this fact, the editors invited Professor Wilson, who is in charge of the electrical engineering department at the university, to tell what he has been trying to do and how he has been trying to do it. This he has done frankly and clearly. It is true that few communities are situated exactly as is Cincinnati, and it is doubtful if exactly the same plan can be followed elsewhere, except in a few places. The general principle holds, however, and if the railway people and the instructors in many communities will get together much can be accomplished.

The electric railways need properly-trained young men to become the foremen, superintendents and managers of the future. It is not too much to expect them to assist in training these young men either while they are in school or thereafter, or both. The professional teachers and the students must take the initiative in the matter, but some encouragement from the railway managements would be of great help and inspiration to them.

Co-operative Education in Electric Railway Work

The Cincinnati Traction Company Has Been Co-operating with the University of Cincinnati for Several Years in the Educational Plan Developed by the Latter—The Instructor in Charge of this Work Explains the Plan and Summarizes the Results

By A. M. WILSON
Professor of Electrical Engineering University of Cincinnati

FOR the benefit of those who may have the patience to read what follows, but who have not had time or opportunity to follow educational developments closely, it should be stated that there are many careful students of the problems involved who have expressed dissatisfaction with the results obtained from our efforts and expenditures in education. This criticism has been applied with peculiar force to technical and professional education, probably because results can be more directly observed and estimated. A perusal of the proceedings of the Society for the Promotion of Engineering Education and of the reports of some of the investigations of the Carnegie Foundation, and similar organizations will at least indicate, beyond doubt, not only that we have not reached perfection in our educational practice but that some of our educational principles could be modified to good advantage.

The gist of the criticism of the product of our technical schools from the point of view of railway executives is, first, that technical graduates cannot apply their training in such a manner as to get economical results; second, that their training does not seem to be of such a character as to develop or increase ability to handle men, and third, that because they have already enjoyed the advantage of a technical training they seem to feel that they are entitled to still further advantages without being required to give the degree of service demanded of those who have not had a technical education. As might be expected, the expressions of many technical graduates engaged in railway work, indicate that the situation is not satisfactory from their point of view. The foregoing is a rough outline of the situation. A complete discussion would take more time than most men have available for such a subject.

There seems to be only one way of meeting this situation, that is, by requiring technical men who wish to follow railway work to become familiar with railway conditions while they are receiving their theoretical training. Such a method of training would eliminate any possibility of the technical graduate having erroneous notions regarding his value, and would give him the ability and qualities required for success, if it is possible for him to acquire them. This is the function of what is called the "co-operative" principle, as applied to this particular phase of education. A statement of what has been accomplished up to the present time will probably be the most effective method of indicating the possibilities of this relatively new departure in education.

CO-OPERATIVE WORK WITH THE CINCINNATI TRACTION COMPANY

The college of engineering of the University of Cincinnati has been co-operating with the Cincinnati Traction Company for three years. There are two students for each job. They alternate between the university and the job. One man goes to the university for two weeks while the other works for the Cincinnati Traction Company. At the end of each two-week period the first man takes up practical work and the other attends the University.

There are four essential factors which affect the successful operation of a co-operative course in electric railway engineering. These are (1) the general business situation; (2) the personal qualities of the students; (3) the personal qualities of the workmen, foremen and superior officers with whom the students come in contact, and (4) the manner in which the university keeps in touch with the students and their foremen or superintendents.

It must be borne in mind that the industrial situation has been far from ideal during the larger part of the past three years, and that electric railways have had to bear their share of the burden. Under normal business conditions many electric railway executives would be glad to entertain propositions which they would not feel justified in considering during the past three years. But in spite of these conditions, during the past year there have been about thirty-five of our students in work more or less directly connected with electric railway operation.

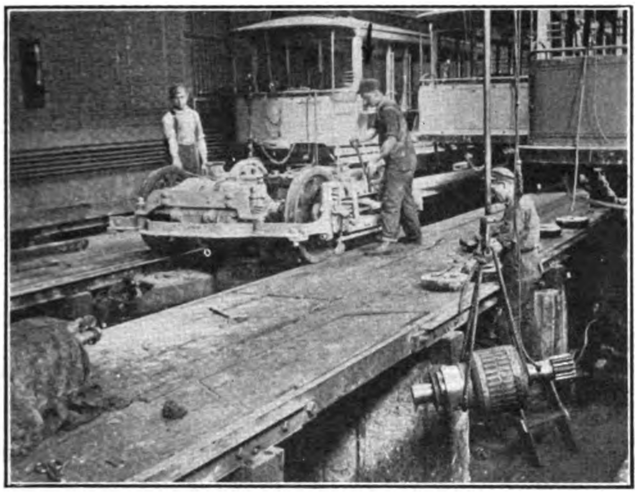
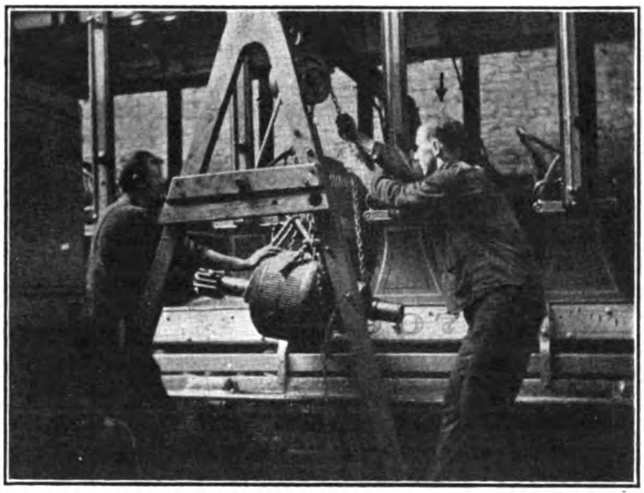
The effect of the personal qualities of the student is felt almost immediately in co-operative work. We have found several cases in which students, who would have been very successful in the ordinary technical courses, have shown a sort of genius for creating situations which were rather difficult to handle. It is remarkable how bad an impression can be created by a youngster whose intentions are really good but whose experience and tact are negligible quantities. He will linger in the memory of a workman long after the good qualities of a dozen subsequent satisfactory students have been forgotten. Fortunately, the work of the co-operative students as a body is judged by men of wide experience and mature judgment, in nearly every case. Besides, good men produce their good effects, just as the poor men their bad effects. The results so far attained have been quite satisfactory.

STUDENTS IN THE CARHOUSE

Regarding the workmen, foremen and higher officials, our experience so far has been that they have, as a rule, been very reasonable and fair. Many of the workmen and foremen realize that this application of the co-operative principle puts within reach of their children opportunities which they themselves were denied. The superintendent of carhouses, Mr. Frazier, has entered into the spirit of our problem, and has contributed many valuable suggestions to help us meet the practical difficulties which have arisen from time to time. It cannot be said that the co-operative students engaged in carhouse work have made any marked contribution to the general efficiency of such work, to justify the interest shown by Mr. Frazier and some of his foremen.

The co-operative principle has seemed so logical to them that they have been interested in watching the results of its application. In the repair shops of the Traction Company Howard Elliott, the master mechanic, and his foremen, have given many valuable suggestions regarding the characteristics of the students. The students in the repair shops have probably exerted an appreciable influence upon the general shop atmosphere, but it would not be safe to make any extensive claims on the basis of the results achieved up to the present time.

Only students of sufficient physical strength to do the work satisfactorily are assigned to carhouse work. They are assigned to night work during the first year, and the grade of work they do is determined entirely by the ability they demonstrate. Usually they are assigned to controller inspection and repairs at first, and later to brake and truck inspection and to car distribution, as they become more familiar with the details of the carhouse in which they are employed. In order to relieve the foreman of as much annoyance as possible, whenever any change is made, the incoming man is required to work with the outgoing man for a couple of nights, or as long as may be necessary to familiarize the new man with the local conditions.



CO-OPERATIVE EDUCATION IN ELECTRIC RAILWAY WORK—STUDENTS OF THE UNIVERSITY OF CINCINNATI AT WORK IN LOCAL CARHOUSES

At the end of the first year, or as soon thereafter as is feasible, the men who have been on the night shift are changed to the day shift. The change is in the nature of a promotion, as the work is different and somewhat pleasanter. Sometimes these changes are not made as promptly as would be the case if it were possible to ignore the practical details for which the foremen are responsible. But students with the proper spirit to make successful men always find that the time devoted to night work is by no means long enough to enable them to master all its details.

The problem of the best way to handle the men who have finished two years of carhouse work has not been solved. A year ago, when the first set of men had finished two years of work, the writer took up the question of establishing a systematic scheme of training, to cover the five years of the course. Several suggestions were made, but the subject was not of sufficient interest to the company to permit of any of these suggestions being given a trial. Some of the discussions of these suggestions would, no doubt, have been of interest to many educators who have not been brought into immediate personal contact with the problems which confront men responsible for practical results day after day. The old difficulties, which have made the field of railway engineering so unattractive to technical graduates in the past, were immediately confronted. But in this case, the men involved had not completed four years of a technical course, and then spent so much time in railway work that they had a feeling of failure in the thought of leaving it. Some of the men took up power plant work. Some took up design work, in which their carhouse experience has been of direct value. One found carhouse work so attractive that he decided to try to reach success by continuing along that line. Not one of them felt that his two years of carhouse work was in any degree a loss of time or effort. Some of those who are now completing the second year of carhouse work have not definitely decided to make any change, because of the valuable experience they feel they are getting.

STUDENTS IN THE SHOPS

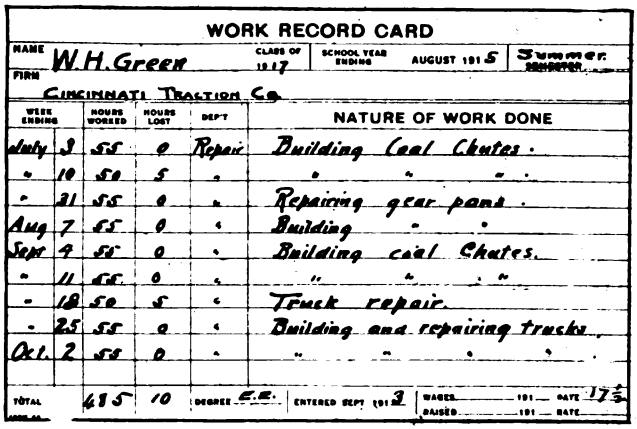
Many students do their co-operative work at the repair shops of the Cincinnati Traction Company. Here there is the usual opportunity for experience of the repair shop character. During the first year the students are expected to adjust themselves to general shop conditions. Those who have natural ability soon have opportunity to exercise it. Those who have no marked ability in shop work are put at work they can do. All have the same opportunity to observe the general conditions under which work of this character is done.

At the end of the second year the question of what to do next is not so important as in the case of those who have done carhouse work. Those who desire to continue the work may remain in the repair shops, in jobs suited to their capacities. Those who feel that railway work is not attractive are given other opportunities. There is always room for men of ability; and in two years it is easily possible to determine the limitations of an individual, especially when his mental capacity is under observation, as well as his usefulness in practical work.

During the first year each student is visited a number of times while at work. If a student becomes restive under the monotony of shop conditions, or develops an attitude which is not entirely satisfactory, it is frequently possible to get him to change his viewpoint by discussing the situation with him. Our experience seems to indicate that it is not a matter of great importance what a student does during the first year. If he has the right spirit, with fair ability, he is almost invariably advanced. If he is not advanced, sooner or later he will have opportunities along other lines. If a student has not the necessary qualities for success in engineering work, it would be impossible for us to locate him in a position satisfactory to him, to us and to the company. But in this case he is in a position to determine whether it is wise to continue in engineering work.

COMPARING NOTES ON PRACTICAL EXPERIENCE

During the second year the co-operative students in electrical engineering meet twice a week in what is called a class in co-ordination. Each student is called upon to tell the others about something which he has seen or has done. No reference to what he has read is permitted, except as it may have direct bearing on what he has done or seen. Students engaged in carhouse work have given talks on the methods or arranging the cars in the carhouses, and getting them out, with the least possible confusion, to suit the operating schedule. Some of the standard trucks used by the Cincinnati Traction Company have been discussed and compared. Brakes and brake rigging have been discussed several times. In all these discussions the men are required to have their sketches ready in advance. Sketches, catalog illustrations, cuts from magazine articles, any illustrations which may serve to make the discussion clear, are urgently requested. Special emphasis is placed upon the use of these aids in presenting ideas to others. In this way each student has several opportunities during the year to know something of what the others are doing; and the exercise of telling about his work is usually of great value to the teller at least. Of the hour assigned to the subject, about thirty minutes are devoted to presentation, and the remainder to discussion.



WORK RECORD CARD

NAME W.H. Green CLASS OF 1917 SCHOOL YEAR ENDING AUGUST 1915 Summer SEMESTER

FIRM Cincinnati Traction Co.

WEEK ENDING		HOURS WORKED	HOURS LOST	DEP'T	NATURE OF WORK DONE
July	3	55	0	Repair	Building Coal Chutes.
"	10	50	5	"	" " "
"	31	55	0	"	Repairing gear pans.
Aug	7	55	0	"	Building " "
Sept	4	55	0	"	Building coal Chutes.
"	11	55	0	"	" " "
"	18	50	5	"	Truck repair.
"	25	55	0	"	Building and repairing trucks.
Oct.	2	55	0	"	" " " "
TOTAL		485	10	DEGREE E.E.	ENTERED SEPT 1913 WAGES ____ 191__ RATE 17½ RAISED ____ 191__ RATE ____

CO-OPERATIVE EDUCATION IN ELECTRIC RAILWAY WORK—CARD RECORD OF STUDENT'S WORK

At first it was our intention to try to arrange the curriculum so that it would fit in closely with the practical experience of the students. But we find that this is not possible, nor is it desirable, except in co-ordination classes. While specialization is a good thing, the student probably gets enough of that in his practical experience. In the curriculum, work of a broad, fundamental character is given, and the student can make any sort of special application.

It should be constantly kept in mind that no amount of detailed instruction can change an inherently mediocre man into one of high caliber. In many cases, too much detailed instruction would be irritating and irksome. After the fundamental principles are thoroughly grasped by the student, it is probably best for him to leave the development of the majority of the practical details to his own initiative and observation. We have had several very successful graduates who, on account of peculiar circumstances, could not be given very close observation during their shop periods; though as a rule, students who desire special assistance or instruction regarding any particular phase of their work can readily obtain it.

WHAT HAS BEEN ACCOMPLISHED

The results of three years of experience in co-operative training in electric railway engineering have been encouraging, all things considered. Most of the difficulties have been those introduced by students who could not appreciate how serious is the problem of making a living. But the principle underlying the co-operative course, as applied at the University of Cincinnati, cannot be controverted by anyone who considers the problems of education carefully.

Several of the co-operative students working for the Cincinnati Traction Company are sons of relatively poor workmen. Their parents are ambitious for them, and they have justified the effort expended to put them through high school. Since they have entered the co-operative course they have earned enough, by working for the Traction company, to pay all their university fees, buy all their books and clothes, bear all the incidental expenses, such as athletic tickets, entertainments, etc., and contribute somewhat towards their own support. Of course, living at home as they do, this burden is not heavy, and will become lighter as they progress towards graduation, instead of heavier. Students whose parents do not live in Cincinnati cannot enjoy this financial advantage to the same degree; but the educational advantage is still beyond question even if we could eliminate financial considerations entirely. We cannot do this, however. For instance, it would be ideal, from the average student's standpoint, if, when he had mastered one practical shop operation, he could be shifted to another. But since it is necessary for him to be a business proposition to his employer, he must remain at any given job long enough to be profitable. It would be ideal from the educational viewpoint, if, when a student has gone as far as desirable in one line of work, he could be changed to another regardless of the rate of wages paid. But frequently the student's financial condition will not allow him to make such a change. It is better that these conditions should be realized by the student, while he is going through the training process. They are continually being met after graduation. Every one has to contend with them more or less. Many of the disappointments of technical graduates have been due to the fact that they were removed from these difficulties and embarrassments too completely for four years.

A POSSIBLE FIVE-YEAR ELECTRIC RAILWAY COURSE

When it was suggested to arrange a five-year course in electric railway work, the attitude taken by a number of officials was this: "Most of us have established our positions without even the aid of a technical education such as your students get. We had to fight our way up without the assistance of any special courses arranged for our benefit. It seems to us that these young fellows have advantages now that we did not have, in being able to work while under careful supervision, and in connection with a technical engineering course. We are quite willing to co-operate with you to a reasonable extent. We will promote those of your students who seem to us to justify promotion, but if a young man who is not receiving a technical education looks better to us, we will certainly give him the preference. Your scheme looks good enough to justify trying it, but our business is to get economical results. We have to have men, anyway, so we might as well hire your students. It is reasonable to suppose that the extra trouble, of taking care of two men for one job, will be offset by the fact that a larger percentage of your students will be satisfactory than of the boys we would pick from the usual applicants for jobs."

Needless to say, such an attitude is absolutely fair and offers a basis for co-operative education from which only good results can be obtained in the long run. No young man coming in contact with electric railway work under such conditions can fail to get some good out of it, even if he does not pursue the course to the end.

In our suggestion that a systematic course be adopted, running through the five years of the school period, we were in absolute accord with the principles outlined by the railway officials. Our thought was that, at the end of two years, it would be easily possible to pick out those who had shown capacity for greater development. It would be a good business proposition for the company to have a number of these men coming through their organization in different capacities. When they came to graduation, if there was a vacancy, the company would have men available to choose from, who would be familiar with their methods. If there was no vacancy, they would have had a good training and would be in a position to do useful work somewhere; and there would always be other students coming along behind them, receiving the same training, and ready to step into their places. In this way the element of healthy competition would always be present and would tend to promote efficiency.

Broader Aspects of Co-operative Education

No mention has been made, so far, of the enriching and strengthening effect of education upon even a mediocre man. But this influence is one of the good reasons why it is not necessary to strain so very hard to tie the theory and practice more closely together than has been indicated. Very often the graduate from the ordinary four-year technical course starts out with high ambition to make a place in the world; but loses much of the finer influences of his college career, through failure to appreciate some of the things that are first brought to the attention of the co-operative student. In the application of the co-operative principle presented here, these ambitions would always be tempered by cold, hard facts.

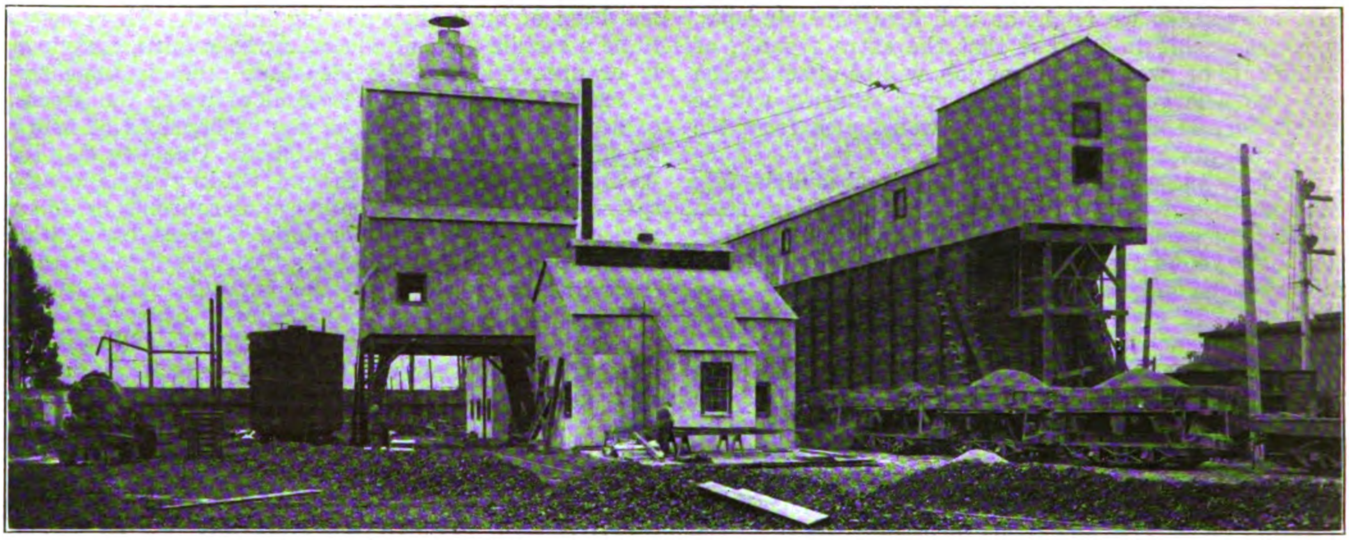
There does not seem to be any particular point of distinction between co-operative education in electric railway engineering and co-operative education in other phases of engineering. There is certainly no difference in principle. The problem of arranging for an entirely satisfactory progressive development for the student is affected by the conditions peculiar to railway work. These conditions soon become apparent to a student who has any power of observation; and he can determine, with prosaic facts before him, whether to continue or not. Of course, in considering these conditions the student has the viewpoints and counsel of his instructors. His fellow students in other lines of work give him information regarding the general characteristics of their jobs. His visits to the various shops and factories, which are part of the prescribed coordination courses, serve to broaden his outlook upon the entire field of engineering activity, and enable him to appreciate the relative advantages and disadvantages of the work in which he is engaged. It seems difficult to imagine a young man considering the field of electric railway engineering from a saner or more effective viewpoint.

There is one feature of co-operative education which has been of more than passing interest. There seems to be a certain type of educator who retains, consciously or unconsciously, the idea that there is some sort of method in education by means of which the process of acquiring a trained mind can be deprived of nearly all effort on the part of the student. One gets this impression from listening to and reading some of the speeches and articles encountered at conventions where educators congregate. Certainly a great many high school graduates seem to have been put through some such process, judging by the results. Many of the young men who enter the co-operative courses have in mind more what a co-operative course should give to them than what they will have to give to it. It cannot be too strongly emphasized, that it is impossible to get more out of a co-operative course than is put into it. This is true of any other course. Those who are in the work feel sure that the co-operative principle tends toward higher efficiency. But efficiency in education is a very difficult thing to determine; that is, the relative efficiency of a co-operative course in engineering, as compared with common practice in engineering education, although cost data, so far, indicate that the co-operative principle has some advantages. But so far as the student is concerned, even after making all possible allowances for difference in efficiency, it cannot be too strongly emphasized that the increased opportunity to come into direct contact with practical affairs calls for increased effort on his part, to make the most of the opportunity.

Ventilation for New York Subways

The Public Service Commission for the First District of New York has received a report from the board of consulting engineers appointed last summer to investigate the method of ventilating the new subways and to determine whether any improvement over the sidewalk grating method could be made. The report approves the system of natural ventilation used by the engineers of the commission, namely, providing for the ingress of fresh air from stations and other openings, the piston action of the trains in forcing out vitiated air and the escape of such vitiated air through ventilating gratings either in the sidewalks above the subway or through openings in the walls of the structure. An improvement could be made, the report points out, by introducing an expensive system of refrigeration, but it is estimated that the cost of such a system would be prohibitive. The report is signed by William Barclay Parsons, S. L. F. Deyo, L. B. Stillwell and J. Vipond Davies, the four consulting engineers appointed by the commission. Mr. Parsons was the chief engineer of the Rapid Transit Commission, and planned the construction of the first subway. He and Mr. Deyo are consulting engineers for the Interborough Rapid Transit Company, while Mr. Stillwell and Mr. Davies are consulting engineers for the Brooklyn Rapid Transit Company.

The electrification of a new tunnel, known as the Otira Tunnel, about midway in the length of the Southern Alps in South Island, New Zealand, is being considered. Suitable energy could be supplied by the construction of hydroelectric plants in the near-by vicinity. A large and comprehensive scheme is also under consideration for the supply of electrical energy in the North Island of New Zealand, with a view toward utilizing part of this energy for railway electrification and for promoting a system of light railways throughout the country districts now suffering from lack of communication.



S. F.-O. T. RYS. PAVING PLANT—LEFT TO RIGHT, MIXER TOWER (BOILER HOUSE IN REAR), DUST HOUSE, STORAGE BINS AND TOWER

Concrete and Asphalt Mixing Plant Saves Its Cost in One Year

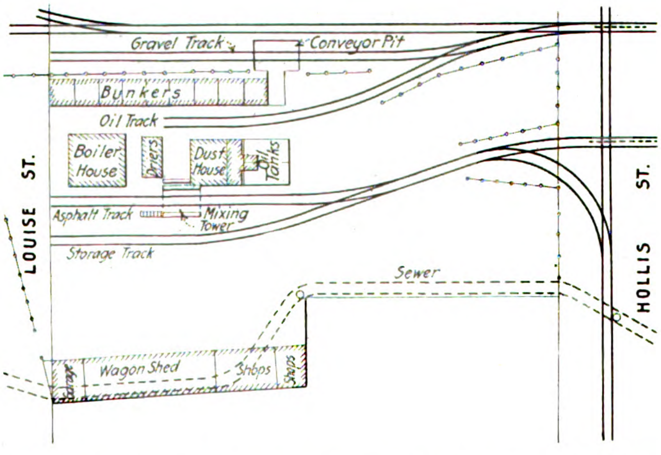
By the Installation of a Complete Equipment for Laying and Repairing Macadam and Asphalt Paving and for Mixing and Placing Concrete, the San Francisco-Oakland Terminal Railways Have Achieved Remarkable Economies

By GEORGE H. BINKLEY

Formerly Chief Engineer Maintenance of Way and Structures Department, San Francisco-Oakland Terminal Railways

THE San Francisco-Oakland Terminal Railways operate a system of tracks in nine municipalities and two counties on the east side of San Francisco Bay. The total length of single and double track amounts to 258 miles, single-track measurement, some of which is on private right-of-way. Practically all of the paving is of two kinds. The main thoroughfares are paved with standard asphalt, consisting of a 6-in., 1:3:6 concrete base, covered with a 2-in. binder course and topped with a 1½-in. asphalt wearing surface. Oil macadam is used on streets of lighter traffic. Five miles of single track and 28 miles of double track are paved with asphalt, and 35 miles of single track and 53 miles of double track are paved with macadam, a total of 202 miles, single-track measurement.

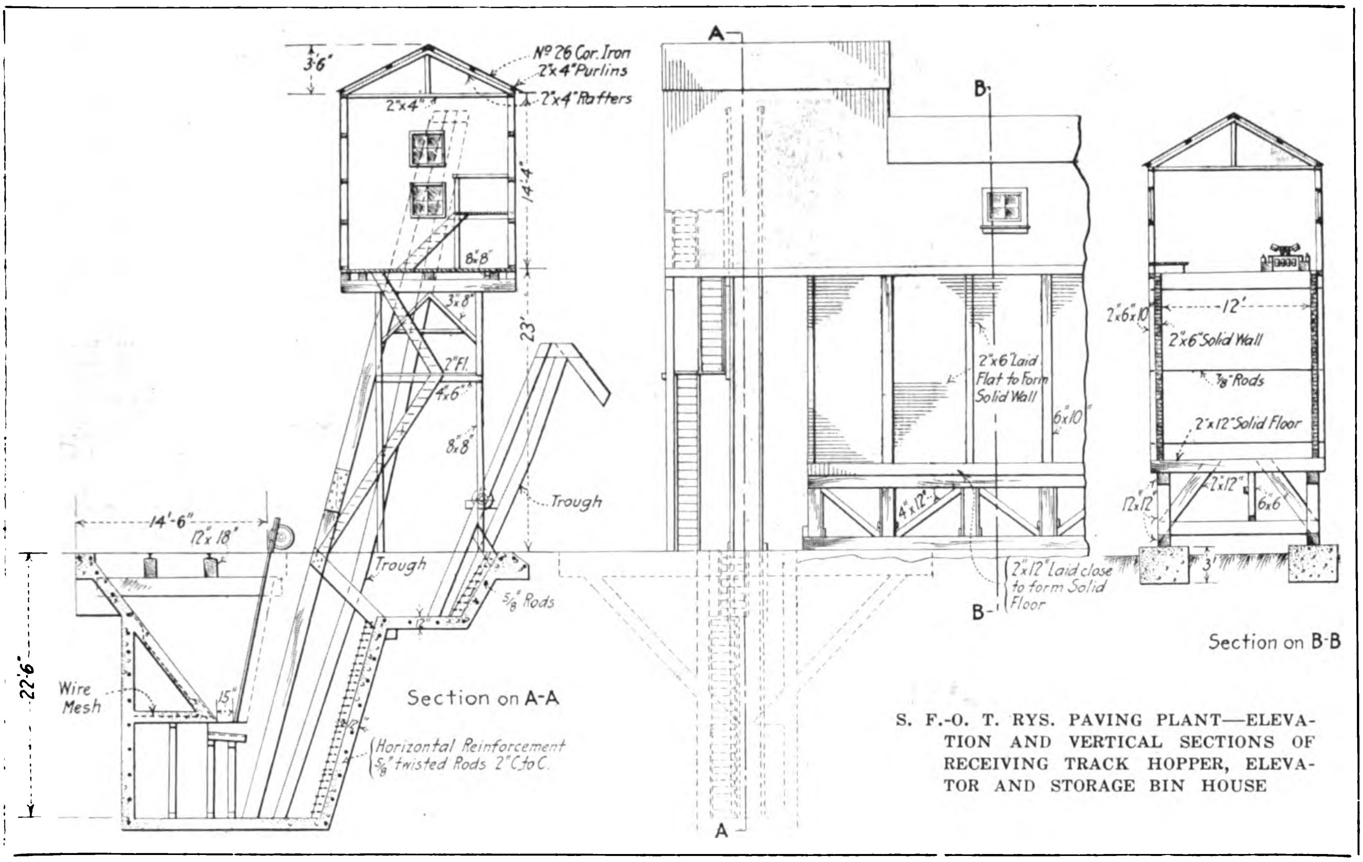
In 1913 the company purchased a 4000-gal. steel oil tank car electrically operated, and equipped with motor and a 4-in. Gould rotary pump for atomizing, and two three-wheeled 12-ton Austin gasoline rollers for oil macadam work. The result was so satisfactory that in 1914 an asphalt plant was erected and the paving department was increased and supplied with tools necessary to carry on all paving operations. For oil macadam, an additional 12-ton Austin gasoline roller was purchased, together with a Ward asphalt road oil atomizer and two Studebaker oil wagons with steel tanks of 600-gal. capacity each.



S. F.-O. T. RYS. PAVING PLANT—GENERAL LAYOUT OF PLANT

For concrete work two two-sack mixers of the Austin cube type were provided. These are steam, oil-burning, reversible, and mounted on wide tread wheels to operate on street paving, and they are self-propelling. One mixer would probably turn out enough concrete, but the machines are heavy, and in order to avoid numerous long moves which would be necessary on account of the large area to be covered, it was thought desirable to have two. Concrete material is delivered on the street by cars, and wheelbarrows are used for charging the machines, which deliver concrete by means of spouts. It has been found entirely practicable to use a 20-ft. spout when necessary to pour across one track on double-track paving. Water is obtained from street hydrants adjacent to the work.

The tools for laying asphalt consist of all necessary street tools, including two fire wagons, made by the Geiger Manufacturing Company, and a 39-in. Erie steam, oil-burning, tandem roller. This is a 5-ton roller with weight added to make a total of 6½ tons, producing a compression of 250 lb. per lineal inch. The narrow roller was selected to permit operation between rails of track. Hot asphalt is brought to the street in six 5-yd., all-steel dump cars, having a capacity of 3000 lb. per cubic yard. These cars were made by the Western


Nº 26 Cor. Iron
2"x4" Purlins
2"x4" Rafters
3'6"
2"x4"
14'4"
8"x8"
3"x8"
23'
2"Fl.
4"x6"
8"x8"
Trough
14'-6"
12"x18"
Trough
5/8" Rods
22'6"
Wire Mesh
15"
Section on A-A
Horizontal Reinforcement 5/8" twisted Rods 2" C. to C.
A
A
B
B
2"x6" Laid Flat to Form Solid Wall
6"x10"
4"x12"
2"x12" Laid close to form Solid Floor
2"x6"x10"
12'
2"x6" Solid Wall
7/8" Rods
2"x12" Solid Floor
12"x12"
2"x12"
6"x6"
3'
Section on B-B

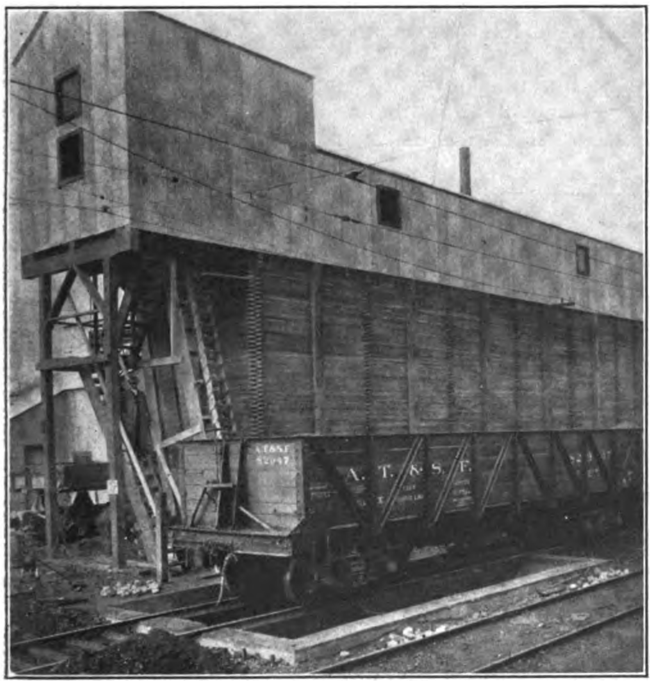
S. F.-O. T. RYS. PAVING PLANT—ELEVATION AND VERTICAL SECTIONS OF RECEIVING TRACK HOPPER, ELEVATOR AND STORAGE BIN HOUSE

Wheeled Scraper Company, and comply fully with all the requirements of the safety appliance act.

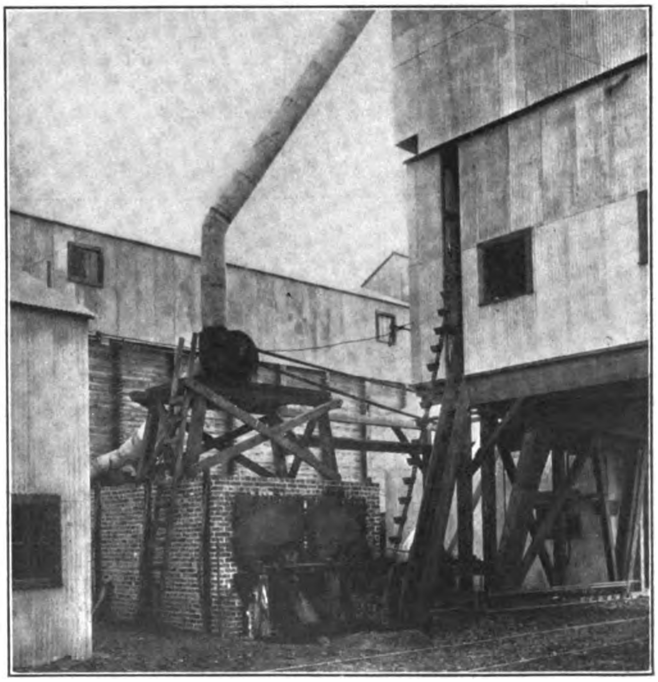
ASPHALT PLANT

The asphalt plant is located in the Yerba Buena yards, between the material yard and the shops of the company. It consists of storage bins for sand and rock, a dust house, underground tanks for asphalt, fuel and road oil, a sand drier, an asphalt mixer and a shed for wagons, rollers, etc., the general layout being as shown in an accompanying plan.

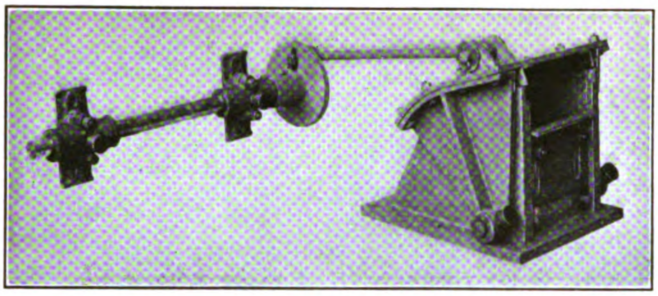
The machinery for the storage bins was designed to take sand and crushed rock at the rate of 100 tons per hour from the discharge of a track hopper, deposit them in bunkers and carry off material at the rate of from 20 to 30 tons per hour from any one compartment. Sand and stone are delivered to the plant in standard cars, which are dumped into a reinforced concrete track hopper. This is covered with a wood grating to prevent accident. At the bottom of the hopper is a 16-in. x 36-in. reciprocating feeder, with automatic regulating gate. Material deposited in the hopper is carried up



S. F.-O. T. RYS. PAVING PLANT—TRACK HOPPER, ELEVATOR AND STORAGE BINS AND TOWER



S. F.-O. T. RYS. PAVING PLANT—DRIERS AND ELEVATOR TO MIXER TOWER



S. F.-O. T. RYS. PAVING PLANT—REGULATING FEEDER GATE IN TRACK HOPPER

into the bunker tower by a bucket conveyor operated by a 10-hp. motor. The lift is 57 ft. and the buckets are 17½ in. x 8½ in. x 11¾ in. All conveying machinery was furnished by the Meese & Gottfried Company.

The entire plant is electrically operated and the several motors are Westinghouse two-bearing, open, horizontal, compound-wound, 550-volt, 1150 r.p.m., with the exception of the 50-hp. motor on the mixer, which makes 565 r.p.m. Current is obtained from the power house of the company located nearby.

The material bins, having a total capacity of 750 cu. yd., are nine in number, each being 12 ft. x 12 ft., in plan and 16 ft. deep, with 6-in. walls made of 2-in. x 6-in. lumber and floors of 2-in. x 12-in. planks laid on edge. They are supported by 7-ft. bents, with 12-in. x 12-in. caps and sills resting on concrete foundations. The tower is 14 ft. x 18 ft., the height of the eaves being 37 ft. 4 in. above the top of the rail. The bucket elevator discharges onto a 20-in. belt conveyor, 117 ft. between centers, operated by a 10-hp. motor. This belt carries the sand and rock to the different bins.

Below the bins are two 16-in. belt conveyors, 48 ft. and 58 ft. centers respectively, which take the material from the bunkers to a bucket conveyor, delivering it to the driers or to a bucket elevator, 12 in. x 5½ in. x 7½ in., 22 ft. centers, used for loading stone and sand into dump cars for use on the street railway tracks. These belts are operated by another 10-hp. motor.

The drying ovens consist of two revolving 30-in. pipes 18 ft. long, with brick firebox for burning oil; cast-iron housings, furnace doors and frames, all inclosed in a brick structure 21 ft. 3 in. x 11 ft. x 7 ft. high. The capacity is 150 cu. yd. A 17-in. Yaeger rotary fan is located on a platform above the driers, connected with a dust collector, 72 in. in diameter, over the mixer tower.

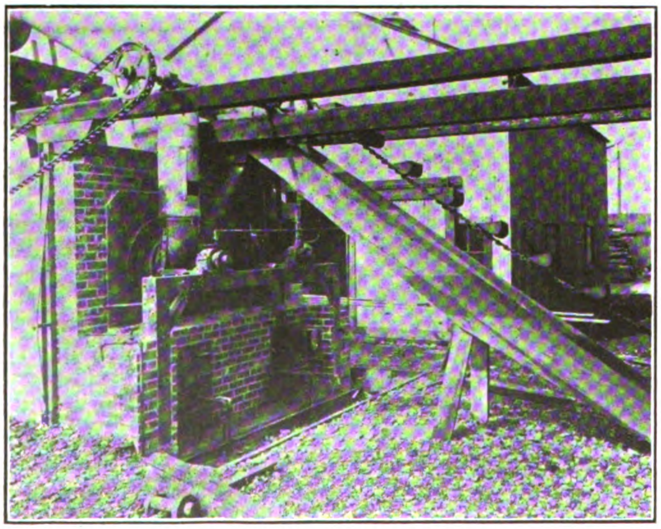
A bucket conveyor delivers hot material from the drier to a double-lined mixer having a capacity of 9 cu. ft. The mixer tower is of 10 in. x 10 in. Oregon pine, with 2-in. x 12-in. flooring. For use with the mixer are Dormant 2500-lb. capacity scales, a measuring box, a steel hot-rock and sand bin 7 ft. square, a dust bucket with 300-lb. dial spring scales, a dust bin 3 ft. 6 in. x 11 ft., a revolving sand screen 24 in. in diameter and 7 ft. 7 in. long covered with ⅛-in. mesh wire, and an asphalt measuring bucket with 500-lb. dial spring scales. The mixer and driers are operated by a 50-hp. motor. Both were furnished by the Geiger Manufacturing Company. The manufactured asphalt paving material is dropped from the mixer into the steel dump cars, referred to before, for delivery to the street. A steam cylinder operates the opening from the mixer.

The dust house is 24 ft. x 24 ft., and a Salem bucket conveyor takes the dust from the house to the dust bin at the mixer. Adjoining the dust house is an annex 8 ft. x 8 ft., in which is located a 7½-hp. motor to operate three small Trahern rotary pumps for asphalt, road oil and fuel oil respectively, and a Worthington duplex piston pump to care for condensation from the steam heating coils in the several tanks.

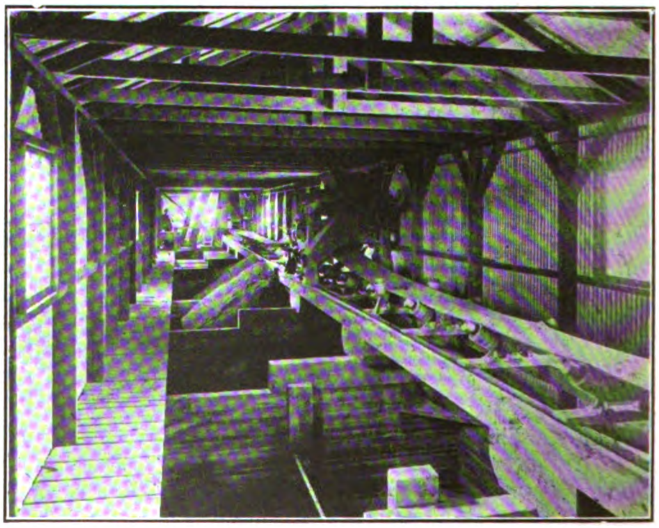
There are three underground reinforced-concrete tanks. The fuel-oil tank is 12 ft. x 22 ft. x 9 ft. deep, and the road oil and asphalt tanks are each 10 ft. 6 in. x 24 ft. x 9 ft. deep. All are equipped with steam coils and are kept heated continuously. Oil and asphalt are brought to the plant in standard tank cars and unloaded by gravity into the underground storage tanks. Asphalt is pumped from the tank to the mixer, fuel oil to the boiler and drier, and road oil to a standpipe with a swinging arm, which is arranged so that it may be used for filling the tank car operating on the tracks of the company, or the horse-drawn tank wagons. Concrete platforms with sumps have been installed, so that the delivery tanks can be blown out and the oil returned to the storage tank.

The boiler house is 28 ft. x 30 ft., including an office and lavatory. The oil-burning boiler, 48 in. in diameter, 15 ft. long, 100 lb. working pressure, made by Joshua Hendy Company, is of 50-hp. capacity, and has an extra feed pump connected with a concrete underground water tank for use in case of interruption to regular water service. The wagon shed is 18 ft. x 130 ft., open in front.

All buildings are of wood and corrugated iron, and the entire plant is inclosed with an 8-ft., tight-board fence with gates. The yard is paved with oil macadam



S. F.-O. T. RYS. PAVING PLANT—DRIERS AND ELEVATOR FROM STORAGE BINS



S. F.-O. T. RYS. PAVING PLANT—BELT CONVEYOR WITH TRIPPER OVER STORAGE BINS and underlaid with drain tile to allow surface water to run off.

The shops of the company are protected by a domestic fire system, with tank and pump, but owing to the danger of water getting into the oil tanks, this system has not been extended to the paving plant. Hand grenades have been distributed throughout and a chemical engine on wheels has been provided. Dust and sand are always available in case of fire in the tanks. A first-aid medical cabinet has been installed for personal injuries, and the company, working in conjunction with the State accident commission, has safeguarded the plant in almost every possible way.

GENERAL CONSIDERATIONS

The paving plant is compact, of low first cost, adapted to its purpose and can be operated at a minimum for fuel, power and labor. The construction of the unloading hopper and storage bins with conveying machinery does away with the large amount of labor which is required when material is brought in and unloaded on the ground, to be rehandled to drier and mixer. The plant is kept ready for operation continuously, and paving repair work is under way daily, weather permitting. The operating force consists of a day engineer, a mixerman, one helper and a night engineer, who acts also as a watchman. The storage of sand in covered bunkers instead of upon the ground without shelter materially increases the capacity of the driers, as the sand does not become wet unless during transportation to the plant on cars.

With its own plant, the company can do work when and where it is necessary or desirable, and there is no delay in waiting for the convenience of contractors, not to mention the difference in cost. The ability to make paving repairs at any time is of great advantage to a street railway.

During the first year the plant was operated, owing to financial conditions, only half as much concrete and asphalt work was done as had been contemplated, and still the difference between the cost of the work done and the prevailing contract prices equalled the cost of the plant, exclusive of interest on the investment and depreciation.

It was estimated that under existing conditions 8000 sq. ft. of standard asphalt paving could be laid each day, although the capacity of the asphalt plant is in excess of that amount. By having its own rollers, which are kept on the street throughout the year, buying road oil in tank cars and delivering by its own tanks, thus reducing cost of tankage and hauling, the company secures a marked saving in oil macadam paving. By owning excellent concrete mixers, with men accustomed to operating them, and delivering material by car, the company can put in good concrete at a cost much below contract price.

The municipal authorities, realizing that the company is equipped to do good work, and has no incentive to slight any part of it, have not burdened the railway with any inspection fees. The asphalt work is done to conform to city specifications, and samples are submitted for laboratory tests.

The work accomplished during the first fiscal year consisted of 509,000 sq. ft. of standard asphalt paving, equal to 10 miles of single track, of which 320,000 sq. ft. was new pavement and 189,000 sq. ft. was patching; 11,000 cu. yd. of concrete, and 1,537,000 sq. ft. of oil macadam, the equivalent of 30 miles of single track, of which new paving and repairs were about equal.

The plant was designed and erected by the maintenance of way department of the railway, of which the writer was chief engineer at the time.

Jacksonville Valuation Brief

Valuation Deduced From Actual Investment Deemed of Primary Import, Although Cost-of-Reproduction Theory Is Thought to Give Fairly Consistent Result

THE Jacksonville Railway & Light Company, Jacksonville, Ill., which is controlled by the Illinois Traction System, has presented to the Illinois Public Utilities Commission an exhaustive brief against complaints filed by two citizens of Jacksonville alleging that the rates charged are excessive and unreasonable. The case is important on account of the question as to what particular rates may be found to be just and reasonable, but it is of even greater importance on account of the fact that the decision will probably establish clearly the policy of the State of Illinois in regard to utility regulation and utility development.

In its brief the railway has attacked the valuation problem from two distinct points of view, namely: the amount of capital actually invested in the business by the present owners of the property, and the cost of reproduction, following the method of the commission's engineers, which involves elements of depreciation, overhead, and intangible values. The company first presents the valuation which it insists should be adopted as the basis for a fair return, as deduced from its actual investment in the plant and property under consideration. It then presents its views in regard to the value of the property as deduced from a determination of the value of the "bare bones" of the plant with adequate assignments of overhead expenses, intangible values and working capital, and in so doing it asks the commission to bear in mind at all times that the two theories of valuation are entirely distinct and independent and should not be confused. At the same time, it emphasizes the fact that if reasonable judgment is exercised and care taken in the appraisal, and the results of experience be applied to the particular theory of valuation under consideration, the results will be fairly consistent.

Following the reasoning of the Massachusetts Public Service Commission in the Blue Hill and Norfolk & Bristol cases, the company holds that the Illinois Commission must find the company to have honestly and prudently invested in the Jacksonville properties approximately $900,000, after making due allowance for depreciation of the property as accruing from an assumed excess dividend of 1 per cent over 8 per cent paid during the years of ownership by the present company. It would seem, it is said, that the investment originally made, together with the capital subsequently invested in rehabilitation, improvements and developments, should remain intact as the basis of return upon which investors' rights should be predicated. The company, however, is familiar with the theory that depreciation should be charged annually and that the investment value of the property would gradually decrease as long as there was a deficit in net earnings below the rate of return plus depreciation. Yet upon the theory that the investor must first take from net earnings, representing the money contributed by the public, a certain amount each year and apply this against the depreciation to plant, whether or not a fair rate of return is earned over and above depreciation, the results in the Jacksonville situation will produce an actual remaining value in the property of $852,340. This figure is obtained by subtracting from the investment each year the insufficiency of net earnings to meet both depreciation and return and thus limiting consideration to the "actual" capital invested in the property, and also at the end of the period by adding to the remaining investment the accrued total deficit by which the investment failed to yield an annual fair return plus depreciation.

On the subject of reproduction cost the brief points out that consistent results are obtained by all the authorities testifying in the case with the exception of the commission's engineers. The total of the present value of the gas, electric light and railway departments of the company, as determined by the commission's engineers and including only the assigned values to the "bare bones" of the property, is $483,899 as compared to L. E. Fischer's similar exhibit of $701,553. The cost-new value as determined by the commission's engineers, taking into consideration certain rehabilitation plans in order to place all figures on a comparable basis, amounts to $732,670 without any element of intangible value, which is said to be entirely reconcilable with the valuation determined for the company by Byllesby & Company, deducing a value of $834,542, including the intangible values. In the face of the repeated admissions and contentions of the commission's engineers that the actual investment in the property is always of more weight in determining the fair value for computing the rate of return, the ultimate valuation of $834,542 determined by Byllesby & Company and the conclusions of Mr. Fischer showing a present value of $898,862 with intangible, both of these valuations being predicated upon the reproduction plan of determining values, are said to be entirely comparable with the investment of $852,340.

In the opinion of the company the much cited Des Moines Gas Company case is authority that "good will" is not a proper element to be considered in a rate-making case, but that it is not improper to include in the valuation put upon various individual units of property the element of "going value." This is believed to be, indeed, by far the better and more logical plan in determining a valuation upon the reproduction-cost basis. The confusion in evaluating "going value" is said to arise from the misnomer of the intangible value thus existing. The terms "going value" or "going-concern value" savor always of the idea of "good will." In so far as it includes the expenditure of money in developing and attaching business and consumers to be served, it represents an investment and is an element of value. If the term "developed potential value" is used to designate this element of intangible value, the confusion is said to be removed.

In regard to the rate of return, the brief states that capital cannot be retained or secured to finance lighting and street railway companies without a fair assurance that a rate of return of 10 per cent upon the money actually invested will not be disputed. It is not the absolute earning of a 10 per cent rate of return that the investor demands and must receive, but it is the knowledge that opportunity is afforded to reach such a rate in view of the fact that there is no guaranty that any given rate of return will be in fact earned. The finding of the commission that the investor should not earn to exceed 8 per cent would limit the opportunity which furnishes the only inducement for the risk assumed by capital invested in public service. The general conclusion of the brief is that the fair value upon which a rate of return should be allowed is something in excess of $800,000, and the fair rate of return would be at least 8 per cent upon this value. Moreover, the company must earn a sufficient amount to accumulate a depreciation reserve of approximately 3 per cent annually on the value of the property used and useful in the gas department, approximately 5 per cent for the electric and railway departments, and approximately 1 per cent on the total fair value to amortize the discount upon bonded indebtedness.

In closing its brief, the company asks the commission in its decision to announce the reasons for its conclusions. It is said to be vitally important that the citizens and the owners of utilities know the theories of the Illinois commission upon the fundamental and controlling factors of the elements governing the fixing of rates in Illinois. Moreover, sources of invested capital are profoundly interested in learning the attitude of the State toward utility development.

Discussion on Energy Saving at Illinois Association Meeting

At the Illinois Electric Railways Association Meeting Held on March 31, Energy Saving Was the Theme to Receive Consideration

AT the annual meeting of the Illinois Electric Railways Association held at the Hotel La Salle, Chicago, Ill., on March 31, several papers were presented on the general subject of efficient car operation. Most of these were abstracted in last week's issue. The paper by E. S. Gillette, abstracted below, was not available in time for that issue. In the account of the discussion printed last week through an oversight the fact that E. S. Cooper, engineer Westinghouse Electric & Manufacturing Company, participated was not mentioned. In connection with his remarks Mr. Cooper used the diagrams presented by N. W. Storer in his 1915 paper before the Western Society of Engineers and the Chicago section of the A. I. E. E. These were reproduced in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 6, 1915, page 286.

Power Saving in Car Operation

BY E. S. GILLETTE

Electrical Engineer Aurora, Elgin & Chicago Railroad, Wheaton, Ill.

The Aurora, Elgin & Chicago Railroad has realized for a number of years that the possibilities in the direction of power saving were great, and it has endeavored in the past to impress this fact upon the motormen by bulletin notice. However, not until last year did we make an active campaign to educate our trainmen in the savings which might be made by coasting.

In formulating our plans for the coasting campaign we gave consideration to the merits of the several devices on the market designed to check the operations of the motormen in handling their cars. There appeared to us to be certain disadvantages involved in the use of any of these devices, aside from the investment required, and we finally determined upon the plan of thoroughly instructing our trainmen in the proper method of operating their cars and with respect to the amount of coasting which could be done without interfering with their schedule, relying upon their pride and interest in producing results equal, or nearly equal, to those obtained through the use of one of the devices referred to. The results which we are at present obtaining, I believe, bear out our judgment in this respect.

Preliminary to the launching of the actual campaign of instruction a letter was sent out by our vice-president and general manager to each trainman, in which was discussed in a general way the widespread industrial depression which had not been without its effect upon our company. It was pointed out in this letter that whatever resulted in gain or loss to the company must correspondingly result in gain or loss to the individual employee. On these personal grounds, as well as on the ground of their interest in the company's welfare, their co-operation was solicited to produce the saving made possible by using the maximum amount of coasting. Following this a few remarks were made on the possible savings, instancing actual results secured by the companies which had preceded us in taking up this matter.

The conductors were not overlooked in this appeal, for the reason that conductors are important factors in securing the possible amount of coasting. They can avoid or reduce many delays and, by being alert, can reduce the time necessary for loading and unloading passengers, thereby increasing the time available for the run. The trainmen were also informed in this letter that the company had engaged a coasting expert to instruct and advise them as to the proper method of accelerating, braking and coasting. Inclosed with this letter were sheets indicating points on our line where coasting could be done to advantage.

For the instruction of our men we secured the services of E. C. Clarke, supervisor of instruction Brooklyn Rapid Transit Company. Mr. Clarke held meetings with the men, rode with them on the cars and, by individual instruction, demonstrated to them what was possible to be done in saving energy. Mr. Clarke spent about a month on the property in the manner above outlined. Upon leaving to resume his duties in Brooklyn he addressed a letter to the motormen, complimenting them upon their aptness in grasping what he had endeavored to teach them, calling their attention to the saving already being made, and urging them to continue their efforts. With this letter was sent a booklet, printed on substantial stock and containing coasting suggestions peculiar to the property.

In connection with the campaign herein outlined our engineering department went thoroughly into the matter of coasting. Following are the main points of their findings.

The objects of the tests made by the engineering department were: (1) To show the great amount of saving which could be made in power if our trainmen would do as much coasting as possible. (2) To determine the energy consumption per car-mile which we might reasonably expect. (3) To show that it is altogether feasible to do a great amount of coasting and still maintain the schedule.

Several trains were fitted up with Sangamo watt-hour meters. The cars weighed approximately 93,000 lb. without passenger load and were equipped with four GE-66, 125-hp. motors, with a gear ratio of 32:20, and an average wheel diameter of 34 in.

No attempt was made to run these tests under special conditions. The cars were placed on regular runs and the operating schedule was followed as closely as possible throughout the trip, except that the different trips were made under as nearly the same weather conditions as possible.

On the first nineteen trips the motormen operated the cars just as they did before receiving instruction in coasting. The energy consumption per car-mile was slightly above 4.26 kw.-hr. On the next seventeen trips they operated with as much coasting as possible, and averaged about 3.58 kw.-hr. per car-mile. The saving effected by coasting was thus more than 0.5 kw.-hr. per car-mile.

In these tests we did not differentiate between braking time and actual coasting time. Naturally the braking time enters into this problem to a very great extent, but what the company was especially interested in at this time was to determine the amount of power which could be saved by coasting.

The amount of coasting which can be done on any given trip depends largely on the number and duration of stops, on the average line voltage, on whether or not the train is running on time, and on the personal equation of the motormen. The number and length of stops for any particular run are probably the most difficult variables to control. Due to the existence of these variables, we can expect neither the same amount of coasting nor the same energy consumption per car-mile for any two runs. However, we can expect that the average figure obtained from all test runs will be an average of what the motormen can be expected to do.

The tests showed very clearly that it is possible to do a considerable amount of coasting and maintain our schedule, and to do a great deal of coasting and even make up time. Attention is called to this fact especially, because we have an extremely difficult schedule to maintain. The cars are geared to make between 60 and 70 m.p.h., while the schedule speed averages about 28 m.p.h., with stops averaging about one to every three-fourths of a mile. Several railroads have to be crossed frequently, delaying the trains. We have to operate through a suburban district of considerable extent at a greatly reduced speed.

By way of illustration of the above assertion several test runs may be cited. On one from Wheaton to Chicago, of average severity, the train left Wheaton three minutes late, made seventeen stops on the trip, came into Elmhurst (9.1 miles from Wheaton) on time, arrived at Fifth Avenue, Chicago, four minutes ahead of schedule, and coasted 55.4 per cent of the time. Another two-car train left Wheaton two minutes late, made nineteen stops during the trip, arrived at Forest Park (15.7 miles from Wheaton) on time, was held up two minutes at the Great Western crossing, and came into Fifth Avenue, Chicago, two minutes late, having coasted 53.8 per cent of the time. Had it not been for the two minutes lost at the crossing the train would have arrived at Fifth Avenue, Chicago, on time.

The following is what we consider a banner run. It was made by a two-car train from Fifth Avenue to Wheaton, with seventeen stops and 68 per cent coasting. This may seem like an exaggerated statement to some who have not investigated the subject of coasting, but I dare say that any roads could obtain as good if not better results.

During the month of January we ran more than 234,000 car-miles on our Chicago division. If only 0.5 kw.-hr. per car-mile had been saved (and I do not wish to convey the impression that I think only this amount can be saved by efficient operation), it would have amounted to approximately 117,000 kw.-hr. at the car.

The average coasting on the non-coasting trips was 22.2 per cent, while that on the coasting trips was 49.3 per cent. These tests were certainly convincing as to possible economies in the use of power by motormen.

After Mr. Clarke returned to Brooklyn we arranged that the service inspectors on each division should ride with the motormen and instruct them in the matter of coasting. If they do not understand the principle after some little instruction the inspector takes the controller handle and shows them what can be done. Each time he rides with a motorman he grades him as to his ability in coasting, and the grades are sent into the general office. If we find that a man who is graded low is not improving he is called into the office and the subject of coasting is discussed with him. We have found as a result that in every case the men have improved to a marked extent in the handling of the equipment.

The Dundee (England) Tramways have installed at a special location on their system an automatic trolley reverser. Should the device work successfully it will be adopted at other places on the system.

COMMUNICATION

Why Trolley Wire Wears Out

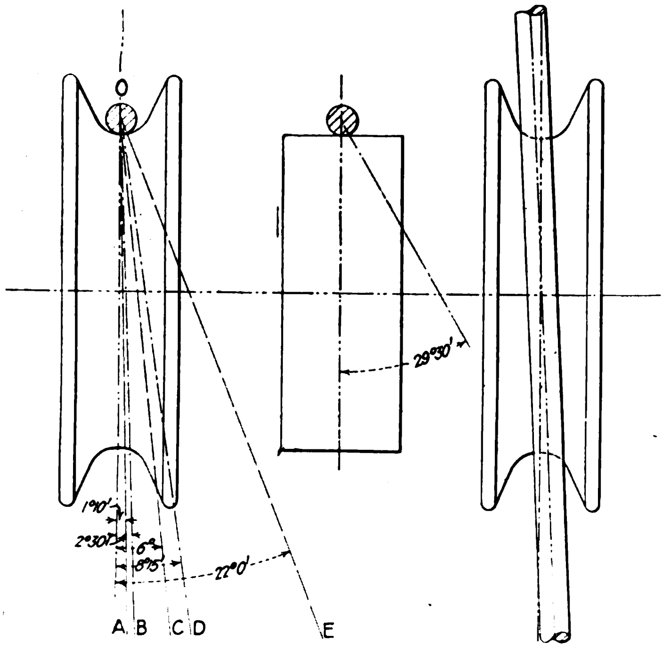
11 Broadway, New York, April 13, 1916.

To the Editors:

I believe that most engineers familiar with trolley operation will differ from the premises, argument and conclusions expressed by S. L. Foster on page 613 of the March 25 issue of the Electric Railway Journal.

It is not necessary to go back to pre-retriever days to get facts for a comparison of the wear on trolley wheels and wire with and without retrievers or catchers. There are still many systems, especially in the cities, where neither retrievers nor catchers are used.

Since reading Mr. Foster's article I have examined a number of trolley wheels, some of which were on cars equipped with catchers located 14 in. out of center and others having neither catchers nor retrievers. As many wheels showing one-sided wear are to be found on cars not equipped as on those equipped. And, what is more significant, on examining a number of wheels on the roofs of the long double-pole cars operated by the Third Avenue Railway, New York, N. Y., where the trolley rope leaves the catcher 14 in. from the center of the car, fully 60 per cent showed wear on one side or the other, and of this 60 per cent fully half showed the wear on the side opposite to that where it would be expected if Mr. Foster's conclusions were correct.



Key: Line *OA*—resultant straight track retriever pull, 5 lb.
Line *OB*—resultant straight track retriever pull, 9 lb.
Line *OC*—Rope on straight track, retriever 16 in. off center.
Line *OD*—Resultant retriever pull, 9 lb., 16 in. off center, wire is 57 in. off center on opposite side.
Line *OE*—Line of rope with retriever 16 in. off center and wire 57 in. off center on opposite side.

EFFECTS OF ANGULAR PULL OF TROLLEY CATCHER OR RETRIEVER ROPE

The trolley conditions under which these cars operate are particularly unfavorable because the roof of the vestibule extends beyond the wheel when the trolley pole is flat on the roof, and the catcher is located under the projecting vestibule so that the rope makes rather sharp bends when it leaves the catcher and another bend at the roof. The cars pass around the sharp curves under elevated railways and the rope frequently catches on the hood, causing it to take a much sharper angle at times than when the rope passes directly from the catcher to the pole.

Now with the aid of the diagrams let us analyze the mechanics of the case and see why an inclined rope does not pull the trolley wheel against the flange.

First, take the case where the rope emerges from a retriever 16 in. off from the center of the car, the extreme case mentioned by Mr. Foster. With the wire 18 ft. high, the angle of the rope would be about 6 deg. from the vertical. Suppose we have 30-lb. trolley pressure and 5-lb. pull on the trolley rope. This is a high trolley-rope tension and a well-constructed catcher or retriever should not give over 3 lb. or 4 lb. at the most. Under these conditions, the resultant force acting between the wheel and the wire is 25 lb. and it acts at an angle of only 1 deg. 10 min. from the vertical. If we have, say, a new trolley wheel in which the groove at the bottom has a radius of 5/16 in. and the trolley wire stands in the groove 0.006 in. from the center on the side toward which the inclined trolley rope tends to pull it, the line of action of the resultant will pass through the point of contact between the wire and the wheel and there will be absolutely no tendency for the wire to move out of this position due to the pull of the trolley rope. Even with the excessive pull of 9 lb. mentioned by Mr. Foster, the angle of the resultant would be only 2½ deg., and the wire, moved 0.013 in. from the center of the groove, would be in a position where there would be no tendency for it to move in either direction.

Take the extreme case given by Mr. Foster where a long car going around a 45-ft. radius curve results in the trolley being 57 in. off the center on one side, with the retriever 16 in. off center on the opposite side, with a pull on the trolley rope of 9 lb., and a net trolley wheel pressure of, say, 24 lb. The line of the rope in this case would be 22 deg. from the vertical and the line of the resultant force acting between the wire and the wheel would be 8¼ deg. The horizontal component of the pull on the rope would be 3½ lb., and the amount which the trolley wire would have to be displaced from the center of the groove to bring the point of contact between the wire and the wheel in direct line with the resultant would be 0.045 in.

The real cause of the wire creeping to the side of the wheel is lack of accurate alignment of the axis of the wheel at right angles to the axis of the wire. The slightest variation of this angle will cause the wire to creep over to one side and climb up the curved side of the wheel until the inclination at the point of contact equals the angle of friction. So long as the horizontal component or direct side pull of the trolley rope does not exceed the force that would be required to make the trolley wheel slip on the wire it can have no effect whatever on causing wheels to wear eccentrically. Suppose for instance a trolley wire rested on a plain cylindrical wheel, that the trolley base springs were adjusted to give a pressure of 30 lb. between the wheel and wire when there was no pull on the trolley rope, and that it took 9 lb. to pull the rope out of the retriever. Under these conditions, assuming a co-efficient of friction between the trolley wheel and wire of 20 per cent, the trolley rope could lead off at an angle of 29½ deg., before it would cause the wheel to slip sidewise on the wire, and at any less angle than this, if the alignment of the axis of the wheel was such as to tend to cause it to creep away from the side on which the retriever was located, it would so creep in spite of the side pull of the trolley rope.

There is no question but that the tension spring which takes in the slack trolley rope in retrievers and catchers should be as efficient as it is possible to make it and it never ought to require anything like 9 lb. to pull out the rope even for the highest wire. It must be strong enough to take in a wet rope, and the friction of the coils of the spring against each other and of the rope drum on its shaft should be kept as low as possible so as not to increase more than necessary the pull required to draw the rope out when the trolley wheel is rising. But the fact that trolley wheels are found to wear on one side where no retrievers are used and that where retrievers or catchers are used the wheels are as apt to wear on one flange as the other, and the wire on curves sometimes wears on the outside and sometimes on the inside of the curve, these facts, I believe, show clearly that trolley retrievers and catchers, even under unfavorable conditions, cannot be the cause of unsymmetrical wear, either on trolley wheels or trolley wire. It is, so far as I have been able to ascertain, the universal experience that the maintenance cost of overhead wires is greatly reduced by the use of catchers or retrievers. C. J. EARLL.

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

ASSOCIATION NEWS

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

Atlantic City Selected for the 1916 Convention of the Association—President Henry Announces Personnel of Convention Committees—New Haven and Milwaukee Company Sections Hold Instructive Meetings

Committees for Atlantic City Convention

At a meeting of the convention committee in New York this week it was announced that the fall convention of the association would be held on Young's Million-Dollar Pier, Atlantic City, N. J., Oct. 9-13. Work on convention affairs has been started in earnest. Members of the convention committees appointed by President Henry met with him at the offices of the association on April 11. The duties of executing the plans for the exhibit and entertainment features were distributed among the three American Association convention committees recently appointed. The membership of these committees is as follows:

Exhibit committee: Daniel W. Smith, chairman, Peter Smith Heater Company, Detroit; John J. Stanley, Cleveland Railway; J. J. Dempsey, New York Consolidated Railway; L. J. Drake, Jr., Galena Signal Oil Company; J. G. Berry, General Electric Company; Miles B. Lambert, Westinghouse Electric & Manufacturing Company, and William H. Heulings, Jr., The J. G. Brill Company.

Committee on entertainment: E. S. Wickwire, chairman, Ohio Brass Company, Mansfield, Ohio. Other members not yet appointed.

Finance committee: L. E. Gould, ELECTRIC RAILWAY JOURNAL, chairman; Britton I. Budd, Chicago Elevated Railways; M. C. Brush, Boston Elevated Railway; J. D. Mortimer, North American Company; William H. Simpson, Railway Materials Company, and Robert H. Belknap, Pennsylvania Steel Company.

The general convention committee, which will have authority over the convention exhibits and entertainment, has been appointed as follows: Thomas Finigan, American Brakeshoe & Foundry Company, chairman; H. C. Donecker, Public Service Railway, vice-chairman; A. H. Ford, Cumberland County Power & Light Company, Portland, Me.; Robert I. Todd, Terre Haute, Indianapolis & Eastern Traction Company, and Daniel W. Smith, E. S. Wickwire and L. E. Gould. President Henry will shortly address a letter to the members of the American Electric Railway Association and to the electric railway manufacturers setting forth the important features with regard to the fall convention. Also, Mr. Smith, chairman of the exhibit committee, will shortly announce the plans and detail arrangements for the exhibit.

Recognition of the participation of the manufacturers in the work of the American Association under the by-laws as revised at Chicago was provided, and the plans for accelerating the membership work were furthered by the appointment of the following manufacturers to serve on the membership committee of the American Electric Railway Association, of which George W. Knox, Oklahoma Railway Company, is chairman; S. D. Hutchins, Westinghouse Traction Brake Company, co-chairman; E. B. Meissner, St. Louis Car Company; John H. Benham, International Register Company; James H. Drew, Drew Electric & Manufacturing Company; Charles C. Peirce, General Electric Company; W. K. Archbold, Archbold-Brady Company, and John M. High, Pantasote Company.

The manufacturers' exhibits will be made by member companies, who will rent space through the exhibit committee. All other privileges of the convention will be open to representatives of all railway and manufacturing member companies without payment of any fees except those of company membership. The executive committee of the American Association has directed that the dues of manufacturing companies joining the association since the recent Chicago meeting will be only one-half of the full annual dues. The fiscal year ends Oct. 31, 1916.

President Henry announced that the membership committee would meet on April 18 at the association headquarters, and that the exhibit committee would meet at the Hollenden Hotel, Cleveland, on April 20.

Activities of the Company Sections

MILWAUKEE SECTION

The meeting of company section No. 1 was held on March 30. It was devoted to a quiz and to reports from the committees on profit sharing and cost of service. The "Review of the Technical Press," a mimeographed index of important articles appearing during the preceding four weeks, was distributed to the members.

W. C. Bolt, shop accountant, presented the report of the committee on profit sharing, a supplemental report of that committee. He discussed the effects of the inauguration of the profit-sharing plans in the several departments of the company, some of the practical advantages which he outlined being as follows: (1) Profit sharing urges economies in both labor and materials; (2) provides a basis of added compensation to individual employees in accordance with merit; (3) develops an *esprit de corps* in the employees and places upon them the burden of maintaining a high degree of efficiency in their respective departments; (4) develops a spirit of friendly co-operation among the employees, resulting in the desire to help one another and thereby increase their store of knowledge, their earning power and their value to their employers; (5) furnishes incentives to greater care and diligence in the daily work of employees; (6) lessens the need of supervision as personal efficiency increases; (7) tends, when properly administered, to retain employees in the service of the company; (8) establishes the identity between the interests of the employees and the interests of the company, and (9) creates an incentive for personal efficiency and increased production, and stirs on to greater and greater efforts.

G. W. Kalweit, general auditor, read the report of the committee on cost of service. This report was in the form of a progress report covering only a preliminary treatise of the subject. He outlined the nature of the costs incurred incident to the development of street railways, taking up organization, financing and construction. He stated further that the costs of service were of three types: (*a*) Interest, taxes and that part of depreciation which would occur if the property existed but was not operated; (*b*) those expenditures necessitated by the operation of cars and which would occur in substantially the same amount if no passengers were carried, and (*c*) those expenses occasioned by the passengers and varying with the number of passengers.

Mr. Kalweit explained the accounting classification of cost of service, and the elements of cost, emphasizing the primary importance of reducing expenditures to unit costs, these units to be operating units. The committee proposes to examine into each element of cost to determine the particular unit of operation to which it is most closely related, and thus to arrive at a set of unit costs from which it will be possible to determine cost of service with some accuracy.

CONNECTICUT COMPANY SECTION

The fifth regular meeting of Company Section No. 7 was held on April 4, being preceded by the usual dinner, during which the section was entertained with musical selections.

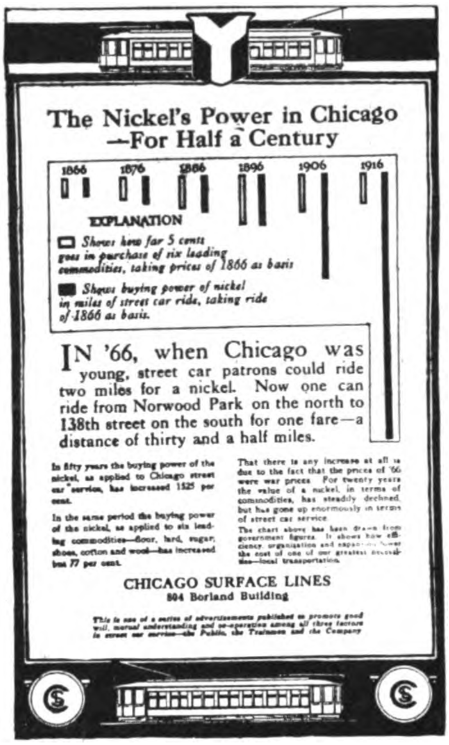
The speakers at the meeting were Alfred Green, mechanical expert Galena Signal Oil Company; W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company, and H. N. Balfour, head bookkeeper accounting department, S. H. Steele, claims investigator, and C. T. Matson, claim agent, all of the Connecticut Company. Mr. Green gave a comprehensive illustrated talk on "Lubrication," and supplemented this by answers to questions on the lubrication of various motors. Mr. Gove gave interesting facts in regard to the system of his company. Mr. Balfour read a paper on "Construction Accounting in Its Relation to Other Departments." Since the meeting the last-named paper has been duplicated and distributed to the several departments of the company. Messrs. Steele and Matson gave short talks on safety-first problems, discussing part of the paper by H. A. Bullock read at the February meeting.

President Flickinger announced the appointment of a committee to investigate various types of snow-fighting equipment with a view to making recommendations to the company. The committee comprises F. W. Miller, superintendent Hartford; F. P. McKaig, roadmaster Hartford; W. E. Crilly, master mechanic Hartford; F. A. Hewitt, superintendent Middletown; H. L. Wales, superintendent Waterbury; P. Ney Wilson, roadmaster New Haven; W. F. McCoy, master mechanic Bridgeport; M. E. Stark, roadmaster Bridgeport, and H. W. Beebe, supervisor of equipment New Haven. Progress reports will be expected from this committee from time to time, pending the completion of its final report.

Chicago Newspaper Advertisement

Emphasizes That Ride Has Increased 1525 Per Cent in Length in Fifty Years

ONE of the series of advertisements which the Chicago Surface Lines has now been running about a year called attention to the fact that the power of the nickel for street railway rides in Chicago had increased about 1525 per cent in fifty years. The relative increases for ten-year periods were illustrated on a chart, a reproduction of which is shown in the accompanying illustration. The title of the advertisement is the same as the title of the chart, namely, "The Nickel's Power in Chicago—For Half a Century." Other text matter reads, "In 1866, when Chicago was young, street car patrons could ride 2 miles for a nickel. Now one can ride from Norwood Park on the north to 138th Street on the south for one fare—the distance between these two points being 30½ miles.


The Nickel's Power in Chicago
—For Half a Century
1866
1876
1886
1896
1906
1916
EXPLANATION
Shows how far 5 cents goes in purchase of six leading commodities, taking prices of 1866 as basis
Shows buying power of nickel in miles of street car ride, taking ride of 1866 as basis.

IN '66, when Chicago was young, street car patrons could ride two miles for a nickel. Now one can ride from Norwood Park on the north to 138th street on the south for one fare—a distance of thirty and a half miles.

In fifty years the buying power of the nickel, as applied to Chicago street car service, has increased 1525 per cent.

In the same period the buying power of the nickel, as applied to six leading commodities—flour, lard, sugar, shoes, cotton and wool—has increased but 77 per cent.

That there is any increase at all is due to the fact that the prices of '66 were war prices. For twenty years the value of a nickel, in terms of commodities, has steadily declined, but has gone up enormously in terms of street car service.

The chart above has been drawn from government figures. It shows how efficiency, organization and expansion lower the cost of one of our greatest necessities—local transportation.

CHICAGO SURFACE LINES
804 Borland Building

This is one of a series of advertisements published to promote good will, mutual understanding and co-operation among all three factors in street car service—the Public, the Trainmen and the Company

CHICAGO ADVERTISEMENT

"In fifty years the buying power of the nickel, as applied to Chicago street car service, has increased 1525 per cent. In the same period the buying power of the nickel, as applied to six leading commodities—flour, lard, sugar, shoes, cotton and wool—has increased but 77 per cent. That there was any increase at all is due to the fact that the prices of 1866 were war prices. For twenty years the value of a nickel, in terms of commodities, has steadily declined, but it has gone up enormously in terms of street car service. The chart illustrating this fact has been drawn from government figures. It shows how efficiency, organization and expansion lower the cost of one of our greatest necessities—local transportation." Accompanying each advertisement in this series is the following paragraph: "This is one of a series of advertisements published to promote good-will, mutual understanding and co-operation among all three factors in street car service—the public, the trainmen and the company." For the past few months new advertisements have appeared in all of the local newspapers once each week.

This advertisement occupied space approximately 6½ in. x 10½ in. in size, and the text matter was inclosed in a standard black margin with cuts of a car at the top and bottom of the advertisement.

An ordinance has been passed in Portland, Ore., forbidding passengers on street cars to talk to the motormen on duty. Signs to that effect have been placed in the cars.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

The Variable-Load Brake

Of all of the novel features of the equipment on the New York Municipal Railways car that have been described in various issues of the ELECTRIC RAILWAY JOURNAL, doubtless the one that has been subject to most discussion is the variable-load brake. This is not so much because the installation constitutes the first application of the idea in rapid transit operations, but rather because it marks the culmination of the efforts of many inventors who are justly entitled to credit as pioneers but who have vainly striven for several decades to evolve a device for which the need was obvious. The successful variable-load brake has involved overcoming extraordinary inherent difficulties. Almost every railroad man has considered the problem, and almost every one has arrived at a solution, for there is, on paper, nothing easier. On the other hand most of these conceptions never passed even the experimental stage, and this has made the variable-load brake seem like the proverbial pot of gold at the rainbow's end.

Practically from the time when the air brake first came into use, this demand for adjustable maximum braking power has existed. It has been especially marked in the case of steam railroad freight cars, whose total weight when light might be only some 30 per cent of the total weight when loaded, because a braking power designed to utilize the adhesion of the loaded car would obviously produce sliding wheels in case the car was empty. On the other hand, a braking power suitable for the light car would be quite inadequate for a heavy loading, and this is the condition that exists largely at the present time, freight trains with a maximum total brakeshoe pressure of only 15 per cent of the gross train weight being common.

With passenger equipment, the demand for adjustable braking power has been, until recently, less insistent. The high-speed car, found on the steam railroads, has been of such great weight that the addition of some fifty or sixty passengers has really been negligible, adding only about 5 per cent to the load on the wheels. With the recent development of light-weight steel equipment, however, the percentage of increase due to the passenger load has been enlarged, and in the New York Municipal car it has actually become 45 per cent, the light car weighing only 85,000 lb., while the passenger load reaches a possible maximum of 38,000 lb. additional.

In this case, the relatively frequent stops for which the car was designed prohibited the company from taking chances with sliding wheels, and the light-weight braking power had to be rigidly limited to a figure suitable to the weight of the empty car. As opposed to this was the fact that a 45 per cent increase in total train weight meant a practically proportional increase in braking distance, this in turn causing a serious waste of time by increasing the distance between trains at limiting points.

The alternative was the provision of adjustable braking power, and this has been accomplished by a scheme which, in brief, consists in varying the capacity of the air-brake auxiliary reservoir and thus making more, or less, compressed air available for use in the brake cylinder. Actually, the change in reservoir capacity is brought about by the introduction of a second reservoir that is divided into a series of compartments of various sizes, these being connected to or separated from the original reservoir by ports controlled by a slide valve. The movement of the latter is effected by the push from a pin against which the slide valve is held by air pressure, the pin being connected by a rack-and-pinion system to the vertical piston of a small air cylinder which is mounted between the spring plank and the truck bolster. Since the vertical rack moves relatively up and down as the bolster is depressed or raised in accordance with the variations in the weight on the truck springs due to the changes in passenger load, the whole constitutes a weighing device which automatically adjusts the position of the slide valve, and thus the auxiliary reservoir capacity, to the load on the car. The process of adjustment, however, takes place only when the car doors are open. When they are closed prior to starting the train, the pin that moves the slide valve is retracted by the release, electrically, of the air in the small cylinder on the spring plank, and at the same time the slide valve is locked, by a simple latch, in the position that it had assumed at the instant when the doors were closed. Obviously the retraction of the pin removes the physical connection between the slide valve and the load-measuring device so that the movements of the springs when the car is in motion have no effect, thus preventing any change in the adjustment of the braking force by the up-and-down motion of the car caused by inequalities of the track.

From the foregoing it is evident that a really accurate adjustment of braking power has been attained with reasonably little complexity and small liability for break-down, because the load-measuring device is operative only when the doors are open and the car is, in consequence, stationary. Of course, the apparatus in this installation has neither the extreme simplicity nor the cheapness to make it altogether suitable for an ordinary freight car, for which another type of empty-and-load brake is beginning to come into use, but on rapid transit cars additional expenditures for brake equipment are truly negligible when they afford opportunity for increasing the service on a line that may cost several hundred thousand dollars per mile. Then, too, with the frequent and thorough inspections that are possible and are the rule on electric railways, the introduction of additional apparatus constitutes by no means the serious problem that would be the case with steam railroad equipment.

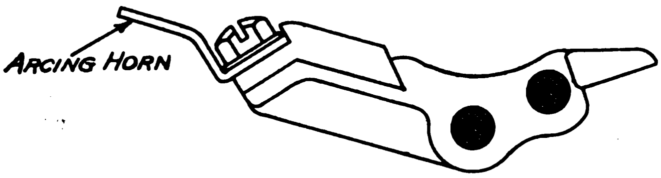
These, in fact, are major conditions which practically assure the commercial success of the innovation, and as its mechanical practicability has been demonstrated by nearly a year of active service, there seems to be good reason for classing it among the important achievements of the railway industry. Certainly when a device permits the application of sufficient braking power to make an emergency stop from 30 m.p.h. in a distance of 194 ft., as in the case under discussion, it constitutes a really definite step toward getting the maximum of capacity out of the road.

Defects in Multiple-Unit Control Equipment

BY C. W. SQUIER, E.E.

Multiple-unit control, as the name implies, was devised as a means for operating several cars, each equipped with its own motors, in trains from a single operating point. For such operation each car of a train is considered a unit and is controlled and operated as a unit independent of the other cars in the train.

Although originally devised for train operation, multiple-unit control, or what now may be more properly termed "unit switch group control," is coming into general use for single car equipment, as it removes the heavy power circuits and the circuit-breaking apparatus from the car platform and permits the installation of these parts in a location where they cease to be a danger and annoyance to passengers. Fundamentally, this system is composed of a set of switches or contactors with heavy contacts for handling the motor current and giving the various circuit combinations necessary for the control of the motors. Small operating controllers at each end of the car control the operation of the switches or contactors. These master controllers are similar in design and operation to the usual drum-type controllers, but are much smaller in size, and handle only the small control current which is admitted to the operating coils of the unit switch group through the train line wires instead of handling the main motor current. The control current is taken either from low-voltage taps of a control resistor connected to the line or from a storage battery.



ARCING HORN WHICH ELIMINATES BURNING AT CONTACTS

Two methods are used for operating the switches or contactors of the unit switch group. One, used by the General Electric Company, employs the control current through solenoid coils to close the electrically operated contactors. The other, practised by the Westinghouse Electric & Manufacturing Company, uses the control current to energize magnet valves, which admit air to cylinders for closing the contactors. The results obtained are the same for both types, the difference being in the method which is employed to operate the contactors.

In the construction of the various parts comprising a multiple-unit control equipment, similar types have been used to those employed for hand controllers, and the troubles and remedies already discussed in previous articles on circuit breakers, controllers, etc., will apply to these parts equally well, so in this discussion I shall take up only those not already mentioned in the articles referred to.

The contacts in all the later types of unit switches are provided with blow-outs, which direct the magnetic flux across the contacts and blow the arc toward the front and away from the operating mechanism of the switches. This is the most efficient and successful type of blow-out and reduces the burning at the contacts to a minimum. If one watches the arc as it is being blown out, he will find it floating to the side of the contacts and thus keeping close to the side of the arc chute. In order to draw this arc away from the restricted part of the arc chute and keep it away from the sides, two important methods have been worked out by the manufacturers. These are not found in the earlier types of unit switch group control, but can easily be added in most cases, and will prove a decided advantage in reducing excessive burning at the contacts. The first consists of the addition of burning or arcing horns to the front of the contacts, so shaped as to stretch the arc and draw it away from the sides of the arc chute. When the circuit is opened at the contacts, the magnetic field set up causes the arc to move from the contacts to the arcing horns, thus lessening the burning at the contacts. An accompanying illustration shows a form of arcing horn that has been added to some of the switches of the Type A B unit-switch group with good results. These arcing horns are held in position by the same screw that fastens the contact tips.

The second method referred to for drawing the arc away from the sides of the arc chute involves the use of pointed contact tips so shaped that the circuit is broken on these pointed ends, and there is still the full width of the tip in contact when the switch is entirely closed. The wiping action of the contacts while closing makes this possible, as they slide over each other from the end to the position where the contacts have full width.

The gases generated by opening the circuit at the contacts cause a yellow metallic layer to be deposited on the sides of the arc chute. This deposit is a very good conductor and causes short circuits if not kept properly cleaned off. The linings of these arc chutes should be examined on each inspection and any deposit scraped off. Care must be taken to see that the gases from arcs are not confined but are allowed to escape by liberal ventilation to the surrounding air. Pockets in the car framing are also a source of trouble where the arc is blown into these. I recall one installation where the line switches were surrounded by car members in such a manner that a few operations of the line switches would fill this space with gas, and short circuits were continually occurring by the arc floating to ground, even though this was a distance of some 12 in. away.

On cars having the Westinghouse electro-pneumatic type of control all magnet valves should be thoroughly cleaned and blown out on regular overhauling, and careful adjustments of the armatures made with metal gages and valve stems lengthened where necessary in order to maintain proper operation at specified voltage. Controllers should then be notched up, and all magnet valves and cylinders inspected for air leakage. If the cylinders leak, the leathers should be removed and replaced with freshly lubricated ones. If a cylinder drops off slowly, inspect for a broken spring.

The following method of treating cylinder leathers has been found to be the most satisfactory: The leathers are worked in Marvin's brake cylinder compound and some of this is rubbed thoroughly into the pores of the leather with the fingers. Any excess of the compound is wiped off with cheese-cloth. Before installing the leathers in the cylinder, the walls of the cylinder are also wiped with a small quantity of the compound. Switch-arm insulators are carefully examined, and any dirt or oil cleaned off, and all switch arms and the controller frame are tested with a lamp circuit for ground. If found clear, the controller frame is grounded and the arms again tested. If grounds show on either test, they are cleared before cars are allowed to return to service.

Multiple-unit control equipments should be given a thorough overhauling at least once a year, when all parts should be removed as far as possible, and switch arms, fingers, pins and all moving parts examined for excessive wear. Broken or burned arc shields, broken shunts, badly worn interlock contacts, or burned tips and arcing horns should be renewed. Broken or oil-soaked switch-arm insulators should be replaced, and all insulation parts should be thoroughly cleaned, then painted or shellacked. All leads to the magnet coils and in the wiring boxes should be tightened and examined for worn insulation or broken strands. Line relays, limit switches and auxiliary relays should be opened up, thoroughly cleaned and tested and adjusted to work properly on low voltages such as might be obtained in service.

Automatic Track Switch in Rochester

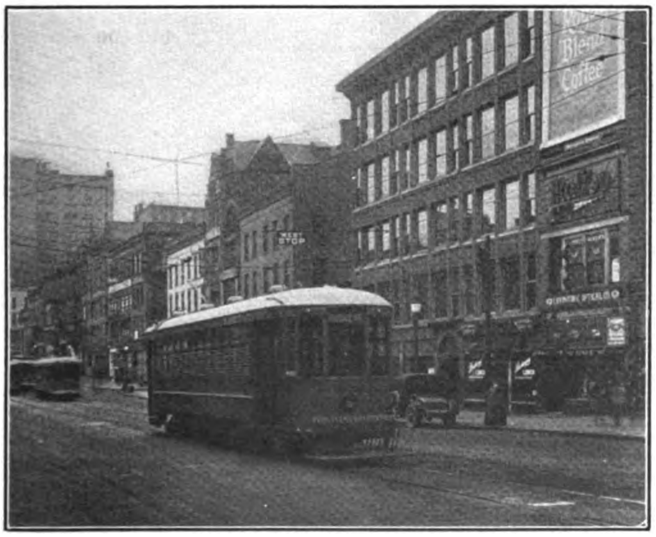
BY C. L. CADLE
Electrical Engineer New York State Railways,
Rochester Lines

In November, 1915, the Rochester lines of the New York State Railways installed at one of the busiest points on its city lines a new type of track switch which is saving its first cost at the rate of about once in every three months, and which has given very satisfactory results from an operating standpoint ever since it was placed in service.

The switch, which is of the Collins non-splitting, non-splashing type, is installed at the corner of Main and State Streets in the city of Rochester. From a study of the traffic conditions at this point it has been found that the number of cars passing the corner and operating the switch, either for main line or for branch line runs, reaches a rate of approximately 150 cars per hour during the maximum fifteen-minute period of the day. During its four months of service no important difficulties have been experienced with its operation. A few minor defects with the mechanism were found, but none of these is serious, and the company thinks so well of the proposition that it expects shortly to install eleven track switches of this type to replace eleven old automatic switches now in operation on the company's city lines.

At the point where the switch is located a switchman was always employed prior to the introduction of automatic operation because of the extraordinarily heavy traffic, which is, in fact, the maximum experienced anywhere on the whole system during the rush hours. The installation of the device has eliminated the switchman at this location, reducing the operating costs approximately $3.30 per day, while the service that is given is just as satisfactory as under conditions of manual operation.

The principal features of the switch that differ from those of the old type generally in operation throughout the country are, first, that it is driven by a motor, thus permitting the introduction of a train of gears to retard the motion of the switch point when it moves from one side of the bed to the other. This causes the switch to operate without splashing. In addition to this the switch point is firmly held in the position to which it is thrown by means of a spring that is connected with a train of gears, and in consequence, the switch point cannot fly back between the trucks of a car and thus make it split the switch. The third important feature is a control that is effected by both a cut-in contact and a cut-out contact so arranged that a following car which is extremely close to the car operating the switch is prevented from throwing the switch point between the trucks of the first car as it passes over the switch point. In the accompanying illustration the cut-in contact is shown just ahead of the trolley pole of the car in the foreground. The cut-out contact does not appear in the picture, being attached to the trolley wire near the frog, approximately over the switch.



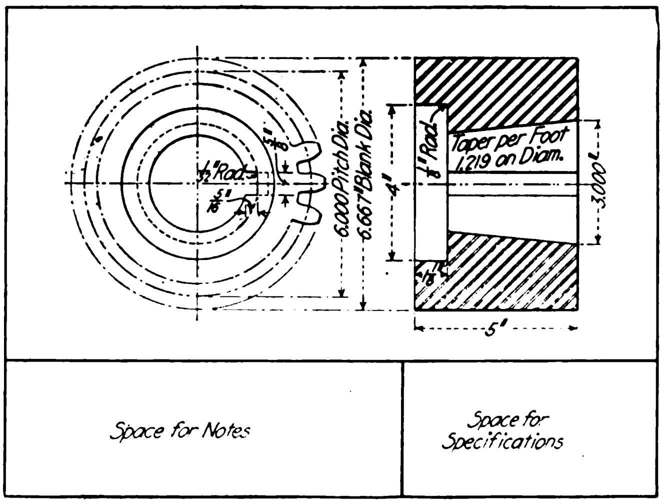
ELECTRIC TRACK SWITCH AT CONGESTED CORNER IN ROCHESTER

Cataloging Equipment Insures Accuracy

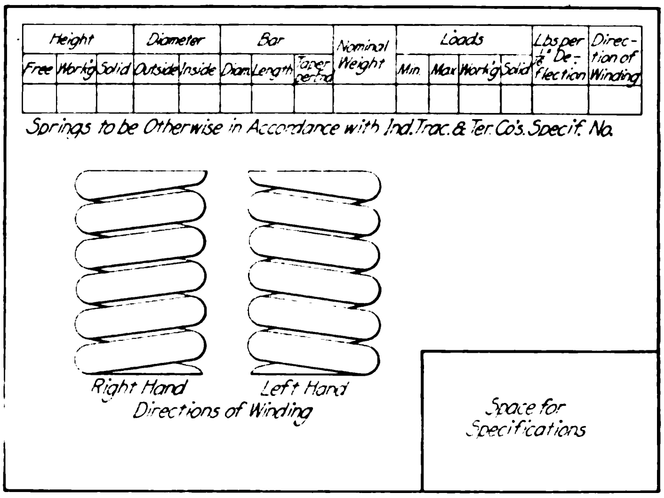
BY L. M. CLARK
Master Mechanic Indianapolis Traction & Terminal Company,
Indianapolis, Ind.

All equipment parts such as springs, gears, pinions, etc., have been carefully cataloged by the mechanical department of the Indianapolis Traction & Terminal Company, Indianapolis, Ind. All the principal dimensions, weights, maximum, minimum, working and solid loads and deflections are itemized for helical and elliptic springs. Reproductions of typical pages taken from the catalog of equipment parts for helical and elliptic springs are shown in the illustration below and those on the next page.

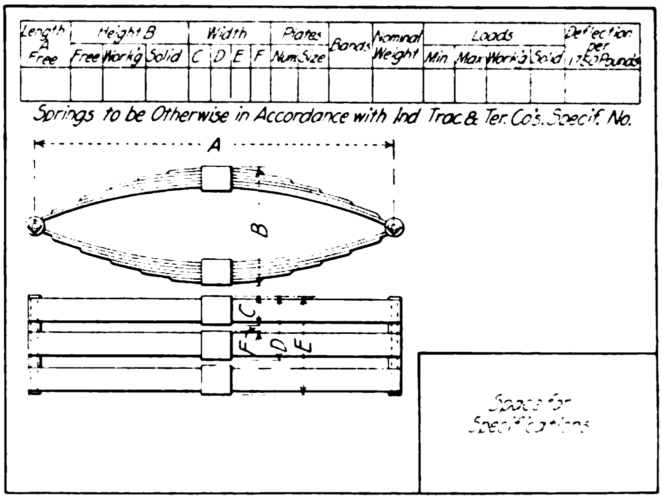
Catalog pages for gears and pinions show all dimensions both in plan and section for the various types. The name of the manufacturer, the number of the motor and the gear ratio are also indicated. All the different types of springs, gears or pinions, as the case may be, are then classified and indexed to show what types are used with certain classes of trucks and motors. A reproduction of one of these classification sheets is also



INDIANAPOLIS EQUIPMENT CATALOG—REVISED PINION DATA SHEET


Height
Free
Work'g
Solid
Diameter
Outside
Inside
Bar
Diam.
Length
Taper'd
Nominal Weight
Loads
Min.
Max
Work'g
Solid
Lbs per ½" Deflection
Direction of Winding
Springs to be Otherwise in Accordance with Ind. Trac. & Ter. Co's. Specif. No.
Right Hand
Left Hand
Directions of Winding
Space for Specifications

INDIANAPOLIS EQUIPMENT CATALOG—HELICAL SPRING DATA SHEET


Length A Free
Height B
Free
Work'g
Solid
Width
C
D
E
F
Plates
Num
Size
Bands
Nominal Weight
Loads
Min.
Max
Work'g
Solid
Deflection per 1750 Pounds
Springs to be Otherwise in Accordance with Ind Trac & Ter. Co's. Specif. No.
A
B
C
D
E
F
Space for Specifications

INDIANAPOLIS EQUIPMENT CATALOG—DOUBLE ELLIPTIC SPRING DATA SHEET

shown in the accompanying table. All drawings are on standard correspondence size sheets so that they may be bound under one cover. An issue letter is added to the drawing number shown in the title to indicate revisions in the standard drawings for any particular equipment part. The original drawing contains only a number, and revised drawings are lettered beginning with the first letter of the alphabet. This method of cataloging equipment parts not only facilitates the work of making requisitions for repair parts but insures the greatest possible accuracy when it is used for reference purposes.

INDIANAPOLIS TRACTION & TERMINAL COMPANY TERRE HAUTE, INDIANAPOLIS & EASTERN TRAC. CO.

CLASSIFICATION OF SPRINGS

Issue of May 1, 1913

TRUCK SPRINGS

Truck	Elliptic		Helical										
	Side Frame	Bolster	Side Frame	Bolster			Equalizer			Journal Box			Motor Susp.
			Single	Single	Outside	Inside	Single	Outside	Inside	Single	Outside	Inside	
Peck Single	1411		1438							1439			1437
Dupont Single	1410 1428		1435							1436			1437
Peck 14-B-3		1412					1441			1442			1437
Brill 27-G		1415		1448						1449			1437
Brill 27-F		1416		1451						1452			1437
Brill 27-F-1		1416		1451						1452			1437
Std. 0-50		1417					1454						1455 1456
Std. C-50-P		1420						1457	1458				

Truck	Elliptic		Helical										
	Side Frame	Bolster	Side Frame	Bolster			Equalizer			Journal Box			Motor Susp.
			Single	Single	Outside	Inside	Single	Outside	Inside	Single	Outside	Inside	
Dorner No. 18		1426						1443	1453				1437
Peck 14-a-xx		1413			1444	1445					1446	1450	
Peck 36-8 (61-79)		1429						1459	1447				
Peck 36-8 (20-58, 1-2)		1414						1459	1447				
Bald, 78-35 (P's. F't)		1424 1425						1460	1461				
Std. C-80 (65-90)		1421					1459						
Std. C-80 (20-58, 11)		1422 1423						1459	1462				
Std. C-80 (600)		1421					1463						

MISCELLANEOUS SPRINGS

Damper Coil, Std. 0-50 Truck	1470	Brake Release spring, Peck 14-0-xx Truck	1481
Dead Lever Guide, " "	1471	Trolley Base, U. S. No. 1-6-10 and 11.	1484
" " " Std. C-50-P Truck	1471	Single Jour. Box, McGuire Sweepers Nos. 37-38	1485
¾ Flat Hanger Coil	1472	Track Switch Box	1486
1" " " "	1473	Siding Spring Switch	1487
1¼" " " "	1474	Draft Spring, City Car Coupler	1488
¾" Parabolic Hanger Coil	1475	Sand Rigging Coil	1489
1" " " "	1476	Draft Spring, Tomlinson, M.C.B. Coupler, Outside	1479
Dead Lever Guide. Std. C-80 Truck	1477	" " " " " " Inside	1483
Damper Coil, " " "	1478	Clutch (10") spring, Concrete mixer	1470
Brake Release Spring, Std. Light	1480	Bolster spring, Barney & Smith Truck	1427
" " Std. Heavy	1482		

Contact Signals for Jamestown (N. Y.) Lines

An unusually complete installation of Chapman trolley-contact signals has recently been made on the city and interurban lines centering in Jamestown, N. Y. On the city lines, which are operated by the Jamestown Street Railway Company and the affiliated Chautauqua Traction Company, nine blocks have been installed. Five of these are on a 4-mile single-track section of a suburban line which extends from Jamestown to a suburb several miles from the city. Over this line city cars are run at twenty-minute intervals in winter and at ten-minute intervals in summer, and the installation possesses no unusual features, being a typical example of the use of signals to accelerate movements on a low-speed line.

However, four other blocks that have been installed in connection with a single-track loop line in the city provide a combination of car-spacing and traffic-accelerating signals that is uncommon. The loop is about 2½ miles long and it surrounds the most closely-built section on the south side of the city, a ten-minute service being maintained on it in both directions throughout the day. The ten-minute headway on the loop line is filled out in one direction by cars that turn into the loop from a single-track line which branches off one side of the loop, and serves an outlying part of the city. These cars are operated on a twenty-minute headway and they alternate on the loop with the loop-line cars in one direction to maintain the ten-minute headway over that section of the line. The spacing of the cars on the loop line is maintained by three signal blocks, and an additional block about 1 mile long has been installed on the branch to establish the same spacing between the loop-line cars and the branch-line cars when they turn onto the loop.

CAR SPACING SIGNAL AT JUNCTION OF BRANCH LINE AND CITY LOOP IN JAMESTOWN

TYPICAL HIGH-SPEED INTERURBAN SIGNAL ON JAMESTOWN, WESTFIELD & NORTHERN RAILROAD

Cars on the branch line that approach the junction with the loop are controlled by the signal at the junction, which prevents their entering the next block on the loop until the preceding loop-line car has reached a point about ten minutes in advance. At the same time the opposing signal holds the block on the branch line against the car which has passed around the loop and is ready for the out-bound service on the branch line, thus preventing interference with the in-bound car that is approaching the loop to take its place in the ten-minute service on the loop line.

The importance of this elimination of interference arises from the fact that the 2½-mile loop is covered in just about twenty minutes—the headway between branch-line cars—and also because of the fact that the branch line joins the loop at the top of a steep hill which obscures the view in both directions. In consequence, the car that is just preparing to leave the loop for the branch line is liable to be on the time of the car which is approaching on the branch line and preparing to enter the loop. If either one or the other happened to be slightly late there might easily be a question, without the use of the signals, as to just where each car was.

The fifteen blocks that have been installed upon the interurban line, which is the converted steam railroad known as the Jamestown, Westfield & Northern Railway, and described in the ELECTRIC RAILWAY JOURNAL for June 12, 1915, are used to protect a service of high-speed cars now operating over the line. Limited cars make the run of 32 miles between Jamestown and Westfield in fifty-nine minutes, and the locals make the run in one hour and fourteen minutes, passenger trains being run at one-hour intervals. In addition there are six baggage-car runs, together with work-car and freight transfer service that is handled by an electric locomotive, the line having been built originally as a connecting link for freight interchange between the trunk-line steam railroads that cross it.

These signals were installed only as a safeguard to high-speed traffic, as the train-order system of operation with "31" orders, as well as "19" orders, has been retained in force since the signals were installed. The signals are designed for high-speed operation in every respect, special provision having been made to eliminate evil results from grounds or crosses on the line wires. Some difficulty was at first experienced through the tendency of motormen to run too fast through the contactors, since it was found that speeds in excess of 40 m.p.h. were liable to cause mechanical damage. However, this difficulty has been entirely obviated since the motormen have become familiar with the signals and their locations, and the cost of maintenance has dropped to negligible figures.

Dynamic Balance

At the recent New Orleans meeting of the American Society of Mechanical Engineers, N. W. Akimoff, engineer Dynamic Balancing Machine Company, Philadelphia, discussed the subject of dynamic balance as opposed to the more commonly understood condition of static balance. For the latter to exist it is necessary only for the center of mass of the body to lie somewhere upon the axis of rotation so that the body is in neutral equilibrium in regard to this axis. For dynamic balance, however, there must first be static balance, and in addition the body must be free from any so-called centrifugal couple in any axial plane. Centrifugal couples are due to two masses on opposite sides of the shaft, and located at a certain distance axially from each other. Such masses may be, for instance, the centers of gravity for corresponding congested regions.

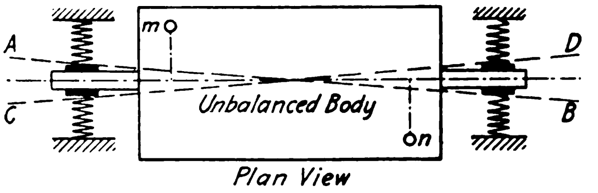


FIG. 1—EFFECT OF DYNAMIC UNBALANCE IN A STATICALLY BALANCED BODY

A condition of dynamic unbalance is illustrated in Fig. 1, which shows a case where vibration may take place even though the rotating body is in static balance. To offset the effect of such a couple as appears here, there must be introduced another couple equal and opposite in effect, and to determine the exact location of the axial plane of the disturbing couple which must be counteracted as well as the numerical value of the disturbing couple and its sign, a new form of balancing machine has been developed. This consists of a rigid horizontal beam, such as a lathe bed, which is hinged at one end and supported by a spring at the other. The body to be tested for dynamic balance, which must be previously placed in perfect static balance, is supported on the beam. If this body is dynamically unbalanced, the body will, when rotated, cause the beam to vibrate in a vertical plane with a period of oscillation equal to the period of rotation of the body.

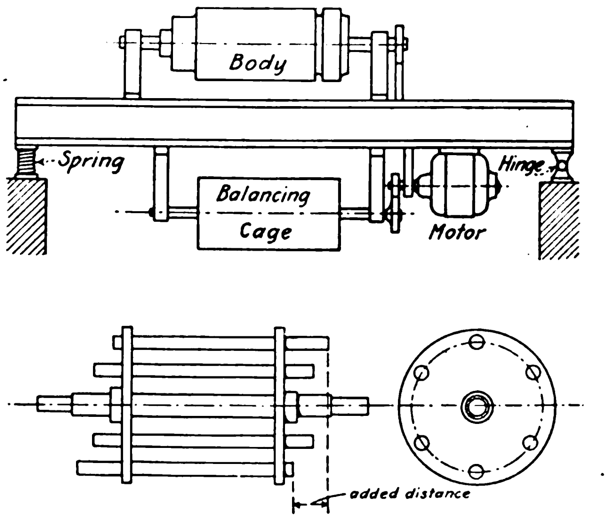


FIG. 2—DYNAMIC BALANCING MACHINE AND CONSTRUCTION OF TESTING CAGE

Below the bed of the machine is supported a so-called squirrel cage that is rotated in unison with the article to be tested. The cage consists of two circular disks carrying an even number of rods, usually six or eight, arranged to slide through the disks. The rods are accurately made and their common weight is known, so that any displacement of one of them with respect to the one exactly opposite will not affect the static balance, originally perfect, but will introduce a certain centrifugal couple according to the displacement. This displacement has been called the "added distance." Thus the cage has means for indicating the exact amount of unbalance which must be put into it in order to counteract, or to reproduce with the opposite sign, the exact unbalance that exists in the article to be tested.

Speed of rotation of the body to be tested is important only as regard the characteristics of the springs that support one end of the bed, and in practice the speed of the cage is never higher than 400 r.p.m. Theoretically, one pair of rods in the cage would suffice to establish the extent of the counteracting couple, since the relative position of the rods to the body that is being tested can be altered readily through the transmission, which is a sprocket chain between the squirrel cage and the piece that is being tested. For convenience, however, it is best to have three or four pairs of rods, and even then it is sometimes necessary also to change the angular position of the cage so that the balancing can be done finally by one pair of rods and not two, as often happens at the beginning of a test. When the rods in the cage have been so adjusted as to eliminate vibration in the bed of the machine, the added distance may be directly determined by measuring the change in position in the two rods, and the body to be tested may be placed in perfect dynamic balance by adding or deducting weight at opposite sides of the axis and at opposite ends of the body to set up a couple equal to that indicated by the adjustment of the rods in the cage, this couple counteracting the disturbing couple existing originally in the tested body.

Savings and Loan Fund for Commission Employees

Through the efforts of the executive committee of the Public Service Commission Association a savings and loan fund for the benefit of the employees of the commission is about to be established. Deposits will be received from officers and employees of the commission. No one will be allowed to deposit more than $10 per calendar month, except by special action of the finance committee. Loans will be made from such funds to officers and employees of the commission applying for the same, in the manner designated by the savings and loan committee. No person, however, is to be allowed to borrow more than the amount of his accrued salary, and in any case not more than 50 per cent of his monthly salary, except by special action, payable on the next monthly pay-day of the office in which the borrower is employed. The accumulations or net profits will be divided semi-annually on May 31 and Nov. 30 among the depositors, according to the amounts and time of their deposits.

According to the *Elektrotechnische Rundschau* electro-magnetic couplers are being introduced on the German railways for switching purposes. The buffers of the switching locomotives are replaced by iron cylinders wound as electro-magnets and the front buffers of the trucks fit into a semicircular recess in these cylinders. To release the truck it is only necessary to switch off the circuit. A considerable saving in labor for switching operation is anticipated.

Electric Railway Legal Decisions

Charters, Ordinances, Franchises

ALABAMA.—*Transfers Assumed to Be Valid Until Proved Otherwise.*

In an action against a street railway for wrongful ejection of the plaintiff, whose transfer was refused, it is to be presumed that the transfer was valid until the contrary appears. (Birmingham Railway, Light & Power Co. v. Smith, 69 Southern Rep., 910.)

ARKANSAS.—*Injury to Property by Change of Grade.*

That a street railway company persuaded a City Council to pass an ordinance creating an improvement district, by the acts of which district plaintiff's property was damaged by changing the street grade, does not create a liability on the part of the railroad for such damages. (Red v. Little Rock Railway & Electric Co., et al., 180 Southwestern Rep., 220.)

CALIFORNIA.—*Ordinance to Sprinkle Streets Presumed to Be Legal.*

Where a municipality by ordinance required that a street railroad operated therein should sprinkle its tracks to lay the dust, all presumptions were in favor of the validity of such ordinance, so that the burden was on the railroad questioning it to show its invalidity. In the absence of showing to the contrary, the court was required to assume that it was a necessary police measure and that the injury it was intended to obviate was caused entirely by the railroad. (Pacific Gas & Electric Co. v. Police Court of City of Sacramento, et al., 152 Pacific Rep., 928.)

ILLINOIS.—*Construction of Text of Ordinance.*

A city ordinance embodying a contract between the municipality and street railways could be construed only in the light of its text, and not in the light of letters, statements and opinions as to its meaning of members of the local transportation committee of the city council which it did not appear were brought to the attention of the council itself at large when the ordinance was submitted to it for passage, since it is the intention of the City Council which the courts must endeavor to determine, not the intention of committee members, in construing an ordinance. (People ex rel. Dwight v. Chicago Railways et al., 110 Northeastern Rep., 386.)

ILLINOIS.—*Municipality Can Contract for Rights in Streets Only Within Its Own Boundaries.*

An ordinance of a village, granting a street railway the right to use its streets, which was accepted by the railway, provided that a 5-cent fare only should be required to a point within the city of Chicago. Thereafter Chicago annexed a part of the village territory and provided by ordinance, which was accepted by the railway, that it must collect a fare from each passenger and could not accept transfers issued at points without the city limits. In a suit to compel the restoration of the 5-cent rate from the village to the point within Chicago, it was contended that the condition prohibiting the exchange of transfers imposed by the city on the railway was invalid, the claim being based on the assumption that the railway was under obligation to maintain a 5-cent fare between the village and the point within Chicago under the village ordinance, that the duty was public, and that any contract not to perform it was void as against public policy. Held, that the contention was invalid, as the power of a municipality to regulate the conditions on which a street railway may occupy its streets is dependent on the jurisdiction of the municipality over the streets and subject to transfer to another municipality. (People ex rel. Dwight v. Chicago Railways et al., 110 Northeastern Rep., 394.)

INDIANA.—*Consolidation—Equitable Relief—Right of Directors to Vote as Stockholders.*

To warrant the interposition of a court of equity in an action by a stockholder in one of two street railway companies to annul a consolidation agreement between them and to restore to one of them the property owned by it prior to consolidation, the facts well pleaded must constitute a fraud or breach of trust, and that the act may be unwise is no ground for relief in equity.

Directors in a street railroad company who are also directors in another company are not disqualified from voting at the stockholders' meeting for the consolidation of the two companies, where the statute authorizing consolidation does not disqualify them, as stockholders are not regarded as trustees for one another. (Norton et al. v. Union Traction Co. of Indiana et al., 110 Northeastern Rep., 113.)

INDIANA.—*Consolidation of Railroads—Compensation.*

Burns' Ann. St. 1914, Secs. 5685-5691, authorizing the consolidation of street railway companies, does not violate Const. Art. 1, Sec. 21, providing that no man's property shall be taken by law without just compensation or, except in case of the State, without such compensation first assessed and tendered, in that it permits the conversion of stock of dissenting minority stockholders without provision for appraisal and payment of its value. (Thomson et al. v. Indiana Union Traction Co. et al., 110 Northeastern Rep., 122.)

KANSAS.—*Verified Statements to Municipality Sufficient and Submission of Books and Records Unnecessary.*

Where a public utility corporation has complied with the provision of an ordinance extending its franchise and providing for the filing with the city clerk of verified, annual statements, showing its receipts and disbursements, mandamus will not lie to compel the corporation to submit its books and records to the city for inspection, for the purpose of verifying the correctness of such statements. (City of Wichita v. Wichita Railroad & Light Co. et al., 152 Pacific Rep., 768.)

MISSISSIPPI.—*Compensation for Damages from Second Track.*

The laying of an additional track in a street does not constitute a "public nuisance," by which abutting landowners sustain such special damages as to entitle them to abatement thereof, but they are entitled to compensation for actual damages suffered thereby, and such compensation must be made before the track is laid. (Williams et al. v. Meridian Light & Railway Co. et al., 69 Southern Rep., 596.)

NEW YORK.—*Time Limit on Transfer Expired While Passenger Waited for Car.*

The conductor of a street railway, receiving a passenger from another line with which it had a transfer agreement, is charged with knowledge of its own schedules and is bound to give due consideration to the passenger's statement that a transfer presented by him shortly after an hour at which it was marked to expire was given to him but shortly before the time limited, and that the time had expired while he was waiting at the transfer point, hence the company was liable for ejecting him for refusal to pay fare. (Kenney v. New York Railways, 154 New York Sup., 151.)

NEW YORK.—*Reasonableness of Extra Charge for Cash Payment to Be Determined by Commission.*

Public service commissions law (Consol. Laws, chap. 48, sec. 28), provides for the filing by the carrier of a schedule of tariffs, together with regulations determining the aggregate of such tariff in each particular case. Sec. 49 confers upon the commission a supervisory control over such tariffs and provides that whenever it deems the tariffs or regulations unjust or unreasonable it may determine the just and reasonable rates and fares, to be thereafter observed. An interurban electric railway company filed a schedule providing for an extra charge to the passenger of 10 cents where he had not purchased a ticket. Plaintiff was ejected from defendant's car for refusal to pay the extra charge and brought action on the ground that, the regulation being unreasonable, he was justified in refusing to pay. Held, that he had no standing to bring the action, the attack being on the rule itself, and not on the manner of its enforcement, and the reasonableness thereof being for the initial determination of the Public Service Commission, and not for the court. (Metzger v. New York State Railways, 154 New York Sup., 789.)

WEST VIRGINIA.—*Ejection of Passenger for Disorderly Conduct After that Conduct Had Ceased.*

Where the evidence tends to show the passenger's persistence in disorderly conduct and the use of vulgar and profane language warranting ejection, an instruction is erroneous which forbids the exercise of that right, if, at the time therof, the passenger "had ceased to curse and swear and had ceased his disorderly conduct." (Frank v. Monongahela Traction Co., 83 Southwestern Rep., 1009.)

UNITED STATES.—*Conditions Under Which Injunction Against Order of Corporation Commission Will Be Granted.*

A clear case of unreasonable, arbitrary or confiscatory action on the part of a State corporation commission in directing a street railway company to double-track one of its lines for a specified distance must be made before a federal court may restrain the enforcement of the commission's order by an interlocutory injunction. (Phoenix Railway of Arizona v. W. Paul Geary, Frank A. Jones and Amos W. Cole, members of the Corporation Commission of the State of Arizona, 36 Supreme Court Rep., 45.)

Law of Negligence

ALABAMA.—*Law Imputing Negligence of Automobile Driver to All Occupants of Private Car Invalid.*

Automobile act (Acts 1911, page 649, Sec. 34), providing that the contributory negligence of the person operating any motor vehicle shall be imputed to every occupant thereof but not to passengers paying fare and riding in motor vehicles regularly used for public hire, is repugnant to the State and federal constitutions, because discriminating against persons riding in motor vehicles and denying equal protection of the law to persons similarly situated. (Birmingham-Tuscaloosa Railway & Utilities Co. v. Carpenter, 69 Southern Rep., 626.)

ALABAMA.—*Injuries to Stock—Burden of Proof.*

Where plaintiff sought to recover for the killing of a calf by a street railroad, the burden of proof was upon him to show negligence of the railroad, for the statutes affecting the burden of proof in cases where stock was killed by railroads do not apply to street railways. A street railway is liable for killing stock on its right-of-way only where its neglect is the proximate cause thereof. (Montgomery Light & Traction Co. v. Woods, 70 Southern Rep., 119.)

CALIFORNIA.—*Last Clear Chance Doctrine.*

In an action for injuries due to a collision between an automobile and defendant's street car, an instruction attempting to charge upon the doctrine of last clear chance was erroneous in telling the jury that defendant would be liable if the motorman was in position to know of the danger to plaintiffs and failed to exercise ordinary care to protect them, as eliminating the doctrine of contributory negligence. (Quackenbush et al. v. Los Angeles Railway Corp., 151 Pacific Rep., 756.)

INDIANA.—*Duty to Look and Listen a Continuing One.*

The duty to use one's eyes and ears in interests of safety when crossing tracks is a continuing one, not excused by obstruction of the view if the approach of the street car might be ascertained from any point, and the failure of a driver to perform such duty was contributory negligence, barring a recovery for injuries in a collision. (Evansville & Southern Indiana Traction Co. v. Williams, 109 Northeastern Rep., 963.)

IOWA.—*Automobile Stopped on Tracks—Doctrine of Last Clear Chance.*

Where an automobile owner was negligent in driving upon a street railway's tracks, and then stopped, involuntarily killing his engine, so that he could not extricate himself, and the motorman of an approaching car negligently failed to stop, when he might have done so, and injured the automobile, the street railway was chargeable with the damage under the doctrine of last clear chance. (Joyner v. Interurban Railway, 154 Northwestern Rep., 936.)

KENTUCKY.—*Attorney Has Lien on Amount of Judgment Not of Actual Payment.*

Under Ky. St. Sec. 107, giving an attorney's lien for fees, where a client, after a judgment in his favor, settled with the adverse party for an amount less than that awarded him by the judgment, the attorney, having a contingent contract for one-half of the recovery, was entitled to one-half of the amount of the judgment, instead of one-half the amount of the compromise. (Chreste v. Louisville Railway, 180 Southwestern Rep., 49.)

KENTUCKY.—*Joint Tort-Feasors in the Case of a Broken Trolley Wire.*

A street railway company established a crossing over the tracks of a railroad company, and the contract required the trolley wire to be maintained 22 ft. above the track. The contract authorized the removal of the trolley in case it sagged below that level. The trolley wire, which sagged, was struck by a wrecking train, and on the return trip was broken by the train. The railroad company had knowledge of the condition of the wire. A person struck by the live wire recovered against both the street railway company and the railroad company. Held, that the railroad company was not entitled to contribution from the street railway to the amount of the recovery against it. (Owensboro City Railroad v. Louisville, Henderson & St. Louis Railway, 178 Southwestern Rep., 1043.)

MASSACHUSETTS.—*Animals Running at Large.*

A bull at large on a highway without a keeper, while subject to being distrained under Rev. Laws, Chap. 53, Secs. 22, 23, is not a trespasser as to a street railway, and a street railway owes it the ordinary duties of care in such cases. (Carrington v. Worcester Consolidated Street Railway, 109 Northeastern Rep., 828.)

NEBRASKA.—*Passenger on Steps.*

It is not negligence *per se* for a street car passenger to take a position with one foot on the steps of the car, with one hand holding onto the handrail, and one foot swinging in the air, preparatory to alighting at his place of destination. But if he should be injured by slipping from the steps while the car is in motion he must prove that his slipping from the steps was occasioned by the negligent operation of the car. (Jelinek v. Omaha & Council Bluffs Street Railway, 154 Northwestern Rep., 545.)

NEW YORK.—*Under Workmen's Compensation Act a Motorman Is Not Engaged in His Employment When Going to Have His Watch Tested.*

The workmen's compensation law provides that compensation shall be payable for injuries sustained by employees "engaged in the following hazardous employments," group 1 of which includes the operation of street railways, etc.; "injury" is defined as "accidental injuries arising out of and in the course of employment"; and an "employee" is defined as a person engaged in a hazardous employment for an employer, carrying it on upon the premises or at the plant, or in the course of his employment away from the plant. Decedent, a motorman, finished his work for the day, signed his name to the register as evidence thereof, and started to take one of the company's cars to go to have his watch tested, a fortnightly requirement of the company, which designated and paid the person making the test, when he was killed by an automobile running near the curb. Held, that decedent was not engaged in the operation of a street railway, included as a hazardous employment, and that the testing of his watch was merely a condition of the employment, so that the employer was not liable. (De Voe v. New York State Railways, 155 New York Sup., 12.)

OREGON.—*Effect of Contributory Negligence Under Workmen's Compensation Act.*

Under employers' liability law, declaring that the contributory negligence of a person injured shall not be a defense but may be taken into account by the jury in fixing the damage, slight carelessness of an employee will not bar recovery for an injury caused by the employee's carelessness and the gross negligence of the employer. But in all cases where there has been any negligence on the part of the employer, the issue of contributory negligence must be submitted to the jury for comparison. (Hartman v. Oregon Electric Railway, 151 Pacific Rep., 472.)

VIRGINIA.—*Injuries from Fellow Passenger.*

Where one passenger is attacked and injured by a fellow passenger, and the assault was unexpected by the train crew and they were in a position where they could not offer protection, there can be no recovery from the company. (Virginia Railway & Power Co. v. McDemmick, 86 Southeastern Rep., 744.)

NEWS OF ELECTRIC RAILWAYS

U. S. SUPREME COURT RULES AGAINST COMPANY

So-Called St. Louis Mill Tax Case Decided Against United Railways—Ordinance Imposing Tax Passed in 1903

The Supreme Court of the United States on April 10 dismissed for want of jurisdiction the appeal of the United Railways, St. Louis, challenging the validity of the St. Louis mill tax ordinance, assessing a tax of 1 mill on the railways for every passenger carried. The decision was in suits instituted by the city to recover from the company amounts aggregating $2,500,000.

Richard McCulloch, president of the United Railways, refused to comment on the decision. He referred the St. Louis newspapers to Henry S. Priest, counsel for the company, who conducted the case for the company before the Supreme Court. Mr. Priest is reported to have said that nothing was left for the company to do but to contest the cases which have not yet been tried involving the tax. The total of judgments already obtained is $2,500 000. The total amount said to be due to the city is $3,500,000. A special reserve fund was set up by the company to meet a possible decision unfavorable to it, the fund consisting of United States bonds and other securities in the treasury.

Argument in the case was heard by the United States Supreme Court on April 5. Mr. Priest, in opening his argument before the court, declared that in the former decision of the court the validity of the mill tax ordinance was not passed upon and that therefore the decision of the Supreme Court of Missouri, which assumed that the Supreme Court of the United States had upheld the validity of the mill tax ordinance, was incorrect. He declared that the tax ordinance was invalid, because it was confiscatory and was in effect double taxation. Charles P. Daues, City Counsellor, and Truman P. Young, assistant City Counsellor, of St. Louis, arguing for the city authorities, contended that the ordinance was a valid exercise of the taxing power, and that the validity of the ordinance was upheld in the first decision of the United States Supreme Court and that the decision of the Missouri Supreme Court should be affirmed.

In 1903 the Municipal Assembly passed an ordinance requiring the United Railways to pay the city of St. Louis, in addition to all of its other taxes, a tax of 1 mill per 5-cent passenger, which amounts to a tax of 2 per cent upon the gross receipts of the company. The matter was tried in the United States Courts on the claim of the United Railways that the imposition of the tax was a violation of the franchise contracts between the city and the United Railways. Two United States judges decided this claim in favor of the company, but when the question reached the United States Supreme Court, that court decided that the imposition of the mill tax could not be considered a violation of a contract agreement.

The question in regard to the justice or the validity of the tax, however, still remained unsettled. The city then brought suit in the local Circuit Court to enforce the payment of the tax. The Circuit Court decided in favor of the city. Upon appeal to the Missouri Supreme Court the question was decided in favor of the city by a divided court, four of the judges voting to enforce the tax and three of them voting that the tax was illegal. The matter was then appealed by the United Railways to the United States Supreme Court. The question at issue before this court was whether or not this was a just tax, and whether or not it was in the nature of double taxation, inasmuch as the United Railway Company already paid city, State, school, franchise and government taxes.

Based upon the present earnings of the United Railways the mill tax amounts to about $235,000 a year. Some time ago the company said in the *United Railways Bulletin* that if it should be required to pay this additional tax of $235,000 a year it would be paying considerably more than 10 per cent of the entire annual gross receipts of its lines for the purposes of taxation.

TOLEDO STRIKE DECLARED OFF

Victory for Open Shop—Court Allows Increase in Fare to Provide Funds for Cars and Other Added Expenses

The Toledo Railways & Light Company, Toledo, Ohio, and its motormen and conductors reached an agreement on the evening of April 9 and the road resumed operation the following morning at 7.30 o'clock, after having been idle since the afternoon of March 28. The company had presented a proposition earlier in the day and the men accepted it by unanimous vote at 5.15 o'clock in the afternoon.

No union buttons will be worn by the men while on duty. This contention, considered the most important by it, was won by the company. The road will, therefore, be operated on the open-shop plan. The company, however, yielded a number of other points considered less vital than the contention of the union for a closed shop. The wage scale agreed upon, in cents per hour, is as follows:

	1916	1917	1918
First year of service	26	27	28
Second year of service	27	28	29
Third year of service	28	29	30
Fourth year of service	29	30	31
Four years and over of service	30	31	32

All tripper and plug runs are to be eliminated as far as possible and no runs are to return less than seven hours' pay in one day. The day for the regular men is to be on the two-turn system and no run is to exceed ten hours' straight time, the time to be divided as equally as possible. Runs are to be assigned in accordance with seniority and the list is to be opened for reselection at least every three months. The extra list of men is to be operated at the respective carhouses on the revolving plan. Regular motormen and conductors, when required to work overtime in emergency, are to be paid time and one-half. While instructing new men the regular men are to be paid 25 cents a day in addition to their regular time. Platform time is to be paid sand-car, wreck-car and work-train employees and flagmen at railway crossings.

Carhouse employees will work nine hours a day and receive 20 cents an hour this year, with an increase of 1 cent an hour next year and an additional cent in 1918. Shopmen are to work eight hours a day, with half an hour for meals. The present rate of pay for the hours worked is advanced 15 per cent, and in emergencies the men are to receive time and one-half after ten hours. Six days are to be considered a week. The men are to have free transportation. All employees are to be paid from the time they are called for duty until they are relieved.

The right of discipline is vested in the company, but employees discharged by the superintendent or others are to have the right to a hearing before company officials. No discrimination is to be shown and the men have the privilege of joining the union or not, as they desire. No sympathetic or other strike is to be declared, except for violation of the terms of the agreement. It is specified that no badge or other emblem objectionable to the company shall be worn and the company has the right to determine the kind of uniform that shall be worn, although employees may buy uniforms in the open market.

The motormen and conductors receive an increase in wages of 3 cents an hour this year and 1 cent each for the two years following. The hours of the shop men and others are reduced from ten to eight with no reduction in wages.

As a result of the strike settlement the Federal Court did not appoint a receiver for the company. In order to provide funds for paying the increased wages and purchase additional cars, Judge Killits authorized the company to charge a straight 5-cent fare at all hours in the day, with six tickets for 25 cents. Heretofore the rate has been 3 cents during the rush hours morning and evening. The court said the company had made the low rate voluntarily, but because of the fact that it has no franchise it has a right to make the rate anything that is fair. The only thing the city can do is to fix a rate and then notify the company to accept it or cease operating on the streets.

On April 10 the court named Capt. John Craig as custodian of the portion of the fund derived from the increase in fares. The money so derived is to be set aside for the purchase of cars.

At the request of Henry L. Doherty a conference with the Council committee on street railways was held on April 10. Mr. Doherty asked that the city select an expert to reroute the cars in such a way as to get the greatest mileage from them, the expense to be borne by the company. He explained that if the city did the rerouteing it would eliminate any doubt regarding the sincerity of the company. Several phases of the proposed betterment of the service were discussed at this meeting. Mr. Doherty told the committee that it would require months to secure new cars, but he agreed that an order should be placed at this time, payment to be made by the Doherty Company, since the Toledo Railways & Light Company cannot secure funds for that purpose now, except through the accumulation from the receipts, as already mentioned.

The electrical workers share in the reduction of the work day from ten to eight hours and the increase in wages.

Mr. Doherty issued a statement in which he said:

"The record of this strike is without parallel in the history of the country and will put Toledo in a class by itself in the eyes of the people throughout the country. There has been not a single arrest, directly or indirectly caused by the strike. Not a blow has been struck, no property damaged. Any city can be proud of such a record, and it is convincing evidence that Toledo is a city of law and order.

"We had told our men that if they would be patient we would endeavor to work out a settlement of the street railway franchise problem and as soon as that settlement was reached we would advance their pay. The men decided to leave the matter in my hands. Later, when they were urged to organize and strike the temptation was irresistible.

"There was a serious difference of opinion between our men. Some wanted to organize and enforce their demands and others emphatically opposed it. The company cannot give good service with two warring factions of employees. We therefore were compelled to take the position that there should be no discrimination or distinction between union and non-union men.

"I hope that every car rider will refrain from doing anything that will cause lack of harmony between our men. A word of counsel from the conservative element of our car riders to all who show a disposition to excite quarrels and arguments will be greatly appreciated by the company."

MR. HENRY EXPLAINS PROPOSED IMPROVEMENTS

Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, made an address before the Westwood Civic Association, Cincinnati, on the evening of April 6, in which he explained the plans of his company for extending its line from Rushville, Ind., to Cincinnati, in case the proposed rapid transit loop is built to give the road an entrance to the heart of the city. Mr. Henry placed special stress on the importance of approving the $6,000,000 bond issue for the construction of the loop on April 25. He asserted that the trade population of Indianapolis has been increased 50 per cent by the interurban railways which enter the city, and that Cincinnati may receive the same benefit if it will make their entrance possible.

Mr. Henry said his company was prepared to spend $500,000 in making connections with the proposed rapid transit loop. The extension of the line, however, depended entirely upon the construction of this loop. It would do no good to build the road to the outskirts and bury it there. The plan of the company was to build a line from Rushville, Ind., through Brookville to Harrison and thence to Westwood. From the latter place the cars would run over the Cincinnati & Westwood line to Queen City Avenue, from which a connection with the rapid transit loop would be built.

Mr. Henry said that the run between Indianapolis and Cincinnati could be made in three hours, and that a sleeper service would be operated after midnight on a schedule of about five hours.

TOLEDO SETTLEMENT PLAN SUMMARIZED

Organization of New Company Suggested With Guaranteed Return of 6 per cent on Valuation Figure

The features of the plan for community ownership of the property of the Toledo Railways & Light Company, Toledo, Ohio, as contained in the report of N. D. Cochran, N. C. Wright, Edward P. Usher and Johnson Thurston, the sub-committee of the committee appointed by Mayor Milroy in November, 1915, were referred to briefly in the ELECTRIC RAILWAY JOURNAL of April 8, page 708. The sub-committee was charged with the task of devising some plan of settlement. In its report the sub-committee said that it submitted only the general outlines of its plan of settlement. The main features of this plan follow:

A separate company is proposed to take over from the Toledo Railways & Light Company at a price to be agreed upon all the company's railway property except the power house. The new company would issue stock of a par value of $10 a share, all common, to the amount determined upon as the fair value of the property. This stock would be owned in the first instance by the Toledo Railways & Light Company, but would be deposited with five trustees under a trust agreement and be voted by these trustees.

The right would be reserved to citizens of Toledo to purchase the stock on installments at par during a period of five years, the stock taken by citizens to be released from escrow when paid for and to be voted by the holder of record. The city would have the right to purchase at par all of the stock not taken by citizens and have the right to take that held by the latter at any time at a 105 or 110 per cent of par. At the end of the five-year trust period all stock then remaining in the hands of the trustees would be released from escrow and become the absolute property of the Toledo Railways & Light Company, subject, however, to the city's right to purchase such stock at any time.

The rate of fare would be fixed periodically so as to return 6 per cent to the stockholders. The trustees would be selected by agreement between the officers of the company and the present franchise committee or its successor. Steps would be taken to secure a Supreme Court decision as to the right of the city to issue bonds to purchase the stock. In this connection the committee says that "if bonds can be sold at 4 per cent to purchase a guaranteed 6 per cent stock, there will be a profit of $20,000 a year on each $1,000,000 of bonds in excess of the interest the city will have to pay."

The committee says that the plan makes its possible quickly to eliminate foreign ownership of the Toledo system. If necessary the plan contemplated would require that the Toledo Railways & Light Company purchase $3,000,000 par value of the stock of the new company to provide funds for extensions and improvements. In concluding its statement the sub-committee said:

"In furtherance of this plan and to bring about the earliest possible settlement of the railway problem, the sub-committee recommends that the general committee appoint a board of five trustees to have charge of the carrying out of the following program:

"1. To secure a valuation of the property.

"2. To secure funds either by private subscription or through the city for expenses the board of trustees will have to incur.

"3. To secure the services of a competent attorney and a competent engineer.

"4. To secure the incorporation of a company under the laws of Ohio, under such name as may be agreed upon, which company will issue common stock, the par value of the shares to be $10 each; and to do such other things as may be necessary to complete the deal for the purchase of the street railway property and carry out this plan.

"5. To cause an ordinance to be prepared which they will initiate by petition and bring to a vote of the people at a special election as quickly as possible.

"6. To offer for sale at the proper time after the passage of the ordinance the stock on deposit to the citizens of Toledo, either reserving the right to allot as they see fit or providing terms in advance as to how the stock shall be sold and apportioned.

"7. To do such other things as may be necessary properly to perform the duties of their trust."

PORTLAND COMPANY DEMURS TO NEW CONSTRUCTION

The Portland Railway, Light & Power Company, Portland, Ore., in a hearing before the Columbia River Inter-State Bridge Commission, stated that it desired to build a line across the Columbia River Inter-State Bridge at a cost of approximately $100,000, and give continuous service between Vancouver, Wash., and Portland, Ore., but that it was not financially able to do so at this time. The meeting was called by the commission to discuss the subject of tolls and kindred topics with representatives of companies desiring franchises over the bridge. According to the estimates of the commission the total annual cost of maintenance will be $62,500. This figure includes interest on the bonds, pay for the toll tenders and bridge tenders, repairs and general upkeep, etc.

F. I. Fuller, representing the company, stated that there were two objectionable points in the franchise. First, the company would be compelled to pave the track across the bridge while other vehicles carrying twenty-five or more passengers but not traveling on rails would be relieved from paying any part of the cost of the pavement; and, second, the street railway would be compelled to maintain an eighteen-hour service, while the large automobile buses would be relieved from such requirement.

The commission finally agreed to change the schedule so that passengers on street cars would be taxed 3 cents and when riding in any vehicle not operated on rails 3½ cents. The commission went on record as favoring the inclusion of all common carriers, even the jitneys, in this classification.

Officials of the Portland Railway, Light & Power Company intimated that the company might operate a one-man car at frequent intervals on the bridge, and stated that in their opinion this feature of giving better service should be encouraged by the commission by granting a somewhat smaller toll. The commission appointed a committee to confer with the various interests in regard to the franchises and to report later.

PLANS DEVELOPING FOR NEW ARKANSAS ROAD

The Little Rock, Pine Bluff & Eastern Traction Company expects to build its proposed interurban line in the near future. It is first intended to reconstruct the Main Street bridge at Little Rock, building an entirely new superstructure sufficient to carry a 50-ton car in addition to highway traffic. The bridge is 1750 ft. in length. The present bridge is without stringers and has a roadway 22 ft. wide with two 6-ft. sidewalks. The new bridge will have a roadway 32 ft. wide with two 5-ft. sidewalks. Two plans are under consideration for this rebuilding. One contemplates a temporary bridge, to cost $20,000, located three blocks above the present bridge, to carry traffic during rebuilding. The other contemplates maintaining traffic on the present bridge during reconstruction. The total cost is not to exceed $300,000 and the contractor is asked to take the old steel.

The Little Rock, Pine Bluff & Eastern Traction Company interests, the representatives of the County of Pulaski and adjacent property holders and the officers of the Intercity Terminal Company expect to confer within sixty days and apportion the expenses of construction of the bridge. Plans for the bridge must be approved by Boller, Hodge & Baird, New York City.

After the reconstruction of the bridge the new interurban company expects to construct 45 miles of track from Augusta and Little Rock to Pine Bluff, using 90 lb. A.S.C.E. rail. The interurban will use the tracks of the present railway companies in the three cities mentioned. The interurban line will operate at 1200 volts, direct current, and the city lines at 600 volts, direct current. The maximum grade will be one-half of 1 per cent. It is proposed to purchase eight double-truck 40-ton cars, each with a seating capacity of fifty-six persons. Two baggage and express cars, four trail cars and twenty flat and box cars will also be purchased. C. C. Kavanaugh, 221 Southern Trust Building, Little Rock, Ark., president of the Argenta-Intercity Terminal Company and a director of the Little Rock Railway & Electric Company, is one of the promoters of the Little Rock, Pine Bluff & Eastern Traction Company.

WAR BONUS FOR SOUTHWEST MISSOURI EMPLOYEES

As a result of the war in Europe the district in which the Southwest Missouri Railroad, Webb City, Mo., operates is enjoying a high degree of financial prosperity in which the company is sharing. In order that its employees may participate in the war profits, especially in view of the fact that the larger volume of business now being transacted by the company entails greater burdens, greater responsibilities and more particular service on the part of every one of its employees, the company has announced that it proposes to pay to each of the regular employees, except the president, attorneys and men employed in temporary or special work, a "war bonus" of 10 per cent each month, based upon the amount earned in the regular way during the month previous. Thus if a man earns $100 during the month of April, 1916, he will receive early in the month of May, 1916, as his bonus $10. The payment of this bonus will be continued so long as conditions warrant. The plan went into effect on April 1.

A. H. Rogers, president and treasurer of the Southwest Missouri Railroad, concluded as follows a statement which he issued about the plan:

"The expenses of the company of every character have been increasing significantly for many years and particularly so during the more recent boom period. Therefore you may know that only a fraction of the present increase in the revenues of the Southwest Missouri can be reserved for net income. The rates of fare on the Southwest Missouri Railroad are as low as the lowest in the United States.

"When the expenses of merchandising, manufacturing and other lines of business increase, the effect thereof is neutralized by an increase of the price of the commodity output. A railroad, however, is helpless in such a situation and cannot raise its rates so as to shift its financial burdens onto the shoulders of the public as is true of commercial concerns. The differential legal status of trade and of transportation must not be ignored.

"However that may be, men, it gives me some comfort to know your 'war bonus' will be paid to you out of the pocket of your own company rather than from the composite pocket of its passengers. Finally, let us all hope that regardless of the effect upon the finances of the Southwest Missouri Railroad and upon thine and mine, the big war may soon see its finish under guarantees that will insure the future peace of Europe without humiliation to the defeated, if there be such, and without dismemberment of any of the little nations or a diminution of their individuality and independence."

NEW YORK CENTRAL FILES WEST SIDE PLANS

Details and maps of the plan finally agreed upon by the experts of the city of New York and the New York Central Railroad for the readjustment, removal from grade and the electrification of the railroad's freight tracks on the West Side of Manhattan were on April 7 filed with the Board of Estimate by the board's sub-committee on port and terminal facilities. The plans were worked out jointly by Ernest P. Goodrich, consulting engineer of the borough of Manhattan; Charles W. Staniford, chief engineer of the Department of Docks and Ferries, and John F. Sullivan, engineer of the Bureau of Contract Supervision of the Board of Estimate acting for the city, and by George A. Harwood, chief engineer of electric zone improvements, and H. D. Jouett, designing engineer of West Side improvements, representing the railroad.

The cardinal principle of the plan is that throughout their length, from Inwood Hill, at the northern tip of Manhattan Island, to Canal Street, where the southern terminus is located, the tracks will be underground or carried on an elevated structure above the street level. Approximately $50,000,000 will be expended by the New York Central in making the proposed improvements, and Ira A. Place, vice-president of the railroad, estimated that of this total about $15,000,000 will be spent for work that will benefit the municipality. It is considered that the effect generally will be of a most beneficial nature because of the increased safety and comfort derived from removal of the tracks from grade and substitution of electric haulage for steam locomotives.

The recommendations of the committee were adopted that sets of the plans be put on view at the Grand Central Terminal and at City Hall, that the Corporation Counsel be instructed to prepare for submission to the board a form of contract to carry into legal effect the recommendations of the committee, and that the Board of Estimate fix April 25, at 10.30 o'clock, as the time of public hearing upon the plans.

HEARING ON NEW YORK COMMISSION BILLS

It was reported from Albany on April 12 that the Senate Public Service Committee was expected to report favorably the bills which have followed the Thompson committee's investigation. The proposed legislation follows:

The removal from the courts of the power to review the commission orders in rate cases through certiorari.

The reparation act, which would force corporations to return to consumers money charged over the rate finally fixed by the commission during the time in which decision had been pending.

The act to give the Board of Estimate the right to supervise all transit construction.

The addition of the Mayor and Comptroller to the Board of Directors of the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company.

The act placing private water companies, outside city limits, under the Public Service Commissions.

At the hearing before the Senate committee on April 12 Public Service Commissioners Whitney and Hervey appeared in favor of the first two bills. They said, however, that they would prefer that the law remain as it is with regard to construction supervision.

Samuel F. Moran, representing the Brooklyn Edison Company, declared that the removal of the right of certiorari would injure the companies and private individuals. He pointed out that taxpayers who made complaints now possess the right of a court review when the decision of the commission goes against them. He said that the law would deprive the companies of their right to a fair return upon their investment. He also said that the reparation act would not hasten in the slightest the decision in rate cases.

On April 13 the Republican caucus decided to pass the Thompson bill permitting the Board of Estimate to take over control of subway construction through a rapid transit commission. In its original form the Thompson bill made mandatory the establishment of a rapid transit commission to take over subway construction work. In the amended bill now before the Legislature such a commission is to be established only if the Board of Estimate and Apportionment votes in favor of the change.

AGREEMENT ON DALLAS FRANCHISES LIKELY

It was reported from Dallas, Tex., on April 10 that the prospects were good for the city and representatives of Stone & Webster, who operate all the local electric railways in Dallas and the Dallas Electric Light & Power Company, which lights the city, reaching an agreement on the new franchises that are soon to be granted.

On April 4 the voters amended the charter of Dallas so as to authorize the City Commission to negotiate franchises with public service corporations on other bases than the 4 per cent gross receipts tax, as was provided under the old charter, and also to negotiate indeterminate franchises; that is, the City Commission received power to negotiate and grant franchises to traction and electric lighting companies requiring service at cost, after allowing a reasonable return on an agreed investment, and the commission also received power to purchase the property of public service corporations or require their sale to some other company at any time after ten years, if the service rendered should fall below the standard demanded by the commission, or if the corporations should otherwise decline to comply with the provisions of the franchises granted.

Voters of Dallas also approved the amendment empowering the City Commission to authorize the consolidation of the various traction companies now operated separately by Stone & Webster.

The voters also approved the amendment empowering the City Commission to negotiate a similar franchise with the Dallas Electric Light & Power Company, fixing its valuation and requiring service at cost after allowing a return of 7 per cent on an agreed valuation of the property. Further, the voters approved a bond issue of $500,000 to be used for the construction of the first unit of a municipal lighting plant that will ultimately furnish current for the city's use and also for the public, the same to be operated by the city for consumers at cost.

Most important of the propositions voted on, aside from the general proposition of empowering the City Commission to negotiate indeterminate franchises with the street railway and electric lighting companies, was the approval of the proposed franchises which the commission will require of the traction and lighting companies. These franchises were based on the report recently submitted by Edward W. Bemis after investigation of the situation in Dallas, and fix valuations for all the properties in question, state the rate of return that will be permitted the companies on this fixed valuation, outline definitely the betterments that will be required from time to time, and specify the rates that will be charged, these being fixed on a sliding scale, being automatically reduced as the earnings of the companies exceed a specified amount for any year.

The valuations fixed by Mr. Bemis are considerably lower than those claimed by the companies and it is on this point that a contest will occur if any is to be made. Prior to the election representatives of Stone & Webster announced that the companies could not accept these proposed franchises, even though the voters approved them. Charles F. Wallace, representing Stone & Webster, intimated that the company would resist such franchises to the full extent of the law, even to the point of resisting the commission's authority to condemn under the right of public domain or any other right, the properties of the companies in Dallas. Mr. Wallace has declined to make any definite statements since the election, merely saying in response to questions that the Stone & Webster officials outlined their position prior to the election.

INQUIRY INTO RELATIONS OF NEW YORK AND QUEENS COUNTY LINES.

A session of the Thompson legislative investigating committee was held on April 8. The committee inquired into the intercorporate relations of the Interborough Rapid Transit Company and the New York & Queens County Railway, which operates in Long Island City and in other places in Queens County. The principal witness was Dr. A. F. Weber, statistician of the commission. He reported to the commission on May 27, 1914, in regard to the company. This report showed that the percentage of operating expenses to gross receipts of the company had increased from 60 per cent in 1906 to 85 per cent in 1914. The principal cause of this increase was deferred maintenance. Fifty steel cars had been purchased in 1908. The committee went over much the same ground that was covered in questioning Commissioner R. C. Cram at the inquiry early in 1915 and reported in the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1915, page 389.

COUNCILS APPROVE PHILADELPHIA LOAN BILLS

City Councils of Philadelphia, Pa., on April 11 passed the two loan bills providing for transit and port improvements and the financing of general purposes and unfunded debt. The bills total $114,525,000. This places the issue of transit improvement squarely before the voters. The Philadelphia *Public Ledger* says that the proposition, embracing the Taylor comprehensive transit plan, designed to serve all sections of the city on a straight 5-cent fare basis, represents the greatest improvement in the history of Philadelphia. It contemplates the expenditure of $57,100,000 for subway and elevated lines. The remaining $10,000,000 in the bill is for port improvement.

The second bill, providing for a loan of $47,425,000 for general purposes and unfunded debt, received a negative vote in Common Council. Mayor Smith said he would sign the bills. They will go before the people at the polls at the primary election on May 16.

Service Resumed in Clarksville.—Street railway service in Clarksville, Tenn., has been resumed by the Citizens Street Railway, the successor to the Clarksville & Dunbar Cave Railway, which suspended operation last fall.

New Terminal in Newark to Open on April 30.—The Public Service Railway, Newark, N. J., has announced that its new terminal in Park Place will be opened on April 30. The company has submitted to the Board of Works a schedule of car line rerouteing. New lines are to be created and existing lines are to be discontinued. Some of these changes are to go into effect on April 25.

Proposals for the Purchase of Transformers.—Sealed proposals will be received at the office of the Assistant Purchasing Agent, The Panama Canal, 24 State Street, New York City, until 2 p. m., on April 22, at which time they will be opened in public, for purchasing transformers offered for sale by the canal. Blanks and general information relating to the sale may be obtained from R. E. Rutherford, assistant purchasing agent.

Brooklyn Company Wins Bridge Toll Case.—Supreme Court Justice Erlanger has handed down a decision holding that the contract entered into by the city with the New York Municipal Railway Corporation and the New York Consolidated Railroad, subsidiaries of the Brooklyn (N. Y.) Rapid Transit Company, relieved the Brooklyn Rapid Transit Company from the obligation of paying tolls for the operation of cars over the Williamsburg Bridge. The contract was made on March 19, 1913.

Two-Year Wage Agreement Arranged.—It was announced at Hamilton, Ont., on March 21 that an agreement to run for two years had been entered into between the Hamilton Street Railway and its employees. The request of the men was for 25 cents an hour for the first-year men, 28 cents an hour for the second-year men, and 30 cents an hour for the third-year men, and an eight-hour day. Under the new agreement the first-year men will receive 22 cents an hour, the second-year men 24 cents an hour, and the third-year men 28 cents an hour, and they will continue with the ten-hour day schedule.

"Toronto Charity Railway."—The Toronto *Daily Star* said recently: "The Toronto Civic Railway is already becoming known as the Toronto Charity Railway. The fare fixed upon by the City Council, when the civic car line commenced operation, was 2 cents cash, or six tickets for 10 cents. A glance at the average fare collected in 1913, 1914 and 1915 shows that very few passengers pay for their ride in cash. If everyone used the little green ticket, the average fare would work out at 1.66 cents. In 1913 the average fare was 1.71 cents; in 1914 it was 1.69 cents, while last year it was 1.70 cents. The annual deficit has more than doubled in three years of operation. At the end of 1913 it totalled $154,317."

Arlington Street Station Bill Reported.—The committee on metropolitan affairs has reported a bill requiring the Boston Transit Commission to construct a station in the Boylston Street subway at Arlington Street, Boston, Mass. The Boston Elevated Railway has opposed the building of a station at this point for the last two years. A provision of the bill requires the Public Service Commission to hold hearings on the measure if the company and the Transit Commission do not agree upon the use of the station, and if the company does not accept the station by Dec. 1, 1916, the bill provides that no additional franchise shall be granted nor any existing franchise be extended until the company signs an agreement to rent and use the station.

Damages Awarded Railway for Change of Grade.—The city of Seattle, Wash., by the decision of Judge Edward E. Cushman of the United States District Court, in the case of the city against the Seattle, Renton & Southern Railway, will be required to pay the company $41,700 for changing the grades of Rainier Avenue. The company demanded $3,000,000. A Superior Court judgment awarded the campany less than $2,000. The receivers of the company after this $2,000 judgment was set aside by the Supreme Court, began an action in the Federal Court to prevent the city from changing the grades of the street, so far as the railroad tracks were concerned. Judge Cushman decided in favor of the city in this case, but referred the question of damages to Judge Claypool.

Amicable Settlement of Ferry Loop Question.—Following a conference with the State Board of Harbor Commissioners on April 3, representatives of the Municipal Railway of San Francisco and the United Railroads reached an agreement whereby the city will have the use of the outer loop of the United Railroads at the ferry, provided it pays for its share of electricity used and a proportion of the cost of construction and maintenance based on the use of the tracks by the "C" and "D" lines. The "A" and "B" lines are to use the loop free, as originally agreed upon. On April 5, however, President Lilienthal announced that his company would oppose the plan of the Municipal Railway to make a physical connection between its Church Street line and the Market Street tracks of the United Railroads.

Reduction in Massachusetts Commission Recommended.—The special legislative committee which has been investigating Massachusetts commissions as a result of Governor McCall's message has reported a bill reducing the membership of the Public Service Commission from five to three, cutting down the salary of the chairman from $8,500 to $7,500, and reducing the salary of a commissioner from $8,000 to $7,000. The term of service on the board would also be reduced from five years to three. Under the provisions of the new bill, the salaries of the commissioners will be paid by the State, but the other expenses of the board will be met by the public utilities regulated by it. The attempt to transfer regulation of telephone and telegraph companies to the Gas & Electric Light Commission has failed. The new bill provides for a reduction of $19,000 a year in salaries.

Cleveland Men Ask Increase.—The motormen and conductors on the Cleveland (Ohio) Railway on April 11 asked for an increase in wages to 40 cents an hour. The present scale is 29 cents an hour for first-year men and 32 cents for all others. In addition the men want seats for conductors on all cars and trailers. They claim for discharged employees the right to be heard before a representative of the union, an official of the company and the person making the complaint that resulted in the discharge. This would mean that a patron of the road who made a complaint would have to appear at the hearing. If the complainant does not appear, then the discharged employee is to be reinstated with full pay. J. J. Stanley, president of the company, said that the fare would have to be advanced to the highest figure in the Tayler franchise if this demand were granted. It is said that he will demand an open shop. Fielder Sanders, street railway commissioner, said he would oppose any demand that would necessitate an increase in the present fare.

PROGRAMS OF ASSOCIATION MEETINGS

Iowa Street & Interurban Railway Association

The annual meeting of the Iowa Street & Interurban Railway Association will be held at Dubuque, Iowa, on May 10, 11 and 12.

Arkansas Association of Public Utility Operators

The date of the meeting of the Arkansas Association of Public Utility Operators fixed originally to be held at Little Rock on May 9, 10 and 11, has been changed to June 6, 7 and 8 in the same city.

Electric Power Club

The Electric Power Club, which is made up of manufacturers of electric motors, generators, transformers and controlling apparatus, will hold its annual convention at the Homestead Hotel, Hot Springs, Va., on May 8, 9, 10 and 11.

National Electric Light Association

The annual convention of the National Electric Light Association will be held this year at the Congress and Auditorium Hotels, Chicago, May 22-26. An exhibit will be held in the Auditorium Theater in connection with the convention. Special trains will be run from New York and St. Louis to the convention.

Financial and Corporate

EARNINGS MAKE BETTER SHOWING

Decrease in 1915 Electric Railway Earnings Over 1914 Not So Great as Feared—Returns for January, 1916, Indicate Marked Improvement

An examination of the gross and the net earnings of many representative electric railways in this country for the calendar year 1915, as compared to 1914, shows that the earnings in the last calendar year suffered slight decreases. On the other hand, a similar examination of the returns for January, 1916, as compared to January, 1915, indicates a substantial improvement in the first month of the present year. These totals are based on the experience of sixty-two companies having an aggregate gross revenue of approximately $281,000,000 in 1915 and being well divided geographically and also well differentiated as regards city, city and suburban, and interurban service.

INCREASES IN 1915 ELECTRIC RAILWAY EARNINGS OVER 1914

	City	City and Suburban	Interurban	Total
Eastern:				
Number of companies	8	5	8	21
Gross	0.80%	d0.67%	7.25%	1.14%
Net	3.06%	2.43%	18.51%	4.08%
Central:				
Number of companies	6	5	8	19
Gross	d2.48%	5.24%	d1.34%	0.12%
Net	d4.43%	7.46%	d4.12%	d0.79%
Southern:				
Number of companies	9	6	4	19
Gross	d8.12%	d0.07%	d12.81%	d4.49%
Net	d9.57%	3.56%	d21.17%	d4.36%
Western:				
Number of companies	..	3	..	3
Gross	....	d14.55%	....	d14.55%
Net	....	d29.62%	....	d29.62%
Total:				
Number of companies	23	19	20	62
Gross	d0.26%	d2.88%	d0.54%	d1.02%
Net	1.35%	d5.58%	d0.33%	d0.62%

NOTE.—"Eastern" includes New England and Middle Atlantic States to Southern Pennsylvania boundary. "Central" includes states west of Pennsylvania and north of the Ohio River, as well as the Missouri River States. "Southern" includes states south of Pennsylvania and the Ohio River, and Arkansas, Oklahoma and Texas. "Western" includes states west of Texas, Kansas, Nebraska and the Dakotas. The letter d denotes decrease.

The concrete percentages of increases and decreases shown in the accompanying tables do not, of course, prove anything conclusive in regard to the entire industry in view of the comparatively small number of reports. In the Eastern section returns from Boston and in the Central section returns from Chicago were lacking, while the available figures for Western railways were so scarce that only the three, Portland, Puget Sound and Vancouver, companies in the Northwest were included. Moreover, the division of the companies as to their character of service was bound in some cases to be somewhat arbitrary, especially when combined service was rendered and no segregated figures were available. In a few cases of both railway and lighting service the total earnings were included because of the impossibility of ascertaining the railway figures. In spite of these difficulties, however, the representative character of the reporting companies tends to indicate the reliability of certain general deductions.

Of the sixty-two companies examined for the calendar years 1914 and 1915, thirty showed increases in gross and thirty-two reported increases in net. About half of these increases came from the Eastern lines, the other half of the increases being about equally divided between the Central and Southern sections. The increases were very evenly divided among the different classes of companies. The aggregate result for 1915 was a decrease of 1.02 per cent in gross but a smaller decrease of 0.62 per cent in net. This decrease in gross was brought about by decreases of 4.49 per cent in the Southern section and 14.55 per cent in the Western section, which more than overcame the increases of 1.14 per cent in the Eastern group and 0.12 per cent in the Central group. The decline of 0.62 per cent in the total net was reached through decreases of 0.79 per cent in the Central section, 4.36 per cent in the Southern section and 29.62 per cent in the Western section in spite of an increase of 4.08 per cent in the East. As to the different classes of service, all lines showed decreases in gross, while the city lines alone secured an increase in net.

The gain of 1.14 per cent in gross for the Eastern group resulted mostly from increases for the city lines and the interurban lines. These with city and suburban lines as well shared in the increase of 4.08 per cent in net. Out of twenty-one companies operating in city service in the East, fifteen had increased gross and thirteen increased net. In the Central section the gain in gross for the city and suburban lines slightly more than offset the losses for the city companies and the interurban companies so as to give an aggregate gain of 0.12 per cent in gross, but owing to the larger decreases in net for the last two classes the gain for the city and suburban lines was insufficient to keep the aggregate net from showing a decrease of 0.79 per cent. The results in this section would have been worse if it had not been for the very favorable earnings made in the Twin Cities, Detroit and Akron, and on a large interurban system in Illinois. As for the Southern group, with the exception of the net for city and suburban lines, all clases met losses in both gross and net. The quarter of greatest loss seemed to be Texas. As before stated, the showing for the Western section is predicated on the reports of three Northwestern city and suburban lines, but general information regarding California and other Western lines would seem to indicate that more reports would give little if any improvement for the section.

The results of operation of the same sixty-two railways during January, 1916, as compared to January, 1915, were more favorable as regards percentage increases than those during the preceding calendar years, for the gross earnings increased 8.08 per cent and the net earnings 14.17 per cent. The important point in regard to these figures is that all geographical divisions except the West, and all classes of service displayed improvements during last January. Every company in the Eastern group reported gains in gross, and all but one reported gains in net. In the Central group all companies except one had increased gross and net, while in the Southern group fourteen out of nineteen showed higher gross and thirteen out of nineteen higher net. In the Northwest, however, the three reporting lines continued to show decreases in both gross and net. The general improvement, however, augurs well for 1916, although it should be remembered that the basis of comparison used for 1915 was abnormally low and also that electric railways are not yet feeling the full effect of current rising costs of operation. All in all, the foregoing tables together demonstrate that the influences making for decreased earnings in 1915 did not have such a harmful effect as anticipated, and electric railways are now in a position to show substantial improvement over 1915 if the present industrial prosperity is maintained.

INCREASES IN ELECTRIC RAILWAY EARNINGS IN JANUARY, 1916, OVER JANUARY, 1915

	City	City and Suburban	Interurban	Total
Eastern:				
Number of companies	8	5	8	21
Gross	7.80%	11.63%	16.20%	8.78%
Net	15.06%	26.86%	21.63%	16.17%
Central:				
Number of companies	6	5	8	19
Gross	6.73%	22.08%	6.59%	11.22%
Net	13.49%	40.85%	6.31%	19.41%
Southern:				
Number of companies	9	6	4	19
Gross	5.33%	7.17%	3.72%	6.14%
Net	8.46%	14.39%	d0.63%	10.73%
Western:				
Number of companies	..	3	..	3
Gross	...	d4.68%	....	d4.68%
Net	...	d11.47%	....	d11.47%
Total:				
Number of companies	23	19	20	62
Gross	7.48%	8.91%	9.13%	8.08%
Net	14.48%	15.67%	10.25%	14.17%

NOTE.—"Eastern" includes New England and Middle Atlantic States to Southern Pennsylvania boundary. "Central" includes states west of Pennsylvania and north of the Ohio River, as well as the Missouri River States. "Southern" includes states south of Pennsylvania and the Ohio River, and Arkansas, Oklahoma and Texas. "Western" includes states west of Texas, Kansas, Nebraska and the Dakotas. The letter d denotes decrease.

ANNUAL REPORTS

Chicago Railways

The comparative statement of income, profit and loss of the Chicago (Ill.) Railways for the twelve months ended Jan. 31, 1915 and 1916, follows:

	1915	1914
Gross earnings Chicago surface lines	$31,690,761	$31,966,048
Operating expenses	21,041,356	19,889,275
Residue receipts	$10,649,405	$12,076,773
South Side Lines proportion of residue receipts (41 per cent)	4,366,256	4,951,477
Chicago Railways proportion of residue receipts (59 per cent)	$6,283,149	$7,125,296
Deduct: Joint account expenses and adjustments applicable to previous years	20,327	(cr.)55,106
	$6,262,822	$7,180,402
Deduct: Interest at 5 per cent on valuation	4,230,975	4,116,762
Net divisible income	$2,031,847	$3,063,640
City of Chicago (55 per cent)	1,117,516	1,685,002
Chicago Railways (45 per cent)	$914,331	$1,378,638
Interest at 5 per cent on valuation of property	4,230,975	4,116,762
Interest on bank balances	64,807	118,231
Interest on treasury securities	103,440	92,534
Gross income	$5,313,553	$5,706,165
Deductions:		
Interest accrued on		
First mortgage bonds	$2,650,242	$2,617,750
Consolidated mortgage bonds	1,809,394	1,818,452
Purchase money bonds	166,314	162,920
Sinking fund reserve, accrued	250,000	250,000
Federal income tax	17,828	16,436
Corporate expenses and adjustments	89,203	123,446
Total deductions	$4,982,981	$4,989,004
Net income	$330,572	$717,161

It will be recalled that the detailed report of the Chicago Surface Lines, comprising the Chicago Railways and the South Side Lines (Chicago City Railway, Southern Street Railway and Calumet & South Chicago Railway), was published in the ELECTRIC RAILWAY JOURNAL of March 25, together with figures for the South Side Lines. For the year ended Jan. 31, 1916, all the surface lines showed a falling off in gross earnings of $275,287 or 0.86 per cent as compared to the preceding year, while the total expenses of operation increased $1,152,081 or 5.79 per cent. As a result the divisible residue receipts suffered a loss of $1,427,368 or 11.81 per cent, so that the 41 per cent going to the South Side Lines fell from $4,951,477 to $4,366,256 and the 59 per cent going to the Chicago Railways decreased from $7,125,296 to $6,283,149.

Thus the Chicago Railways' portion of the residue receipts decreased $842,147. After making certain adjustments, as shown in the preceding statement, the net income divisible between the company and the city of Chicago dropped from $3,063,640 to $2,031,847, a decrease of $1,031,793 or 33.67 per cent, this being shared in amount proportionately by the company and the city. The Chicago Railways' own gross income after the deduction of the city's share from the divisible amount totaled $5,313,553 in 1915 as compared to $5,706,165 in 1914, a decrease of $392,612 or 6.88 per cent. The income deductions showed a slight decrease, so that the company's net income amounted to $330,572 in 1915 as compared to $717,161 in 1914, a decrease of $386.588 or 53.9 per cent. After deducting the interest paid on the income bonds for the year ended Jan. 31, 1915, amounting to $100,000, and two dividends of $4 each on the participation certificates, Series I, in full for the year ended Aug. 1, 1915, and expenses, all totaling $264,016, there was left a deficit from the year's operations of $33,444 for the participation certificates Series 2. Surplus, however, was called upon for the payment of a $2 dividend on the second certificates, amounting to $248,600, so that the surplus as of Jan. 31, 1916, totaled $286,952 as compared to $568,996 a year before.

In spite of the difficulties encountered in the year, the company complied with all the reserve requirements of its ordinances and also made the usual annual payment of $250,000 for the retirement of Series C consolidated mortgage bonds. In order to provide funds with which to take care of the company's expenditures for rehabilitation work during the year, $1,500,000 of first mortgage bonds were sold in January, 1916, of which $500,000 were treasury bonds. As soon as the Board of Supervising Engineers shall have made certain adjustments, however, the company will be in a position to issue additional bonds to replace the above mentioned treasury bonds. During the year the company constructed approximately 15 miles (single track) of new extensions, under ordinance requirements, and reconstructed 10 miles of track. The amount added to capital account during the year was $1,868,717, bringing the total up to $85,626,674 on Feb. 1, 1916.

Public Service Railway

The comparative statement of income, profit and loss of the Public Service Railway and the Public Service Railroad, Newark, N. J., for the calendar years 1914 and 1915, follows:

	1915	1914
Revenue from transportation	$15,842,346	$15,625,268
Revenue from operations other than transportation	180,586	171,228
Total operating revenue	$16,022,932	$15,796,496
Operating expenses:		
Maintenance of way and structures	$1,534,735	$1,490,226
Maintenance of equipment	1,176,045	1,173,990
Traffic	2,287	4,060
Conducting transportation	5,029,181	5,154,900
General and miscellaneous	1,201,882	1,289,889
Total	$8,944,130	$9,113,065
Taxes	1,224,833	1,177,442
Total operating revenue deductions	$10,168,963	$10,290,507
Operating income—railway	$5,853,969	$5,505,989
Operating income—other operations	13,592	15,666
Total operating income	$5,867,561	$5,521,655
Non-operating income	68,024	67,910
Gross income	$5,935,585	$5,589,565
Income deductions	5,397,909	5,274,453
Net income	$537,676	$315,112
Appropriations (excluding dividends)	....	(Cr.) 2,272
Net increase in surplus	$537,676	$317,384

The foregoing statement has been secured to supplement the data taken from the published report of the holding company, the Public Service Corporation of New Jersey, and printed in the ELECTRIC RAILWAY JOURNAL of April 8. The revenue from transportation in the railway department increased $217,078 or 1.3 per cent during 1915, while the revenue from operations other than transportation increased $9,358 or 5.4 per cent, making the total increase in operating revenues $226,436 or 1.4 per cent. The operating expenses dropped $168,935 or 1.8 per cent during the year, this decrease being mostly occasioned by decreases of $125,719 or 2.4 per cent in conducting transportation and $88,708 or 6.8 per cent in general and miscellaneous, and an increase of $44,509 or 2.9 per cent in maintenance of way and structures. Moreover, taxes increased $47,391 or 3.8 per cent during 1915, with the result that the net increase in railway operating income amounted to $347,980 or 6.3 per cent. Income deductions, however, increased $123,456 or 2.3 per cent, so that the net income gained $222,564 or 70.6 per cent.

As stated in the issue before mentioned, the revenue passengers in 1915 totaled 313,923,363, as compared to 310,308,660 in 1914, an increase of 3,614,703 or 1.1. per cent. This compares with an increase of 1,323,420 revenue passengers or 0.4 per cent in 1914 over 1913. In 1915 the transfer and free passengers increased 3,529,423 or 3.5 per cent as compared to 1,543,389 or 1.6 per cent in 1914, so that the increase in total passengers was 7,144,126 or 1.7 per cent in 1915 and 2,866,809 or 0.7 per cent in 1914. Thus the percentage of passengers using transfers increased from 21.2 per cent to 21.5 per cent, while the average fare per passenger fell from 3.83 cents to 3.82 cents. The revenue from transportation decreased from 30.763 cents per car-mile to 30.540 cents per car-mile. The car mileage rose from 50,792,889 car-miles to 51,873,660 car-miles, and the passenger receipts per car-mile decreased from 30.72 cents to 30.49 cents. The car-hour total in 1915 was 5,573,670 as compared to 5,665,119 in 1915, and the passenger receipts per car-hour rose from $2.75 to $2.84.

PETITION TO FORECLOSE EMPIRE UNITED

Permission to bring a foreclosure action against the Empire United Railways, Inc., Syracuse, N. Y., will be asked of Justice William Andrews on April 15 by Murray, Prentice & Howland, New York, as counsel for the Equitable Trust Company. They will also ask for the appointment of C. Loomis Allen and Hendrick S. Holden, temporary receivers of the company, as receivers under the mortgage. The Equitable Trust Company is trustee under the mortgage dated July 1, 1913, under which the Public Service Commission granted permission to issue a total of $20,000,000 in first and refunding 5 per cent gold bonds. The petition states that $605,000 of these first and refunding Empire United bonds were issued on Nov. 10, 1913, and that the interest of these was defaulted on Jan. 1, 1916. The trustee now asks that the default be made as to principal and interest and that it be permitted to proceed with the foreclosure of all the Empire United properties.

TENTATIVE REORGANIZATION PLAN APPROVED

The plan for the reorganization of the Seattle, Renton & Southern Railway, Seattle, Wash., proposed by Attorney John C. Higgins, of the law firm of Higgins & Hughes, representing a committee of the bondholders, has been approved and signed by Judge Frater, in the King County Superior Court. The new company will be capitalized at approximately $1,700,000, or the amount of claims and the liabilities of the present receivers. The company has liabilities of about $1,650,000, including $175,000 of indebtedness incurred by the present receivers. Mortgage claims amount to approximately $1,060,000. Approximately 25 per cent on the face of all claims, or $373,000, will be paid into the new company in cash by claimants who have entered the reorganization. This new cash will be used in clearing the liabilities of the present receivers. The liabilities include a bill for $105,000 for power furnished by the Puget Sound Traction, Light & Power Company, Seattle. Under the plan, for cash paid into the new company the bondholders will receive first mortgage bonds and for their claims second mortgage bonds. The common claimants will receive first mortgage bonds for cash paid into the new company, and stock for their claims in the old company.

The road will be sold at auction on May 1, and the preferred and common claim holders will unite in bidding it in. The city utilities committee of the City Council of Seattle has recommended to the Council that the matter of purchase be referred to a special committee composed of members of the city judiciary, the utilities and the finance committees, to discuss with representatives of bondholders a plan whereby the city may become a bidder.

Boston (Mass.) Elevated Railway.—The Massachusetts Public Service Commission has granted approval of two bond issues of $1,581,000 and $815,000 by the West End Street Railway, both issues payable in not exceeding thirty years with interest not exceeding 5½ per cent annually. It is understood the former is to be used to refund the one-year issue of serial 5 per cent debenture bonds of 1915, maturing $1,581,000 on Aug. 1, while the latter will refund the 4 per cent twenty-year gold bonds due on May 1.

Choctaw Railway & Lighting Company, McAlester, Okla.—The property of the Choctaw Railway & Lighting Company was sold on April 8 at public sale by Special Master Allen Wright to C. B. Mason, chairman of the bondholders' protective committee, for $450,000. The new owners announced that they would purchase new equipment, put the property in first-class condition throughout and continue operation. It is expected that the property will be leased to an operating company.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The Los Angeles & San Diego Beach Railway has applied to the California Railroad Commission for authority to issue notes for $37,500 to the Southern Trust & Savings Bank, San Diego; the Merchants National Bank, San Diego, and the Citizens' National Bank, Los Angeles. The company has also applied to the commission for authority to issue four notes for $4,750 each to the Citizens' National Bank, Los Angeles, with interest at 7 per cent. The notes are in renewal of former notes.

Monongahela Valley Traction Company, Fairmont, W. Va.—Knauth, Nachod & Kuhne, New York, N. Y., and Hambleton & Company, Baltimore, Md., and New York, N. Y., having sold more than $750,000 of an issue of $1,000,000 of first and refunding mortgage 5 per cent gold bonds of the Monongahela Valley Traction Company, are offering the balance at 94 and interest to yield 5.45 per cent. The bonds are callable at 105 and interest on June 1, 1922, or any interest date thereafter.

Otsego & Herkimer Railroad, Cooperstown, N. Y.—The New York Public Service Commission, Second District, has authorized the Otsego & Herkimer Railroad to issue $250,000 of its 5 per cent fifty-year first mortgage bonds, to be sold at not less than 80, netting $200,000. The proceeds of this issue will be applied in discharging and refunding the capital obligations of the company, including $84,000 in notes held by the Equitable Trust Company, New York, and $163,000 of accounts payable and other unfunded debt. The case is held open on the records of the commission pending the completion of an examination of the company's books and affairs.

Petaluma & Santa Rosa Railway, Petaluma, Cal.—The California Railroad Commission has denied the application of the Petaluma & Santa Rosa Railway to issue to George P. McNear 165 shares of its capital stock at $25 a share, under an agreement previously made with him. The road has leased its yards at Petaluma from McNear on a ten-year lease and agreed to buy the property for $9,500 on condition that McNear in turn buy 165 shares of the company at $25 a share. The commission in this decision adhered to its policy of not permitting corporations to issue stock at less than 80 per cent or 85 per cent of its par value.

Philadelphia Company, Pittsburgh, Pa.—The Philadelphia Company has declared a quarterly dividend of 1¾ per cent on the $40,443,000 of common stock, payable on May 1 to holders of record of April 15. This compares with 1½ per cent paid in February, 1916.

Republic Railway & Light Company, Youngstown, Ohio.—The Youngstown & Niles Railway has applied to the Ohio Public Utilities Commission for authority to issue $100,500 of common stock to reimburse the Mahoning & Shenango Railway & Light Company, a subsidiary of the Republic Railway & Light Company, for financing the electric railway the former company is building between Warren and Youngstown. The Mahoning & Shenango Railway & Light Company has advanced $60,000 and is willing to advance $40,000 additional to purchase right-of-way between Youngstown and Niles.

Scioto Valley Traction Company, Columbus, Ohio.—The Columbus Depot Company has applied to the Ohio Public Utilities Commission for permission to sell $200,000 of its common stock to the Scioto Valley Traction Company. The depot company was organized to build an interurban station at the corner of Rich and Front Streets, Columbus.

Southern Traction Company, Inc., Bowling Green, Ky.—Suit has been filed at Bowling Green, Ky., against the Southern Traction Company, Inc., asking that a receiver be appointed for the company.

Syracuse & South Bay Electric Railroad, Syracuse, N. Y.—The properties of the Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad are to be offered at foreclosure sale on May 19. The sale of the properties was originally set for Jan. 21.

Toledo Railways & Light Company, Toledo, Ohio.—The Federal Court at Toledo did not act upon the request made by the city solicitor for the appointment of a receiver for the Toledo Railways & Light Company in connection with the strike of the employees of the company. As a result of the strike settlement, noted elsewhere in this issue, the court authorized the company to charge a straight 5-cent fare with six tickets for 25 cents and named a custodian for the funds derived from the increase in fares, which are to be applied to the purchase of cars.

Western New York & Pennsylvania Railway, Olean, N. Y.—The New York Public Service Commission, Second District, has approved the surrender of all of its capital stock by the Olean, Bradford & Warren Railroad to the Western New York & Pennsylvania Railway for a consideration of

$1. Upon the surrender of the stock a certificate to that effect must be filed in the office of the Secretary of State and of the Public Service Commission, and the stock certificates themselves must be indorsed with a notation of these facts.

DIVIDENDS DECLARED

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.

Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., 1 per cent, common.

Pacific Gas & Electric Company, San Francisco, Col., quarterly, 1¼ per cent, common.

Philadelphia Company, Pittsburgh, Pa., quarterly, 87½ cents, common.

Public Service Investment Company, Boston, Mass., quarterly, $1.50, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period			Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.							
1m.,	Feb.,	'16	$410,857	*$317,425	$93,432	$118,373	‡†$23,742
1 "	"	'15	358,756	*290,973	67,783	117,299	‡†48,527
8 "	"	'16	3,595,335	*2,733,646	861,689	924,053	‡†993
8 "	"	'15	3,541,838	*2,666,256	875,582	944,638	‡†2,851
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO							
1m.,	Feb.,	'16	$27,808	*$17,058	$10,750	$11,050	†$300
1 "	"	'15	23,460	*15,593	7,867	10,938	†3,071
2 "	"	'16	56,673	*34,303	22,370	22,112	258
2 "	"	'15	49,274	*31,621	17,653	21,900	†4,247
CONNECTICUT COMPANY, NEW HAVEN, CONN.							
1m.,	Feb.,	'16	$681,372	*$477,232	$204,140	$97,450	‡$129,352
1 "	"	'15	556,153	*380,181	175,972	98,257	‡99,136
8 "	"	'16	5,835,300	*3,932,572	1,902,728	788,791	‡1,298,580
8 "	"	'15	5,353,002	*3,927,701	1,425,301	786,234	‡812,277
GRAND RAPIDS (MICH.) RAILWAY							
1m.,	Feb.,	'16	$103,429	*$64,435	$38,994	$14,486	$24,508
1 "	"	'15	94,889	*63,629	31,260	13,679	17,581
12 "	"	'16	1,186,079	*831,255	354,824	166,787	188,037
12 "	"	'15	1,286,852	*832,498	454,354	161,921	292,433
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO							
1m.,	Feb.,	'16	$106,507	*$76,660	$29,847	$36,325	†$6,478
1 "	"	'15	89,200	*68,734	20,466	35,990	†15,524
2 "	"	'16	219,876	*153,479	66,397	72,434	†6,037
2 "	"	'15	187,537	*140,546	46,991	71,916	†24,925
NEW YORK (N. Y.) RAILWAYS							
1m.,	Feb.,	'16	$1,040,676	*$763,345	$277,331	$284,815	‡$39,719
1 "	"	'15	982,480	*734,200	248,280	294,381	‡9,201
8 "	"	'16	9,107,997	*6,211,049	2,896,948	2,287,491	‡982,278
8 "	"	'15	8,887,645	*6,390,642	2,497,003	2,289,730	‡547,007
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.							
1m.,	Feb.,	'16	$22,358	*$21,698	$660	$7,985	‡†$7,283
1 "	"	'15	21,129	*22,228	†1,099	7,979	‡†9,052
8 "	"	'16	256,775	*205,008	51,767	63,979	‡†11,779
8 "	"	'15	259,008	*208,788	50,220	63,109	‡†12,567
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.							
1m.,	Feb.,	'16	$36,414	*$80,220	†$43,806	§$9,624	‡†$52,098
1 "	"	'15	32,206	*41,767	†9,561	§6,237	‡†14,175
8 "	"	'16	335,319	*378,970	†43,651	§52,174	‡†82,816
8 "	"	'15	292,817	*347,351	†54,534	§51,358	‡†92,660
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO							
1m.,	Feb.,	'16	$359,403	*$213,006	$146,397	$53,411	$92,986
1 "	"	'15	260,451	*164,986	95,465	50,862	44,603
2 "	"	'16	726,545	*424,612	301,933	106,991	194,942
2 "	"	'15	541,289	*346,964	194,325	101,114	93,211
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO							
1m.,	Feb.,	'16	$310,459	*$180,245	$139,214	$64,867	‡$65,738
1 "	"	'15	233,237	*145,471	87,766	55,254	‡32,617
2 "	"	'16	628,774	*362,810	265,964	132,155	‡134,455
2 "	"	'15	482,600	*301,049	181,551	110,644	‡71,169
RHODE ISLAND COMPANY, PROVIDENCE, R. I.							
1m.,	Feb.,	'16	$410,857	*$317,425	$93,432	$118,373	‡†$23,742
1 "	"	'15	358,756	*290,972	67,783	117,299	‡†48,527
8 "	"	'16	3,595,335	*2,733,645	861,689	924,053	‡993
8 "	"	'15	3,541,838	*2,666,256	875,582	944,638	‡†2,851
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.							
1m.,	Feb.,	'16	$16,533	*$20,302	†$3,769	$1,725	‡†$5,467
1 "	"	'15	16,079	*20,444	†4,365	1,384	‡†5,742
8 "	"	'16	168,363	*172,292	†3,929	13,288	‡†16,983
8 "	"	'15	175,279	*181,031	†5,752	10,270	‡†15,933

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*Includes taxes. †Deficit. ‡Includes non-operating income.

§Excludes interest on bonds, charged against income and paid by the New York, New Haven & Hartford Railroad under guarantee; also interest on notes held by the New York, New Haven & Hartford Railroad, not credited to income of that company.

Traffic and Transportation

BUS RIGHTS GRANTED OVER RAILWAY PROTEST

New York Public Service Commission Holds Albany Bus Line to Be a Real Necessity

The Public Service Commission for the Second District of New York has granted a certificate of public convenience and necessity to the Woodlawn Improvement Association Transportation Corporation for the operation of its autobus line from the Union Station to the city line, Albany, via Broadway, Orange Street and State Street, North Pearl Street, South Pearl Street, Hudson Avenue, Lark Street, Madison Avenue and New Scotland Avenue. The granting of the certificate was opposed by the United Traction Company, which urged that the bus line's authority from the Common Council was not valid, and that it would be a source of unjust competition with the electric railway. The traction company attorneys urged that the authority from the Common Council was not valid because it purported to be a franchise and was not sold at public auction as the law requires in connection with franchises. Of this the order of the commission said:

"In the opinion of the commission the consent of a city to the operation of a bus line or stage route required by Sec. 26 of the transportation corporations law is not the granting of a franchise within the meaning of Sec. 37 of the second class cities law. It is more in the nature of a license, such as those issued to hackmen and others."

The commission likewise dismissed the assertion of the railway that the new bus line will unjustly compete with the railway. In speaking of New Scotland Avenue the commission says:

"It passes through a new and rapidly developing residential section of the city. The nearest line of street railroad is along Madison Avenue, which, throughout this residential section, lies from 2500 to 4000 ft. from New Scotland Avenue. The cross streets now open are few in number and for the most part not well improved. While the building of a street railway on New Scotland Avenue has for a long time been urged by the property owners, it does not appear that the company proposes to construct such a line in the near future. It is therefore quite evident that at present some convenient and cheap means of transportation would not only be of help to the residents of the New Scotland Avenue section, but that some such means is a real necessity."

The commission refers to the competition with the railway lines east and south of New Scotland Avenue as only "potential competition," and says that the only evidence concerning it is that it will be so slight as not to affect at all the revenues of the railway company.

The commission says that the traction company cannot claim protection from competition in the New Scotland Avenue district itself where the company's lines are so far away as not to afford adequate service.

SAFETY-FIRST TALKS IN JACKSON

The Jackson Light & Traction Company, Jackson, Miss., has recently been publishing a series of safety talks in the local papers. While they were written primarily to reduce accidents in which the cars are concerned, they cover a number of situations with which public utilities have nothing to do. In other words, an effort was made to hold the interest of the readers by going outside of railway accidents and including accidents in the homes. These talks were read each day in all of the public schools of the city, and as an indication of their effectiveness the company has received a request from a near-by city to send copies of them for this purpose. The talks were written by Raymond H. Smith, general manager of the company, formerly superintendent of the Connecticut Railway & Lighting Company at Bridgeport, Conn.

Excerpts from Safety Talk No. 2, which discusses the meaning of the word, and Safety Talk No. 11, which was addressed particularly to automobile owners, follow:

"Safety First. What is its significance? When you see or hear this expression, does it mean anything to you, or is it one of the many expressions and movements which you designate as 'a good thing,' and dismiss from your mind as something in which you have no personal interest? 'Safety First' is synonymous with 'The Prevention of Accidents.' Now, let's go a little further. Accidents happen unexpectedly, like the proverbial bolt from the clear sky. To-day your neighbor may be the victim. To-morrow you may be the unfortunate one. 'Safety First' now has a new meaning to you; it is a measure for the Prevention of Accidents—a movement in behalf of your own personal safety—the safety of your family."

"Street intersections are places which call for considerable care. Don't depend too much upon hearing the car gong, and don't place too much dependence upon the motorman hearing your horn. Both the auto and the street car are making considerable noise. Depend largely upon your eyes to keep you out of danger. Slow down in coming out of side streets. Hold back. It takes but a few seconds' time. If there is any turning out to be done, you must do it—the motorman can't. In turning into a street with car tracks, try as far as possible to avoid the car tracks. Get the habit, even if there is no car coming.

"Again we repeat, we are not asking you to be careful in order that we may be careless, without taking the consequences. There are two parties concerned in street railway accidents, the public and the company. The exercise of care by one of these parties will greatly reduce accidents; but think what an additional safeguard it would be if the second party would acquire the habit of caution! It would lessen the possibility of accidents 100 per cent—a pretty good dividend on life and limb. Let's both be careful."

Mr. Smith also sent recently over his signature a note asking all automobile and other vehicle owners to co-operate with the company in trying to avoid accidents. He said that if each owner would caution his driver, and then repeat his words of caution, it would be a distinct benefit to the owner, to the company and to humanity.

JOINT TROLLEY-AUTO FREIGHT ARRANGEMENTS

Articles of incorporation have been filed by the Mount Eden Motor Truck Company, which will operate the truck end of the joint freight service with the Louisville & Interurban Company, referred to in the ELECTRIC RAILWAY JOURNAL of April 8, page 715. The authorized capital is $5,000, and the incorporators are in no way connected with the railway company. The agreement concerns only a joint through rate which will enable the Louisville & Interurban Company to accept shipments at Louisville or at any point on any of its lines, for delivery at certain points beyond the terminal of the Louisville and Shelbyville line, and vice versa.

Service will start with one truck on April 15, but three other trucks of large capacity are available for service at any time they are needed.

At the outset the run which is to be made will be 12½ miles, through Southville, to Mount Eden, or 25 miles for the round trip. It is planned to make two round trips daily, starting from Mount Eden in the morning and making connection with the morning freight train at Shelbyville, then returning and dropping freight at the way stations. After noon the proceeding will be repeated, meaning that the truck will supply the same character of freight service to points on its route as does the railway. There will, therefore, be two, or four, or six, etc., round trips daily, according to the number of trucks put in service.

Rates have been perfected and tariffs issued to the shippers who are expected to patronize the service. The tariffs will be filed with the State Railroad Commission before service is begun. An idea of the tariffs charged will be gained from the fact that on first-class freight the rate from Louisville to Shelbyville (railroad) is 23 cents per 100 lb.; from Louisville to Southville (railroad and truck), 34 cents per 100 lb.; from Louisville to Mount Eden (railroad and truck), 40 cents. On sixth-class freight, the rates for the same distance run: Louisville to Shelbyville, 13 cents; Louisville to Southville, 21 cents; Louisville to Mount Eden, 26 cents.

THROUGH SERVICE OVER 250-MILE ROUTE

A new through limited service between Indianapolis, Ind., and Zanesville, Ohio, was inaugurated on Sunday, April 9, by the Terre Haute, Indianapolis & Eastern Traction Company and the Ohio Electric Railway Company. This is probably the longest interurban journey in the country without change of cars. The distance from terminal to terminal is 250 miles, and the running time is eight hours and fifty minutes. One train will be operated each way every day, leaving Indianapolis at 9 a. m. and leaving Zanesville at 7.10 a. m. The through cars pass through Richmond, Ind., and Dayton, Springfield, Columbus and Newark, Ohio, and make stops at the larger interurban towns along the line. The standard type of three-compartment interurban cars of the Terre Haute, Indianapolis & Eastern Traction Company and the Ohio Electric Railway Company, of an over-all length of 61 ft. 6 in., will be used in the new service, except that these trains, will be known as "The Columbian," will be fitted with special floor coverings, etc., in order to make as attractive as possible the equipment used in this limited service.

This is the first step toward the establishment of more extended through interline interurban service which was advocated at the meeting of the Central Electric Railway Association held at Indianapolis last winter. The schedules of the new Indianapolis-Zanesville service have been arranged so that a three-minute connection may be made with through limited service from Springfield, Ohio, to Lima and Toledo, Ohio, and to Fort Wayne, Ind., via the Ohio Electric Railway. It is now possible to travel from Indianapolis to Toledo with only one change of cars, at Springfield, Ohio, and from Indianapolis to Cleveland with only two changes of cars.

NEW ROCHELLE MOTOR-BUS LINE SUSPENDS

On April 12 the New Rochelle Auto-Bus Corporation announced that operation of the four motor buses owned by the company would be permanently discontinued on the following day, and with the carrying out of this apparently sudden decision the first 5-cent bus line to be organized under the Thompson regulative law of New York State went out of existence after only two months of operation. Reasons for the abandonment of the project were reported by the president of the company to be failure of the local residents to patronize the buses, but from approximate figures given out at the same time it appears that about one and one-half passengers per bus-mile were being handled by the fifteen-passenger units. It was also stated that the "overhead charges" were very heavy and that residents who had promised to purchase stock in the company after buses had been placed on the streets did not make good their agreements, thus leaving the corporation with insufficient capital to expand its service beyond that given by the four buses originally placed in operation. Just how these purchases of stock would have benefited the situation is not clear, because according to the president's statement the daily earnings of each bus approximated $10, while the daily expenses of operation were $20 per bus. The total loss to the backers of the venture is reported to be about $10,000.

The territory served by the two routes that were operated was closely built up with detached suburban residences, and the round trips approximated 3 miles in length. Service was given at ten-minute intervals in opposite directions, each of the two buses on one route making three round trips per hour during an eighteen-hour day, and thus covering about 160 miles. The reported expenses of $20 per bus per day, or 12½ cents per bus-mile, did not, apparently, cover anything more than direct operating expenses, because during the two months that the buses were running they had depreciated but little and had evidently required no expenditures for heavy repairs.

Boston Fare-Limiting Bill Killed.—The legislative committee on street railways has voted down the bill prohibiting street railways from charging more than 5 cents for a continuous trip within Suffolk County.

Rhode Island Transfer Investigation Proposed.—An act has been introduced into the Rhode Island Legislature to require the Public Utilities Commission to investigate the use of free transfers on the street railways of the State, and to order such changes as it may deem desirable. The commission is to report on the matter to the General Assembly in January, 1917.

Use Found for the Janitor.—The Board of Education of Louisville, Ky., is considering a proposal advanced by a member of the Louisville City Council, which would make the janitors of the schools traffic policemen during the hour before the schools "take up" and just after they are closed at the end of sessions. He proposes that the janitors take stands at crossings and see to it that the traffic laws are observed by motorists, drivers and street cars.

Chicago Traffic Board Urges Safety Zones.—Safety zones for the heavy traffic street intersections in all parts of Chicago have been recommended by the Citizens' Traffic & Safety Commission. These are intended particularly for the safety of persons boarding and alighting from street cars, and it is recommended that these zones be marked off with movable posts and chains inclosing an area approximately 100 ft. long and 5 ft. wide, measured from the track rail.

New Kansas City Publication Christened.—The monthly publication of the Kansas City (Mo.) Railways has been christened *The Railwayan.* The second issue, for April, has a cover printed in colors showing attractive spots in Kansas City that can be reached for 5 cents. It is a twenty-four-page magazine, three columns to a page. A considerable demand for the magazine has developed among the general public, although it is intended for distribution only to the street railway employees.

Safety Signs in Buffalo Cars.—Signs with a red background and white letters, "Watch Your Step," have been placed just outside the entrance of the near-side cars on the Buffalo city lines of the International Railway, and the iron railings and grab irons have been painted white so as to be more easily seen by passengers boarding and leaving the cars. Heretofore these railings were painted black. Other signs bearing the words "Safety First. It never pays to take a chance" have also been prominently hung from the car ceiling.

Request for Change in Fares Refused.—The Town Board of Fredonia, N. Y., has refused to modify the franchise of the Buffalo & Lake Erie Traction Company so as to permit the company to increase its passenger fares in certain zones. The officials of the company are said to have considered the advisability of abandoning the road between Erie and Fredonia because of inability to meet the operating expenses under the present tariff. The appeal of the company for relief in this connection was noted in the ELECTRIC RAILWAY JOURNAL of March 18, page 583.

Dubuque Ordinance Bars One-Man Cars.—Plans made by the Union Electric Company to put one-man cars in operation in Dubuque, Iowa, were stopped by the passing of an ordinance compelling the use of cars with entrance and exit at both ends and designed to be operated by two men. The company has endeavored in a friendly way to obtain a repeal of the ordinance but without success. The City Council has since been asked to suspend the operation of the ordinance for six months in order to try out the one-man cars in regular service. This request has not been acted upon yet.

Final Argument in Rochester Jitney Case.—Final argument was held at Albany on April 12 before all the members of the Public Service Commission of the Second District of New York on the application of sixty Rochester jitney operators for certificates of necessity and convenience. Commissioner William T. Emmett, who conducted the hearing, announced at the close that the decision of the commission would not be announced until after Charles R. Barnes, the commission's electric railway expert, had reported to the commission in connection with the matter. The hearings held in Rochester before the commission on the jitney applications were reviewed briefly in the ELECTRIC RAILWAY JOURNAL of March 4, page 476, and March 25, page 628.

Michigan Railway Freight Increasing. — Although the Michigan Railway, Jackson, Mich., has not entered the carload freight business on an extended scale, the growth of its business along this line is said to indicate clearly the stability of this class of traffic as a source of revenue. During the last five-year period the annual gross receipts from freight traffic have gradually increased, and even during the general business depression, which began in 1913 and continued through 1914, the freight revenue did not fall off as did the earnings from passenger traffic. On the other hand, the increase in freight receipts during 1915 was practically the same as that in receipts from passenger traffic. The year 1915 was a very prosperous one for most of the industries in Michigan, a condition which is reflected in the gross earnings of the company.

St. Louis Service Case Carried to Court.—A writ of mandamus was applied for in Jefferson City, on April 4, by the United Railways, St. Louis, in the suit to prevent the Public Service Commission of Missouri from passing on the question of whether the company shall install additional service in North St. Louis. A petition filed by the Citizens' & Taxpayers' League and set for hearing April 13, asks that a direct line be installed from the western city limits along St. Louis Avenue to the river. The league contends that the service in North St. Louis is inadequate and does not provide for handling patrons from the western to the eastern city limits expeditiously. In the application for mandamus, the company takes the position that under the public service law the commission has no right to pass on such question.

Jamestown Employees Insured Under Group Plan.—The twenty-fifth anniversary of the electrification of the Jamestown (N. Y.) Street Railway was celebrated on April 4. A. N. Broadhead, president of the Jamestown Street Railway, Chautauqua Traction Company, Jamestown, Westfield & Northwestern Railroad and Western New York Electric Company, announced that a group life insurance policy had been taken covering every employee of the companies under sixty years of age. It provides a $500 policy to every man who has been employed six months, the certificates increasing with length of service to five years, when the benefit amounts to $1,000. Increases in the wages of the railway employees have also been announced. The increase amounts to 2 cents an hour, from 19 cents to 21 cents, for new men, and a similar increase up the scale until the five-year men and over receive an increase of 2½ cents, or from 25 cents to 27½ cents an hour.

Endless Chain Ticket Scheme Revived.—The Duluth (Minn.) Street Railway has been embarrassed lately through the revival in that city of the endless chain street railway ticket scheme which had its origin more than ten years ago and has reappeared several times since then in different parts of the country. Herbert Warren, vice-president and general manager of the Duluth Street Railway, called attention to the fact that the company had no connection with the sale of the tickets under the endless chain scheme, and that it was not responsible for any one offering to make a special rate or to reduce prices. The scheme was operated by the Cut Rate Car Fare & Advertising Company, with W. R. Bilderback, Chicago, as manager. He began to operate on April 4, but on April 6 was arrested and charged with advertising illegally. The $200 bail which he posted was forfeited when he hurriedly quit Duluth. The police estimate that his earnings for the three days he operated were between $1,500 and $2,500.

Postal Employees Checked in Chicago.—In 1906 the post-office authorities agreed to pay the Chicago surface railways $23,852 annually for transporting 347 carriers. Since then the amount has been increased to $24,837. On July 1, 1915, the number of carriers employed in the territory covered by the Chicago Surface Lines was 2407. This represented an increase of more than 27 per cent while the increase in return to the company amounted to only 3 per cent. A check made by the company showed that each day there were 11,893 rides with pouches and 8914 without. After taking into account the ordinary transfer percentage, the railway concluded that the post-office department was receiving 12,000 cash fare rides daily, equivalent to approximately $190,000 a year. The situation was called to the attention of the postmaster. He admits that the compensation to the company is inadequate now, and has asked the men to use the cars as little as possible. The question of a readjustment of the method by which the government pays for the rides of its employees is being considered.

Personal Mention

Mr. G. J. Meyer, heretofore chief engineer of the Montreal & Southern Counties Railway, Montreal, Que., has been appointed chief engineer and general superintendent of the company.

Mr. Curtis Duke has resigned as chief engineer of the power station of the Fort Wayne & Springfield Railway, with headquarters at Decatur, Ind., to accept a position at Hoopeston, Ill.

Mr. S. G. McMeen, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, has been appointed a member of the navy consulting board by Secretary Daniels. The announcement of his appointment was made on April 7.

Mr. G. A. Henson, heretofore chief accountant of the Winnipeg (Man.) Electric Railway, has been appointed assistant treasurer of the company, and is in charge of the accounting department of the general office under Mr. F. Morton Morse, the secretary-treasurer.

Mr. F. S. Woodcock, heretofore traffic manager of the Saskatoon (Sask.) Municipal Railway, having left for active military service, the position has been abolished, and Mr. J. P. McKenzie, formerly master mechanic, has been appointed assistant superintendent, a new position.

Mr. Franklin T. Griffith, president of the Portland Railway, Light & Power Company, Portland, Ore., has also been named chairman of the board of directors of the Willamette Valley Southern Railway, which is controlled by the Portland Railway, Light & Power Company.

Mr. Marion G. Charles, whose appointment as master mechanic of the Oregon Electric Railway and the United Railways, Portland, Ore., was noted in the ELECTRIC RAILWAY JOURNAL of April 1, page 672, was with the Oregon Electric Railways in the capacity of shop foreman from July 15, 1910, to Sept. 8, 1915, at which time he was transferred to Spokane, Wash., as general foreman of the Spokane & Inland Empire Railway. He remained in the latter capacity until March 17, when he was appointed to his present position.

Mr. James E. Gibson, whose appointment as general manager of the Kansas City (Mo.) Railways was noted briefly in the ELECTRIC RAILWAY JOURNAL for April 1, was born in Kansas City on Aug. 20, 1881. He is the son of Mr. James F. Gibson, formerly judge of the Circuit Court. He was educated in the public schools of Kansas City and at the University of Missouri, from which institution he was graduated with the class of 1902. In the same year he was appointed secretary to Congressman W. H. Cowherd. After serving under Mr. Cowherd from 1902 to 1904 he resigned to enter the service of the Metropolitan Street Railway, Kansas City as a clerk in the accounting department under Mr. J. A. Harder, then auditor of the company. In December, 1905, he was advanced from the auditing office to the position of assistant to President Corrigan of the company. He entered the transportation department of the company in 1909 as superintendent of the Forty-eighth and Harrison division, where he remained until June, 1910, when he was appointed to the office of general superintendent of the company. He served in the capacity of general superintendent through the receivership of the Metropolitan Street Railway and the reorganization of the company as the Kansas City Railways.

J. E. GIBSON

Mr. William C. Harrington, whose appointment as superintendent of transportation of the Kansas City (Mo.) Railways, was noted briefly in the ELECTRIC RAILWAY JOURNAL for April 1, was born on Aug. 31, 1872, in County Tipperary, Ireland. He came to the United States in 1882, and went to work for the Corrigan Consolidated Railway, Kansas City, in 1888, as stable boy, at Fourth and Wyandotte Streets. He was later promoted to driver, gripman, cable splicer, motorman and division superintendent. In August, 1909, he became connected with the general office as assistant general superintendent under President Corrigan of the Metropolitan Street Railway. Mr. Harrington knows Kansas City, is thoroughly familiar with its traditions, is well acquainted with the need of the business and the pleasure-traveling public, and has the respect of the employees such as comes through years of familiar association in working with them toward a given end.

W. C. HARRINGTON

Mr. Richard T. Sullivan, for the last eight years general superintendent of the city and interurban railways of Houston (Texas) Electric Company, has been appointed manager of railways of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio. The appointment was announced by President R. P. Stevens, of the Mahoning & Shenango system on April 10 and Mr. Sullivan will assume his new position within a few days. Mr. Sullivan was born in Newton, Mass., and was educated in the public schools there, the Massachusetts Institute of Technology and Harvard University, taking the degree of electrical engineer at Harvard in 1906. He has since been identified with the Stone & Webster Engineering Corporation, participating in a number of important investigations and reorganizations in various parts of the country. In his new position Mr. Sullivan will be manager of approximately 200 miles of city and interurban railways in Youngstown, Warren and Niles, Ohio, and New Castle and Sharon, Pa., and connecting those cities and smaller communities.

OBITUARY

William Chisholm, chief engineer of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., was electrocuted on March 23 while coupling electric cars at a gravel pit in Essex.

George O. Jenkins, first president of the Brockton & Whitman Street Railway, died at Whitman, Mass., on March 31. Mr. Jenkins was born in Boston in 1846. He was prominent in manufacturing circles.

Frank P. DeLong, dispatcher of the Stark Electric Railroad, Alliance, Ohio, died at his post on March 22, from the effects of a stroke of apoplexy. For many years he was a dispatcher on the Lake Shore Railroad.

Fred A. Berg, general foreman of carhouses of the Puget Sound Traction, Light & Power Company, Seattle, Wash., died at the Seattle General Hospital on April 4, after an illness of several weeks. Mr. Berg was born in Russia. He settled in Portland, Ore., in 1888. He had been a resident of Seattle since 1905. He was fifty-seven years old.

William A. Read, head of the banking and investment firm of William A. Read & Company, New York City, died at his home in New York on April 7. Mr. Read was born in Brooklyn fifty-eight years ago, and was graduated from the Polytechnic Institute of Brooklyn. In 1877 he entered the employ of Vermilye & Company, New York, bankers, and was admitted to the firm in 1896. In 1904 he retired from Vermilye & Company and formed the firm of William A. Read & Company. He had long been a director of the Twin City Rapid Transit Company, Minneapolis, Minn., and the Interborough Rapid Transit Company, New York, N. Y.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Clear Lake Suspended Monorail Company, Sacramento, Cal.**—Incorporated to construct a line from Sacramento to Lakeport, 24 miles. The road will be of the suspended monorail type. Freight and passenger service will be provided. Capital stock, $50,000. Directors: L. H. Briggs, Kelseyville; Andrew Smith, Fenley; S. E. Brookes, Hopland; F. D. Flint, San Francisco, and M. S. Sayre, Lockport.

FRANCHISES

Atlanta, Ga.—The Georgia Railway & Power Company has asked the Council for a franchise to construct a 2½-mile extension, beginning at Moreland and Ponce de Leon Avenues to Emory University.

Newport, Ky.—An agreement has been reached between the South Covington & Cincinnati Street Railway and the city commissioners of Newport on a franchise that will be offered for sale and which this company will secure. It is to pay $6,000 as a rental for the use of the streets, furnish larger cars than those now in use and build a new line in the east end of the city.

Shreveport, La.—The Shreveport Railway will ask the Council for a franchise on certain streets in Shreveport with a view to changing the Fairfield and Jordan Street line.

Fairhaven, Mass.—The Union Street Railway has asked the Council for a franchise to construct an extension of its line on Fort Street from the present terminus to the Acushnet River.

Brooklyn, N. Y.—Acting Mayor Frank L. Dowling has signed the franchises requested by the Brooklyn Rapid Transit Company for new trolley lines on Metropolitan Avenue, from Dry Harbor Road to Jamaica Plank Road, on Eighth Avenue from Thirty-ninth Street to Bay Ridge Avenue, and on Fresh Pond Road between the Lutheran Cemetery line and Myrtle Avenue, which were voted by the Board of Estimate on Aug. 26, 1915.

Buffalo, N. Y.—The Public Service Commission for the Second District of New York has approved the franchises of the International Railway for the tracks in Ohio Street, between Main Street and Illinois Street, which will form part of a new loop for the Main Street cars, serving the new Lackawanna terminal and the various boat lines at the foot of Main Street with a direct connection to the business and residential parts of the city.

Lorain, Ohio.—A tentative franchise has been prepared for the Lorain Street Railway which calls for a fare of 5 cents and seven tickets for 25 cents. The company some time ago refused a franchise which provided for a 3-cent fare.

***Chester, Pa.**—The Chester & Eddystone Street Railway has asked the Council for a franchise to construct a line in Chester.

Ephrata, Pa.—The Reading & Ephrata Street Railway has received a franchise from the Council to construct a line in Ephrata. The tracks will reach the borough limits at Pine Street and Church Avenue and will extend along Pine Street to Duke Street, on Duke Street to Marshall Street and on Marshall Street to Washington Avenue, where connection will be made with the tracks of the Ephrata & Adamstown Street Railway. [April 1, '16.]

Salt Lake City, Utah.—The Board of County Commissioners has agreed upon the terms of a franchise to the Salt Lake & Utah Railroad, granting them the right to construct an extension through Granger and Pleasant Green, subject to the approval of the details of the franchise by the county attorney.

TRACK AND ROADWAY

Birmingham Interurban Development Company, Birmingham, Ala.—In connection with its proposed electric railway from Birmingham to the Warrior River and Jasper, this company will erect bridges across Locust Fork and Mulberry Fork of Warrior River. W. W. Shortridge, Birmingham, secretary. [April 8, '16.]

Calgary (Alta.) Municipal Railway.—The Mayor of Calgary has requested Commissioner Graves to prepare a report as to the cost of extending the Calgary Municipal Railway to the Sarcee military camp.

Oatman, Ariz.—D. L. Mayhew, secretary Mohave-Oatman Water Company, Oatman, and associates will soon be ready to receive bids for the construction of 24 miles of electric railway, with mileage to be increased ultimately to 75 miles, including power plants and a gas plant with 28 miles of main pipe, the total cost amounting to more than $2,000,000. [March 11, '16.]

Little Rock, Pine Bluff & Eastern Traction Company, Little Rock, Ark.—This company plans to begin construction in the near future on its proposed line from Argenta and Little Rock to Pine Bluff, 45 miles. It is proposed first to reconstruct the Main Street bridge at Little Rock, building an entirely new superstructure, the cost to be proportioned between the Little Rock, Pine Bluff & Eastern Traction Company, the County of Pulaski and adjacent property owners and the Intercity Terminal Company. The company will use the tracks of the present railways in Argenta, Little Rock and Pine Bluff. The main line will operate at 1200 volts direct current and the city lines at 600 volts direct current. The maximum grade will be one-half of 1 per cent. The county judge of Pulaski County, Little Rock, will have charge of letting contracts for the bridge construction. C. C. Kavanaugh, 221 Southern Trust Building, Little Rock, president. [Dec. 19, '14.]

Pine Bluff (Ark.) Company.—This company has just completed the construction of about 1 mile of new track, using 70-lb. A.S.C.E. rail, concrete foundation and creosoted ties.

Pacific Electric Railway, Los Angeles, Cal.—This company will construct an extension from Claremont to Uplands. This extension will be made as part of a general scheme of the Pacific Electric Railway to extend its freight business in the Pomona Valley, accepting fruit shipments to be turned over to the railroads for shipment East. It is stated that as soon as the line, for which rights-of-way have already been obtained, is completed, the company will construct a large packing house at the Uplands end of the line.

***Tampa, Fla.**—Plans are being made to construct a line from Tampa to Lakeland via Plant City and Gary. Franchises have been secured to operate the proposed line through Plant City and Gary. E. J. Binford, Tampa, is interested.

Freeport Railway & Light Company, Freeport, Ill.—This company will reconstruct the track on its North Galena Avenue line.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—It is reported that this company plans to construct a line from Maywood Speedway to Franklin Park through the west end of Maywood, east end of Bellewood and Melrose Park.

St. Joseph Valley Railway, Elkhart, Ind.—It is reported that this company will begin construction this spring on a 9-mile extension either from Montpelier or from Pioneer.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—This company will lay new tracks in Indiana Avenue from West Street to Fall Creek.

Fort Dodge, Des Moines & Southern Railway, Boone, Iowa.—This company, which recently purchased the Crooked Creek Railroad, will electrify the line and make connections with the interurban railway at Fort Dodge.

Tri-City Railway Company, Davenport, Iowa.—This company will spend nearly $75,000 this year in Davenport on track work. Several extensions have been asked by residents, and plans are being made to construct at least one of the extensions this year. More than 60,000 ties, costing approximately $55,000, have been purchased by the company for use in Davenport.

***Carrollton, Ky.**—Business men of Carrollton are projecting a plan to construct an electric railway to connect Carrollton and Prestonville, which is across the Kentucky River. The project is industrial and the railroad would be used largely for freight hauling.

***Mount Olivet, Ky.**—W. C. Myers, Mount Olivet, has taken up with the Cincinnati Chamber of Commerce the matter of construction of an electric railway line from Mount Olivet to Cincinnati. He suggests a route via Bridgeville, Germantown, Brooksville, Powersville, Berlin, Lenoxburg, Caddo, Mount Auburn, Peach Grove, Bradyville, Grants Lick, Claryville and Alexandria.

***Shelbyville, Ky.**—J. W. Cudgell, Shelbyville, is preparing plans for the construction of an electric railway from Frankfort to Shelbyville, 20 miles. W. W. Lindsey, Detroit, Mich., is interested. The Kentucky Traction & Terminal Company will co-operate in the construction of the line.

Winnipeg (Man.) Electric Railway.—Plans are being considered by this company to extend its Marion Street line to the stockyards. The company will also construct a line over the Arlington Street bridge.

Boston & Eastern Electric Railway, Boston, Mass.—This company has asked for an extension of time of three years in which to file its bond preliminary to constructing an electric railway between Boston and Lynn, Danvers and Beverly. [April 17, '15.]

Worcester (Mass.) Consolidated Street Railway.—This company has under consideration the construction of an extension from Rice Square to Sunderland Road and the extension of the Greenwood Street line to reach the Worcester-Millbury municipal boundary line.

Emma, Mo.—A communication from the Emma Creamery Company states that the company is not interested in the construction of an electric railway from Sweet Springs to Emma, as reported in the issue of March 25. It is proposed to construct a transmission line from Sweet Springs to Emma for the purpose of lighting and power.

***Red Lodge, Mont.**—Surveys are being made for a proposed electric railway between Red Lodge and Columbus via Bear Creek, 40 miles. D. E. Thompson, Lincoln, Neb., is interested.

Public Service Railway, Newark, N. J.—Work has been begun by this company on the construction of an extension of its Central Avenue line through Orange.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Supreme Court has ordered the Mercer County Traction Company to construct a line from Yardville to North Crosswicks, in accordance with the terms of a franchise granted the company.

Brooklyn (N. Y.) Rapid Transit Company.—Ground was broken on April 8, at the corner of North Seventh Street and Bedford Avenue, in the borough of Brooklyn, for the new eastern district subway to connect Williamsburg with Fourteenth Street, Manhattan. The contract provides for the completion of the subway within twenty-seven months from the signing of the contracts on Feb. 29, 1916. The cost of construction is estimated at $15,000,000.

International Railway, Buffalo, N. Y.—Construction work has been begun by the International Railway on the new tracks in North Main Street. Despite the heavy traffic over this line, service is being continued without delay or interruption while the construction work is in progress. While the tracks on the south-bound line are being laid cars are being operated over the north-bound track by means of temporary switches.

Interborough Rapid Transit Company, New York, N. Y.—This company has notified the Public Service Commission for the First District of New York that it is ready to proceed with the work of raising the Second Avenue elevated railroad structure between Fifty-eighth and Sixty-second Streets in order to provide for the proposed extension of that line over the Queensboro Bridge to connect with the new rapid transit lines in Queens.

Ottawa (Ont.) Electric Railway.—The United States Steel Products Company, Montreal, has received a contract from the Ottawa Electric Railway to construct an extension of its Rideau Street line.

Niagara, Welland & Lake Erie Railway, Welland, Ont.—Work has been begun by this company on the construction of an extension south to Dain City and Port Colborne. The line will pass under the Michigan Central Railroad tracks at the subway between Main Street and the Welland Canal.

Willamette Valley Southern Railway, Oregon City, Ore.—This company proposes extensive improvements and repairs to its system during the present year.

Oregon Electric Railway, Portland, Ore.—Plans are being considered by the Oregon Electric Railway to construct an extension of its lines from Eugene to Springfield, about 4 miles.

Lewistown & Reedsville Electric Railway, Lewistown, Pa.—Preliminary surveys are being made by this company for a proposed extension from the Reedsville terminal across the Seven Mountains via Milroy, Potter's Mills and Bellefonte to State College.

Lykens Valley Railway, Williamstown, Pa.—A report from this company states that extensive improvements are being planned on its line.

Citizens' Street Railway, Clarksville, Tenn.—Street car service was resumed in Clarksville by this company on April 5.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—This company has completed the construction of an extension to Salem and operation has been begun on the line. This is part of the proposed extension to Payson.

SHOPS AND BUILDINGS

Tri-City Railway, Rock Island, Ill.—Work on this company's new car shops at Rock Island is progressing and the buildings will be completed about July 1. The new inn being constructed in Rock Island will be completed by June 1.

Kansas City, Mo.—Negotiations are in progress, with prospect of early completion, for establishing a union freight terminal for the interurban railways in Kansas City. An option has been obtained on a large building west of Main Street and north of Fifth Street, acceptable to a majority of the interurbans, that can easily be transformed into a terminal, and would provide about 10,000 ft. of dock room.

Public Service Railway, Newark, N. J.—Nine storage houses for trolley cars will be erected by this company for the new cars to be placed in operation during the coming summer. Four of them will be built near the Passaic Wharf and the others near the Plank Road car shops. Each building will be 50 ft. wide with a depth of 150 ft., and will be of timber construction with a covering of metal protected by asbestos. Contracts for the buildings were awarded to the Stillman, Delehanty & Ferris Company

Charleston (W. Va.) Interurban Railroad.—This company will build a combined freight and passenger station in Charleston. New stations will also be erected at St. Albans and at Cabin Creek Junction.

POWER HOUSES AND SUBSTATIONS

Bloomington & Normal Railway & Light Company, Bloomington, Ill.—This company will install a substation in Lexington and rebuild its distribution system there to operate at 2300 volts, three-phase, stepped down to 110 and 220 volts.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—Plans have been completed by this company for the construction of a new power house in Perry to cost about $100,000.

Charlottesville & Albemarle Railway, Charlottesville, Va.—This company is in the market for one 50-kw. or 75-kw. motor-generating set consisting of a 2300-volt, three-phase, 60-cycle motor, direct connected to a 250-volt d.c. generator. John L. Livers, general manager.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—This company is constructing a system of negative feeders to the various substations at an estimated cost of $50,000. The system will cover practically every electric line in Seattle.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company contemplates the erection of a boiler house three stories high on Lake Avenue, Racine, and will install three boilers.

Manufactures and Supplies

FERROMANGANESE SITUATION UNIQUE

Ferromanganese, an alloy which plays a very important part in the manufacture of all steels, as well as in the manufacture of manganese steel castings, is in such demand that the price of the limited supply has advanced from a normal average of $50 per ton at the seaboard to a cash price of $450 per ton. In smaller lots, where the purchaser is in desperate need, as much as $550 and $600 per ton has been paid for this alloy. The difficulty is said to be because deliveries are being made only on contract, and high prices prevail in emergency sales. Contracts for delivery during the first half of 1917 are being made at $175 per ton. These facts are mentioned because they are reflected in the high prices of structural steel and special work. No doubt greater increases will follow if the war continues and the present restrictions on delivery from England obtain.

This manganese alloy is made from manganese ore which is mined principally along the Black Sea on the coast of Asia Minor, a source of supply which has been cut off by the present European war. Most of the ferromanganese used in this country in the past has come from England, and it is said that practically 75 per cent of the English output of the alloy has come to the United States. The English are securing their present supply of ore from India and Brazil, and except for the control by the United States Steel Corporation of a few mines in Brazil, England and France have had almost a monopoly of output of ferromanganese. Naturally, the demand for the material in connection with the manufacture of munitions abroad and the restricted supply of the ore have reduced the shipments to this country. They have also stimulated domestic production, and recent dispatches report the establishment of some electric furnaces at Herolt, Shasta County, California, for the manufacture of ferromanganese. In the past, of course, the use of ferromanganese in the manufacture of war materials has been very small compared with its use in the manufacture of structural material and rail steel.

T-RAIL PRICES ADVANCE

Announcement was made by the United States Steel Corporation April 13 of increases of $5 a ton for Bessemer and open-hearth T-rails. After May 1, contracts placed for rails to be delivered after May 1, 1917, will be $35 a ton for open hearth and $33 a ton for Bessemer. The old price of $28 a ton for Bessemer rails has been in force for thirteen years without change. It is reported from Pittsburgh that the independent companies would also add $5 a ton to their rail prices.

Inquiry on April 14 at the New York office of one of the manufacturers of girder rails disclosed that as yet that office had not been told of any increase in the price of girder rails, but that such notice might be received any day. The grooved girder rails used by electric railway companies, owing to the fact that these rails are more expensive to manufacture than T-rails, have usually sold at about $6 a ton more than T-rail. As a rule, however, the prices for the rails are quoted for delivered rails rather than for the rails at the mill.

ROLLING STOCK

Keokuk (Iowa) Electric Company has ordered one car body from the American Car Company.

Northern Texas Traction Company, Fort Worth, Tex., has ordered ten car bodies from the American Car Company.

Springfield & Washington Railway, South Charleston, Ohio, has ordered one closed car from the Cincinnati Car Company.

Reading Transit & Light Company, Reading, Pa., has ordered fifteen double-truck cars from The J. G. Brill Company.

Sand Springs Railway, Tulsa, Okla., has acquired two new all-steel passenger cars, which will be placed in immediate operation.

Conestoga Traction Company, Lancaster, Pa., has ordered three city and one interurban car from The J. G. Brill Company.

Little Rock, Pine Bluff & Eastern Traction Company, Little Rock, Ark., proposes to purchase new car equipment, as described in the news department of this issue.

New York State Railways, Rochester, N. Y., have ordered fifty large center-entrance cars from the Cincinnati Car Company, through the W. R. Kerschner Company, New York.

Aurora, Elgin & Chicago Railroad, Aurora, Ill., has ordered four double-end, semi-steel, 42-ft., prepayment-type cars for its Fox River division from the St. Louis Car Company.

Boston (Mass.) Elevated Railway has ordered thirty surface trailer car-bodies and fifty sets of trucks from The J. G. Brill Company and twenty car-bodies from the Laconia Car Company.

Kankakee (Ill.) Electric Railway has ordered two one-man cars from the St. Louis Car Company. These cars are of the manufacturer's standard lightweight type similar to those furnished Albuquerque, N. M.

Southwest Missouri Railroad, Webb City, Mo., mentioned in the ELECTRIC RAILWAY JOURNAL of April 1 as expecting to purchase additional cars, has ordered five cars from the American Car Company, for delivery within four months.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, will place orders immediately for ten new all-steel cars of the center-entrance type. The company also has been reconstructing four trail cars in its shops.

New York State Railways, Syracuse, N. Y., have ordered thirty-five city cars from the G. C. Kuhlman Car Company, and will also order six interurban cars. The Westinghouse Traction Brake Company, New York, N. Y., has received the order for air-brake equipment for all these cars.

Detroit (Mich.) United Railway has ordered from the G. C. Kuhlman Car Company eight 55-ft. 4-in. passenger cars, seating capacity fifty-eight; and one trail car, 56 ft. 6 in. over bumpers, seating sixty-four. These cars are of Pontiac city type, with trail car entrance and exits from the front of the car. The company also has ordered from the Cincinnati Car Company eight 50-ft., 25-ton capacity freight trail box cars with monitor deck roofs.

Steubenville & East Liverpool Railway & Light Company, Steubenville, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of March 25 as having ordered five suburban double-end cars from the Cincinnati Car Company, has specified the following details for this equipment:

Date of delivery	End of May
Seating capacity	52
Weight of car body	18,000 lb.
Bolster centers, length	24 ft.
Length of body	36 in.
Length over vestibule	47 ft.
Width over all	8 ft. 6 in.
Height, rail to sills	38½ in.
Rail to trolley board,	11 ft. 11½ in.
Body	Steel
Interior trim	Cherry, stained
Headlining	Sheet steel, carlines in view, white enameled
Roofs	Arched
Underframes	Steel
Airbrakes	West. S. M. E.
Axles	Baldwin 5-in.
Control	West. H. L.
Curtain material	Pantasote
Wheelguards	Cincinnati
Destination signs.	Elec. Ser. Sup. Co.
Door operating mechanisms,	Cincinnati
Gongs	Cincinnati
Handbrakes	Peacock
Heaters	Cooper
Headlights	Dayton Incandescent
Journal boxes	Symington
Motors	West. 532-B-4, 50-hp., inside hung
Registers	Ohmer
Sanders	Lintern
Seats	Cincinnati, rattan
Step treads	Mason
Trolley catchers	Knutson
Trolley base	U. S.
Trucks	Baldwin 73-18-K
Ventilators	Cincinnati
	33-in., 3-in. tread, ⅞-in. flange
Wheels	Baldwin 1 wear steel,

TRADE NOTES

Parrott & Company, Portland, Ore., are now representing the Track Specialties Company in that territory.

Goldschmidt & Lyman, Inc., New York, N. Y., have organized to conduct a brokerage business in raw metals and manufactured metal products. The company is located at 90 West Street.

Electric Railway Improvement Company, Cleveland, Ohio, has recently furnished bonding cars to the Reading Transit & Light Company, Rhode Island Company, Massachusetts Northeastern Street Railway and Atlantic Store Electric Railway.

Railway & Signal Equipment Company has been established in Peoria, Ill., a location having been secured in the E. A. Havens Building on the Rock Island tracks. The company makes railway supplies, such as anchors, drawbars, replacers, etc.

Electric Service Supplies Company, Chicago, Ill., has moved its offices into more commodious quarters on the sixth floor of the Monadnock Building, Chicago. At the same time this company's Chicago warehouse was moved to larger quarters at 352 Ohio Street.

Curtain Supply Company, Chicago, Ill., has received orders to equip with Ring No. 88 fixtures and Rex all-metal rollers the following cars, which have been recently ordered: Rockland, Thomaston & Camden Street Railway, one car; Cumberland & Westernport Electric Railway, five cars; Waterbury & Milldale Tramway, two cars.

Heywood Brothers & Wakefield Company, Wakefield, Mass., reports the recent receipt of orders for seats for the ten cars ordered by the Holyoke (Mass.) Street Railway and twelve cars ordered by the Northeastern Massachusetts Street Railway, Haverhill, Mass.; specifications for sixty cars for the Boston (Mass.) Elevated Railway. The company is also building the seats for the forty new cars ordered by the Des Moines (Iowa) Street Railway.

Acme Supply Company, Chicago, Ill., has appointed Franklin M. Nicholl as sales representative. Mr. Nicholl will be located at the general sales office, Steger Building, Chicago. He has been for the last seven years Eastern and Canadian sales representative for the Dayton Manufacturing Company. Previous to that position he was for five years sales representative with the O. M. Edwards Company, and before that was sales representative for the Curtis truck.

John C. Dolph Company, Newark, N. J., has moved into larger quarters on Emmet Street, in Newark, with convenient shipping facilities, being next to the South Street station of the Pennsylvania Railroad. The new factory occupies plotted ground, 75 ft. x 100 ft., on which has been erected a modern brick building, which is equipped with every facility for the manufacture of insulating varnishes and compounds, in which line this company has specialized for several years.

Holden & White, Chicago, Ill., have received an order for Hartmann self-centering center-bearing plates and Perry anti-friction side bearings from the McGuire-Cummings Manufacturing Company, for the forty cars recently purchased by the Des Moines (Iowa) City Railway. Orders have also been received from the Southern Car Company for ten Wasson air-retrieving trolley bases for the cars being built for the Cumberland & Westernport Electric Railway, Cumberland, Md. An order has also been received from the Chicago & West Towns Railway for 100 Bierce anchors.

General Electric Company, Schenectady, N. Y., reports that the sales in its railway department for the first eight weeks of the current year as compared with those of last year have been proportionately greater than the sales in any other department of the company. Two recent large orders have been received, one for GE-248 motor equipment for the 200 additional subway cars ordered by the New York Municipal Railway, this order having been approved by the Public Service Commission; the other for fifty-four four-motor equipments for the cars just ordered by the New York State Railways, Rochester Lines.

Perry, Coffin & Burr, Boston, Mass., dealers in investment bonds, have dissolved by mutual consent. The following members of this firm: W. Coffin, A. Burr, W. L. Garrison, Jr., P. S. Dalton, together with P. Jewell and F. E. Frothingham, have incorporated under the name of Coffin & Burr, Inc., to conduct a business in investment bonds at 60 State Street, Boston, and 61 Broadway, New York. Associated with the foregoing will be R. Spellman, J. A. Paine, W. P. Barker, J. T. Beach and H. B. Pennell, Jr., Arthur Perry, formerly senior partner of Perry, Coffin & Burr, Arthur Perry, Jr., and Henry H. Perry have formed a partnership to deal with investment bonds with offices in the Equitable Building, corner of Devonshire and Milk Streets, Boston; associated with them are G. F. Wells, F. W. Mitchell, J. A. Fowler, C. N. Breed, and F. N. Peirce. This firm has opened a branch office at 17 Exchange Street, Providence, R. I., which will be in charge of Mr. Fowler.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued a folder describing its magnetic blow-out lightning arresters for electric railway service.

Roller-Smith Company, New York, N. Y., has issued a catalog describing its electrical instruments for signal system testing. These instruments include d.c. and a.c. portable volt-ammeters and direct reading portable ohmmeters.

Standard Underground Cable Company, Pittsburgh, Pa., has issued Bulletin No. 202-1, describing the properties of its standard C. C. C. wire for telephone or telegraph systems, transmission systems, railway signal systems and bond, messenger, guy and tie wires.

Cleveland Railbond Company, Cleveland, Ohio, has issued a bulletin entitled "Rail Bonding: The Problem and Its Solution," which describes and illustrates the "Champion" method of rail bonding. Photographs show this process in operation without interruption to traffic.

Westinghouse, Church, Kerr & Company, New York, N. Y., have issued "a story in pictures" of the new Taylor-Wharton plant located near Easton, Pa. The plant comprises five buildings of which the main or finishing shop is 460 ft. x 420 ft. All buildings have complete skeleton steel frames with base walls of reinforced concrete to the window sills. The power plant contains six 350-hp. Stirling boilers with Detroit stokers, two 500-kw. geared turbines, and one 1000-ft. two-stage air compresser.

Ohio Brass Company, Mansfield, Ohio, has issued Catalog No. 16, in 654-page book form, covering its complete line of appliances used in the construction, maintenance and operation of electric railways, mine haulage systems and transmission lines. This catalog supersedes and cancels all other catalogs of this company, with the exception of Valve Catalog No. 50. Notwithstanding its size, the book is very easy of reference, the materials described being divided clearly into the following general classifications: catenary line materials, direct suspension line material, high-tension porcelain insulators, rail bonds and tools, third-rail insulators, and car equipment materials. The description of catenary line materials is prepared in a particularly interesting manner, owing to the numerous photographs reproduced of representative types of construction. Included under car equipment are the following apparatus: emergency hose bridges, trolley wire pick-ups, trailer connectors, electric car signal systems, trolley catchers and retrievers, trolley bases, whistles, air-sander equipment, and couplers. The last section of the book contains tables and data showing quantity of overhead materials required per mile for different types of construction, tensile strength of copper wire, and properties, weights and sizes of different types of cables, wires and tubings.

NEW BRAKESHOE COMPANY

A new company to manufacture brakeshoes was incorporated last week under the laws of Delaware with a capital of $1,000,000. The name of the company is the Vulcan Brake Shoe & Equipment Company, and the enterprise will be conducted largely by a number of the younger men formerly connected with the American Brake Shoe & Foundry Company. The plant of the new company will be located at Baltimore and the main office at 120 Broadway, New York.

Permanent organization will be perfected in the near future, when a complete staff of officers and directors will be elected. It is understood that W. H. McDonough, who is well known in the financial district, will be chosen president. F. W. Grant, formerly assistant to the vice-president of the American Brake Shoe Company, will be treasurer. Raymond M. Brower and Edward Barrett Smith, formerly in charge of the sales department of the American Brake Shoe Company, will be vice-presidents. R. N. Hill will be engineer of tests. H. K. Shoenherter, who was with the American Brake Shoe & Foundry Company since its inception in 1902, will be foundry superintendent for the company just incorporated.

Electric Railway Journal

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REGULATION VERSUS MANAGEMENT The exact dividing line between the regulation of public utilities and the management of such enterprises seems to be difficult of location, and in most cases of doubt the tendency has been to broaden rather than narrow the regulatory field. One commission, however, has set forth in no uncertain terms its conception of its duties and limitations in one phase of regulation—the control over security issues. Pending the settlement of the Bay State Street Railway fare case before the Massachusetts Public Service Commission, opponents of the company have been attacking on various grounds a petition to issue about $1,500,000 of new preferred stock and bonds for necessary purposes. As noted elsewhere in this issue, however, the commission has refused to interfere with the legitimate financing of the company, and in particular it holds that it has no authority to refuse approval to a new security issue because better terms might be secured later or to a combined issue of both stock and bonds, if in the opinion of the management that plan offered a wider investment field. The board can well check up the reasonableness of the expenditures to be capitalized, and naturally in rate and service cases it feels that it must prevent the public from being injured by any financial mismanagement at the expense of the stockholders, but in general the exact methods of financing to be followed in particular instances are a matter upon which the management should decide. We wish that more commissions showed as clear an understanding of the scope of their work.

JUDGING SIGNALS BY RESULTS Recently there has come to our attention a bit of the history of the signaling of a short but busy line which serves as a rather striking example of an unfortunate characteristic of railway operation. In this case the signals, after the usual initial period of adjustment and elimination of minor troubles, began to operate on a basis of 100 per cent perfection. In fact, they went for four consecutive months without a single interruption. The management, conceiving the brilliant idea that the absence of failures indicated a corresponding absence of need for repair work, laid off the signal maintainer, and within a few months a complete break-down of the signals necessitated calling the manufacturers to the rescue. Just why such superficial thinking should be done by railway officials is not easily understood, but it is by no means uncommon, and the evil results appear in every branch of operation. The signal department may, perhaps, be most susceptible to it, with the result that signal maintainers are not infrequently anxious to avoid clean records for the signals in their districts. It may not be that they fear actually being laid off when things run too smoothly, but it is apparently a common understanding among signal repair men that the avoidance of trouble means the imposition of additional work to keep them busy beyond any possibility of doubt. This viewpoint may not be creditable to the signaling fraternity, but its existence is still less creditable to the managements whose lack of common sense permits them to judge employees otherwise than by results.

INDUSTRIAL MOBILIZATION PROGRAM The program for organizing the nation's industries so that they may be made promptly available for supplying munitions in case of war, as outlined in detail at the recent New Orleans meeting of the American Society of Mechanical Engineers, and mentioned also in a communication this week, is primarily intended for the manufacturer rather than for the electric railway company. At the same time, we believe that the repair shops of at least the larger companies, with their machine shops and wood mills, could easily be converted into manufacturing units of no insignificant value. This fact should not be overlooked by the new engineering board. Experience in the present conflict abroad has shown that the demands in the way of supplies are of infinite variety. While guns and ammunition may still form the bulk of the material that must be furnished to an army in the field, there is just as vital a need for other articles of a less directly warlike character. These latter range from the most complicated gasoline-engine parts to the simplest kind of dinky cars and even wooden cases for holding projectiles. It is the latter class of miscellaneous supplies that the larger electric railway shops might well undertake to furnish. Without either the organization or an extended equipment of automatic machines necessary for efficient routine production, few repair shops could turn out such material as fuses or shells in quantities that would warrant the undertaking. Yet for the supply of miscellaneous munitions a number of the electric railways can lend a hand in the general movement toward affording the country at least a chance of protecting itself, and their shop equipments should be listed on the data blanks to be sent out in connection with the industrial mobilization plan, even though the use to which the machinery may finally be put is not immediately apparent. This, of course, is in addition to the transportation service which they can render in the mobilization of troops, a subject which we suggested last November and which has since been taken up by the General Staff.

CAN RAILWAY VOLTAGES BE STANDARDIZED?

High-voltage d.c. railway practice was the subject of discussion at the A. I. E. E. meeting in New York last week, and a number of the men who have had much to do with its development expressed themselves frankly concerning it. This subject is of vital interest to executives as well as to equipment men, as, on the one hand, the technical advances in the business open up new fields for electrical transportation, while, on the other hand, each advance renders some equipment obsolescent.

At the meeting referred to one speaker advocated the selection of a definite voltage as standard for interurban and heavy traction, not arbitrarily, exactly, but on the basis of present tendencies. His idea was that 5000 volts seems to be the limit which is being approached by the process of natural selection. Another speaker deprecated this plan as being contrary to the method by which effective standards are produced. In view of the existence of these two points of view, and of the savings undoubtedly to be secured by standardization, the query which heads this article is worthy of careful consideration.

Two things may be taken for granted as a basis for argument, namely, that standard apparatus is cheaper in first cost and maintenance, and that standards somewhat hamper progress. If we could unerringly determine where unhampered progress would lead, and could select standards accordingly, the ideal conditions would obtain. Obviously with our limited prescience this is impossible. Taking conditions as they are, what is the safest, most economical and wisest course in view of the unsettled condition of long-distance traction? Is it not to standardize first those elements which seem most nearly to have reached stability? In view of the difficulties found by the standards committee of our own association in spreading the use of standards in physical equipment, which is in a sense uniform for all lines, one can understand the enormously greater difficulty of standardizing voltage or system because from an engineering standpoint economic conditions would dictate the use of various voltages and different systems to suit different conditions.

For city work 600 volts can almost be considered standard, so that voltages of 500 or 700 seem abnormal. A combination of conditions of motor design, overhead mechanical construction, transmission economy, accident and fire hazard, etc., has brought this about. So firmly established has this standard become that it has naturally been selected as a unit for determining the higher voltages, 1200, 2400 and 3000. In this connection the analagous situation with regard to the incandescent lamp comes to mind. The carbon lamp began commercially around 50 volts, but soon 80, 100 to 110, and 200 to 220 were tried. Combined manufacturing and operating requirements finally established 110 volts as the practical standard, so much so that voltages of 110, 220 and 440 came logically for motors, and even 6600 and 11,000 are familiar in power work where lighting is incidental. The city car motor and the incandescent lamp occupy corresponding places in their respective fields to-day.

To return again to the starting point, there are compelling reasons for the upward tendency in railway voltage, all having to do with power-distribution economy. Opposing these are considerations of increased costs of equipment and maintenance elsewhere than in those elements affected favorably by reduction in current. These opposing forces are by no means in stable equilibrium at present. Why is not the proper plan that by which the American Electric Railway Engineering Association approaches the subject of standards? This association makes a distinction between standards and recommended practices. The former is the higher grade. A recommended design or method is one which represents good present practice, but which, because of the formative state of the art and the likelihood of changes, does not admit of adoption as a standard. It seems to us that among the higher d.c. voltages both 2400 and 3000 might be accepted as recommended, until perhaps one of these should prove so superior to the other as to be selected as a standard. Five thousand volts logically would be another higher step, but it can yet hardly be considered even a recommended voltage in view of the limited experience with it.

ECONOMY OF REDUCED INTERCHANGE TIME

In an article published on another page of this issue, D. D. Ewing seems to have established with reasonable definiteness that, for the cars in any given city, the arrangement of entrance and exit facilities is a major factor in the time spent at each stop by boarding and alighting passengers. There is thus raised the point that there may be cases wherein the expenditures necessary for rebuilding old cars so as to provide the best entrance and exit facilities may bring returns that are ample warrant for the investment.

Mr. Ewing's investigation leads to the conclusion that a three-second interchange time may be reduced through improved facilities by about three-fourths of a second in the particular city to which the data apply, because a line that was favorably situated as regards activity of passengers showed one second saving per passenger, and one less favorably situated, about half of this, when improved facilities were provided. However, since records of interchange time as low as one and a half seconds per passenger have been published, it is permissible, for the sake of using round numbers, to assume that an even second may be saved by a change from the worst arrangement to the best. Then, if the average extent of the interchange is two and a half passengers per stop—a conservative estimate in the light of experience in a number of cities—the time saving would be two and a half seconds per stop, and with eight stops per mile, the total saving would become twenty seconds per mile.

Since a schedule averaging eight stops per mile would probably permit a speed of 9 m.p.h., whereby 1 mile would be covered in 400 seconds, the result of cutting the passenger interchange time by one second, or saving twenty seconds per mile, would permit an increase of 5 per cent in schedule speed. In a small city this saving might not be noticeable, because, theoretically, there would have to be twenty or more cars on a line to permit the release of one car subsequent to an increase of 5 per cent in speed, and so many cars as this would hardly be found on a single line except in the larger communities. Expressed in another way, a line with a round-trip length of 9 miles would be covered in sixty minutes at 9 m.p.h., and 5 per cent saving would cut three minutes off the schedule for the round trip. Then if the headway was three minutes, one car could be taken off without changing the headway or reducing the number of seat miles that were furnished, but if the headway was more than three minutes no car could be taken off without either changing the headway or else permitting a gap to occur every sixty minutes, the seat-miles being reduced in either case.

However, in large cities normal conditions would frequently permit full advantage to be taken of increases in speed still smaller than this. Even in the smaller towns, occasional individual lines may be found where there is sufficient density of service to utilize faster schedules, and in any event, there is always the possibility of combining time savings from other sources with the one under consideration, thus making an aggregate reduction in schedule time sufficient to effect a direct improvement in operation.

Under such circumstances, if full advantage is taken of a 5 per cent increase in speed, there should be saved the equivalent of some 3.5 per cent of the operating expenses. If there is taken as a basis the average figures from the last electric railway census, where the annual operating expense is $3,960 per car, the annual saving would thus become $135. Such a return, capitalized at 20 per cent, would warrant an investment of $685, generally more than enough to lengthen platforms and provide front exits, fare boxes, wide passageways and other features commonly considered essential to rapid handling of passengers.

THE NEW ROCHESTER CAR

Two features of the new car that has been built for Rochester, N. Y., as described on another page of this issue, stand out with particular prominence. First of these is the arrangement of facilities for fare collection, whereby the space between the entrance door and the conductor is reduced to the absolute minimum. The arrangement in the car now in operation provides room at the most for three passengers to board the car before payment of their fares, and the transportation department of the company seems to want even less space than this for future cars of the same type that may be built.

The theory on which the design is based is consistent enough, provided the people generally can be educated up to the point where they will invariably be ready to pay fare before entering a street car. The plan adopted also follows more or less the experience of some ten years ago, which showed that the abnormally large platforms on prepayment cars were not altogether desirable, as these have been replaced in more recent designs by platforms of moderate size. In any case, the scheme, as applied to center-entrance cars, has the distinct advantage of providing additional seating space within the car and thus adds definitely to the revenue-producing ability of the unit of transportation.

The second radical feature found in the new design is the use of "low-floor" motors with maximum traction trucks, giving a total of only 70 rated horsepower for the car. The test figures that have been obtained seem to demonstrate with reasonable certainty that the small capacity motors are going to be sufficient, at least under the grade and traffic conditions that exist in Rochester, and it is to be hoped that the operating records will prove to be as satisfactory after a long period of service. Certainly, the experiment is of very distinct importance to the industry, not only because it will demonstrate whether or not the advantages of low floors may be combined with those accompanying two-motor equipments, but also because it will throw some light upon the question on which there has been considerable debate, regarding the necessity for over-motoring surface cars.

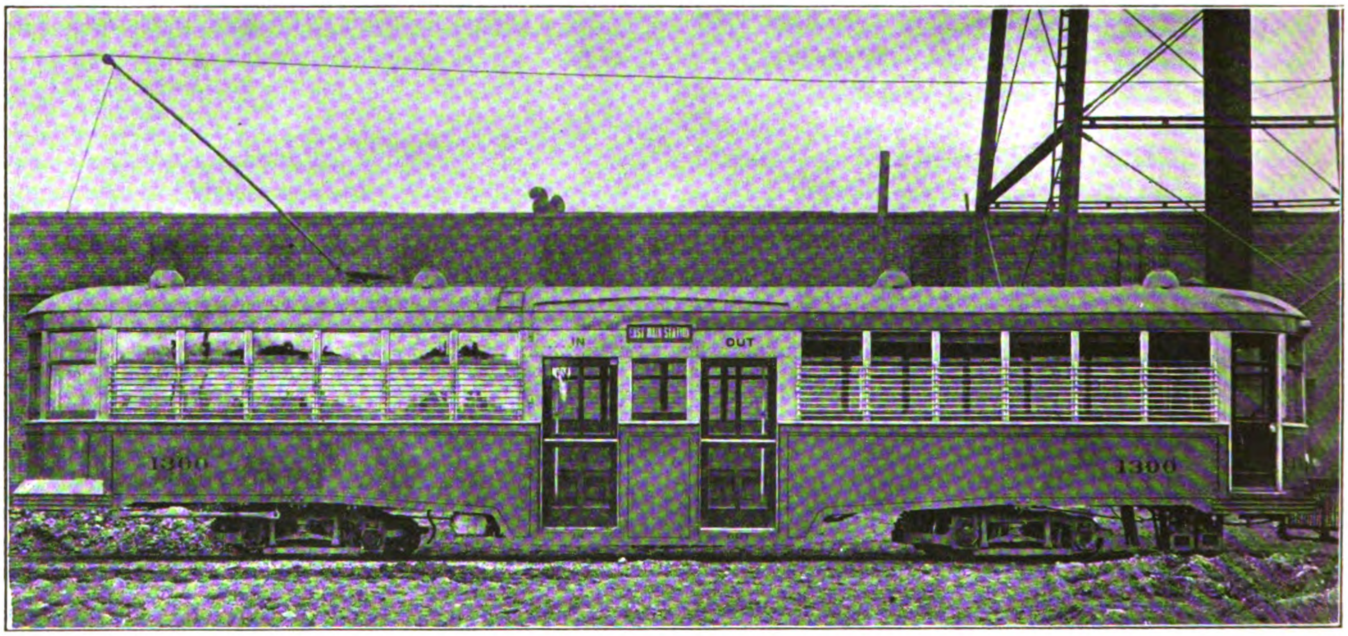
There is a third feature of novelty in the design which is at least of interest, although it may not be of great importance because of the limited possibility for general application. This consists in the location of the pony wheels in front of both of the maximum traction trucks. For single-end cars this is a thoroughly logical arrangement, and, as a matter of fact, it is somewhat surprising that advantage has not been taken before this of the opportunity thus provided to increase adhesion at starting. The principle is that, when the car is being accelerated, there is a tendency for both trucks to be tilted backward, throwing an increased proportion of the load upon the rear wheels of each truck. The phenomenon is common enough in the case of maximum traction trucks which have the driving wheels at the outer, or platform, side of each truck, because under such circumstances slipping invariably takes place at the front wheels, while the rear wheels almost always hold the rail.

For a double-end car, a symmetrical arrangement is necessary, and the best is that in which the driving wheels are placed at the inner side of each truck, so that the first and fourth pair of wheels for the car are idlers. Although this latter arrangement causes the rear truck to lose some of the weight on its driving wheels when it is tilted backward, it is also true that an increase of load is thrown upon the rear truck as a whole because of the tilting of the car body, and this tends to offset the effect of the tilted truck. This question is, of course, considered here only in regard to the effect of acceleration, but normally there are no other conditions that affect it, so that the principle is of general application with modern double-end cars. For single-end cars, however, the location of the drivers at the rear of each truck is obviously most advantageous, and this is the arrangement that has been adopted in the new Rochester design.

Low-Level Car for Rochester

A Single-End Car Equipped with Two Low-Floor Motors on Maximum-Traction Trucks Having 24-In. Driving Wheels Has Successfully Passed Through Extended Service Tests—The Weight Is 31,800 lb. and the Seating Capacity Sixty

SERVICE tests have recently been completed on a new car for the Rochester lines of the New York State Railways and the successful record of the equipment in the trials may well exert an appreciable influence upon future car design and equipment. The notable feature of the new car is the use of a 24-in. driving wheel for a maximum-traction truck, and the provision of only two "low-floor" motors as opposed to the four that have heretofore been considered necessary when this type of equipment, rating 30 hp. on 500 volts, has been used. The new arrangement provides the advantage of low maintenance cost inherent in a two-motor equipment, a point that has been raised effectively in the past against the use of the "low-floor" motor, and yet it permits the establishment of the low-level car floor so much desired at the present time. An incidental feature of importance in the new design is the installation of the pony wheels at the front of each truck, the car being constructed for single-end operation, and it may be said that the designer has thus taken advantage of a much-neglected principle of inertia to improve adhesion at starting.



ROCHESTER CAR—GENERAL VIEW OF CAR SHOWING ARRANGEMENT OF ENTRANCE AND EXITS DOORS

CAR-BODY CONSTRUCTION

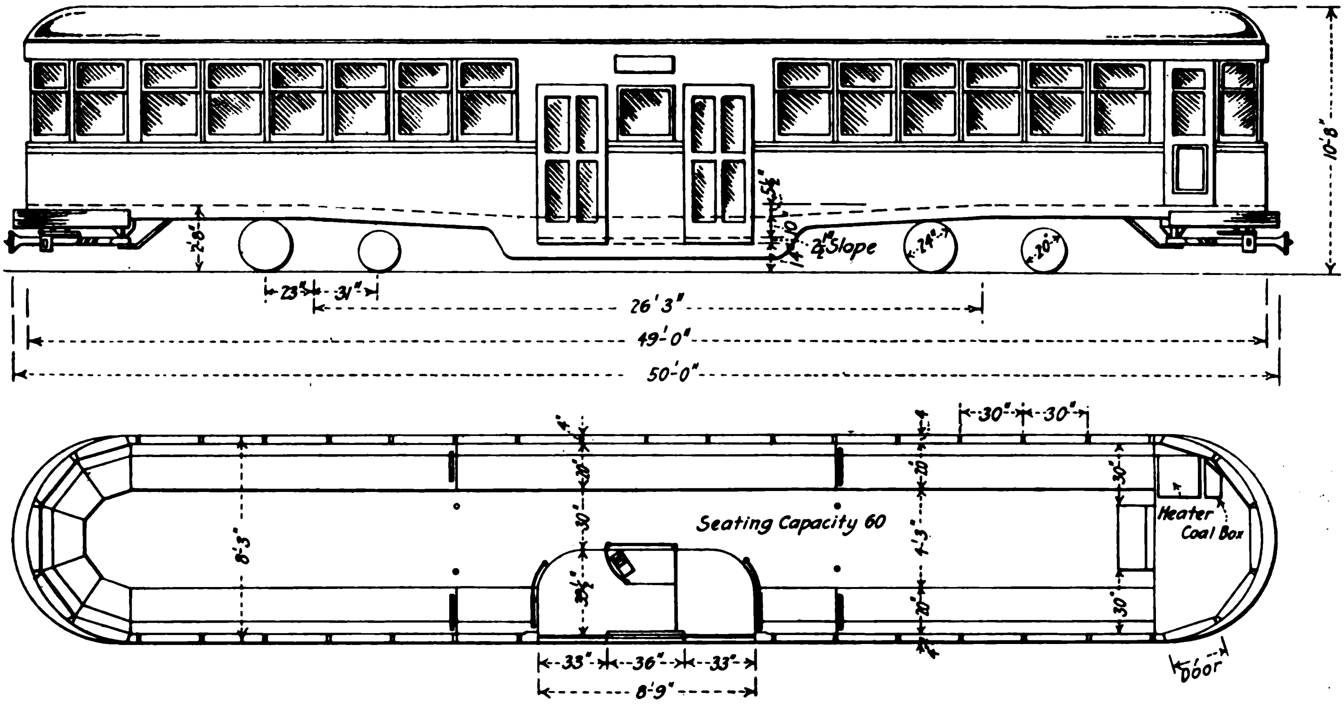
Still another feature that is novel in the design is found in the entrance and exit facilities provided for the car body. A center-entrance arrangement has been adopted, the entrance and exit doors being individually operated by National Pneumatic Company's air-operated door engines and rather widely separated. The novelty consists in the extremely small prepayment space that has been provided for entering passengers, a distance of only about 3 ft. being provided between the door and the fare box. The fare box is located inside of a narrow well in front of the doors and the conductor stands on a slightly raised section of the well floor on the exact center line of the car, having the fare box between him and the entering stream of passengers.

Contrary to the experience obtained in several other cities, this limitation of prepayment space has proved to be advantageous in Rochester. In fact, it is reported that tests have shown a minimum distance in front of the fare box to be more productive of rapid loading, when final results are considered, than a large loading space, the principle being that prospective passengers acquire the habit of having change ready before boarding, because they are hustled across the short loading space by other passengers wanting to board the car.

The arrangement has, incidentally, a distinct advantage in placing the conductor so near the door that a wide aisle is provided between him and the seats on the opposite side of the car. This permits movement of passengers from the rear to the exit door without undue congestion as the conductor is passed. It has the advantage also of placing the conductor near to both doors, so that he can oversee their operation without difficulty.

The separation of the entering and exit doors by a panel 36 in. in width makes certain that the entering and leaving streams of passengers will be divided at all times. A front door has been provided in the motorman's vestibule, but this is used only by the motorman and not by the passengers, steps between the door sill and the street level having been omitted.

In the new car, also, advantage has been taken of the possibility of using ramps in the floor between the bolster centers and the doorways, and a drop of 5½ in. in this distance has been introduced in the main car floor. A ramp has been introduced also in the floor of the small loading well, a drop of 2½ in. existing between the inner edge of this space and the door sills.



ROCHESTER CAR—PLAN AND ELEVATION SHOWING GENERAL ARRANGEMENT

In consequence, the step heights are conveniently low. The rise from the rail to the door sill is 14 in. and that from the entrance well to the main car floor is 10 in.

Longitudinal seats have been installed throughout, and these are level, being set in tiers to make up for the effect of the ramps in the main floor. At the end of car the seat level is 17 in. above that of the floor, and over the central portion of the car the seat has been lowered 4½ in., making the height 18 in.

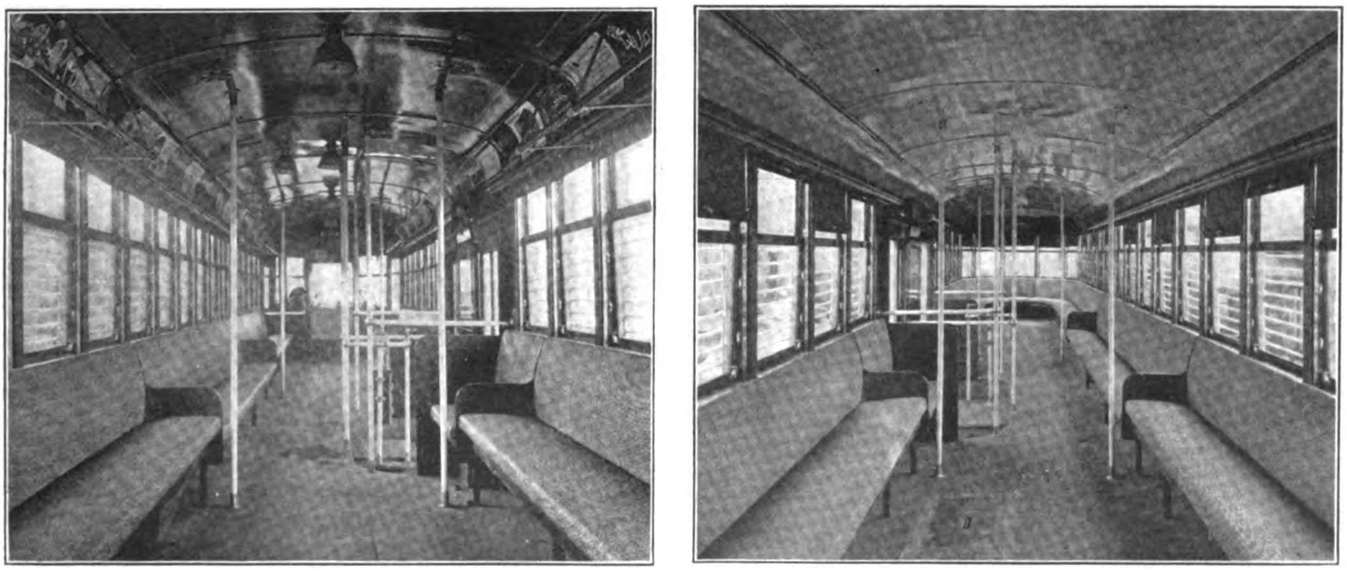
The car is somewhat longer than customary for city service, the over-all length being 50 ft. and the truck centers 26 ft. 3 in. The width is limited to 8 ft. 3 in. by the clearances in the city. Longitudinal seats have been used throughout, but notwithstanding this the high-seating capacity of sixty has been attained. The car is without bulkheads, and at the front end the motorman is separated from the rest of the car by horizontal railing and a cross-seat that serves two passengers, no one being allowed to ride in the motorman's section. In this section there is a Peter Smith heater and a coal box in addition to the controller and brake equipment.

The body is constructed with steel sheathing below the belt rail, but wooden posts, roof and letterboard are used. All carlines also are made of wood, but each alternate one has been reinforced with steel. The roof is of the plain-arch type, and headlining has been installed on account of cold weather that is experienced during winters in Rochester. The floor is built up of two ½-in. layers of wood with felt in between them.

The scale weight of the car complete and ready for operation, but without heaters, is 31,350 lb. Allowing 450 lb. for the heaters, ducts, stovepipe, fan-motor equipment and hand rails complete, the weight becomes 31,800, giving the astonishingly low figure of 530 lb. per seated passenger. The weight is divided as follows:

Body	17,490 lb.	Air brake equipment	770 lb.
Trucks	8,640 lb.	Heaters (estimated)	450 lb.
Motors	3,710 lb.		
Controller and electric equipment	740 lb.	Total	31,800 lb.

From this table it will be seen that the low weight has been effected by using light equipment rather than



ROCHESTER CAR—FRONT AND REAR VIEWS OF INTERIOR by cutting down the car body. The latter is of normal weight, at least, or, if anything, is a little higher than usual for a car of this type. For example, the New Orleans car of a year ago had a body 47 ft. 8 in. long, and this would weigh, after an allowance is made for heaters, 16,000 lb., or 4 per cent less than the car body of the Rochester car when reduced to the same length basis. The Chicago Railways car of two years ago was 48 ft. 5 in. long over all, and when compared on the same length basis the body would weigh 8½ per cent less than the body of the Rochester car. Nevertheless, both of these cars, complete and ready for operation, weigh some 3000 lb. more than the Rochester car (allowing for the fact that the latter has single-end control), thus giving an idea of the saving in weight made possible by the small motors on maximum-traction trucks.

In the Rochester car body, however, considerable attention has been devoted to the reduction of unnecessary weight, hydro metal and aero metal having been used for all fittings. A feature of the body equipment is the type of arm-guard that is used outside of the lower windows on both sides. This is made up from seamless steel tubing, and all of the rods except the two in the center are held in brackets that are hinged from the center tubes so that they can be swung out of place without removing them from the car whenever it is desired to wash the outside of the windows. The car was built by the G. C. Kuhlman Company, Cleveland, O.

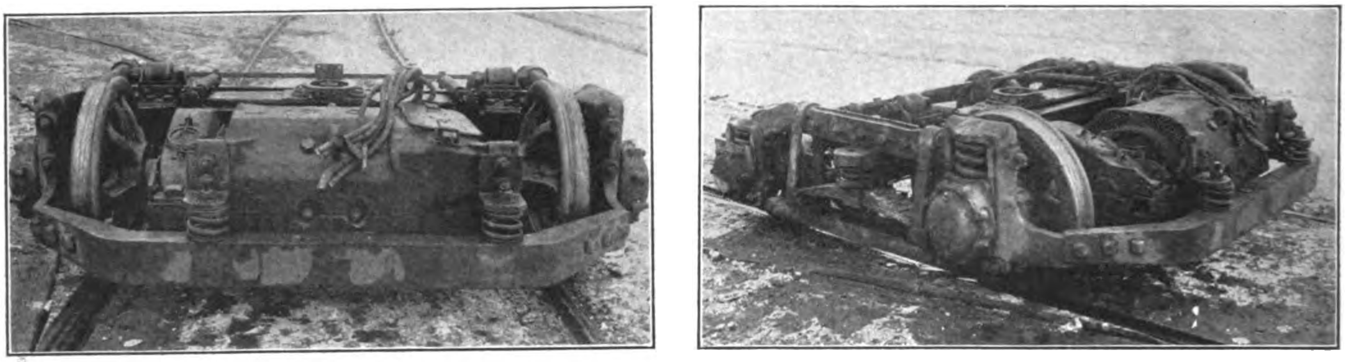
TRUCKS AND MOTORS

As before mentioned, the most striking feature of the car lies in the use of maximum-traction trucks with 24-in. driving wheels. The pony wheels are 20 in. in diameter, and both these and the drivers are equipped with ball-bearings. On both trucks the pony wheels are the leading ones, and since the car is designed for a single-end operation, the location of the driving wheels at the rear of each truck provides the advantage of increased adhesive weight when the car starts, thus reducing the tendency to slip the driving wheels at starting. The principle here involved is that when acceleration takes place the point of application of the external force producing the acceleration is at the level of the rail. The greater part of the weight that is being accelerated, however, is supported at the level of the truck bolsters, and therefore, whenever the car starts, a couple is set up which tends to tilt each truck backward and throws a larger proportion of the weight upon the rear wheel of each truck. Since the rear truck wheel in this case is the driving wheel, the added pressure upon the rear wheel tends to keep it from beginning to slip, and thus eliminates, in part at least, a characteristic of two-motor equipments that has frequently been found objectionable in the past.

The truck frames are of the well-known Brill type, and they are liberally provided with springs. Coil springs are installed over each journal box, and a longitudinal leaf spring is hung from the side frame to carry the bolster, this having another coil spring in series with it between the leaf spring seat and the spring seat on the bolster end. The motors, of course, are outside hung, and they have a bracket suspension in which large coil springs are introduced between the brackets and the truck end-frame.

The motors are of the General Electric No. 247 type, which has become variously known as the "low-floor" or "dachshund" design, because the vertical height is so limited that the motor can be used with a 24-in. wheel. The rating is 30 hp. at 500 volts, or 35 hp. at 600 volts, and since the total rating of the two motors installed is only 70 hp., even at the higher voltage, it would seem that the car establishes a record for being lightly motored.

However, the use of such a small motor horsepower has been made possible for two definite reasons: One of these is that the total weight of the car is only 31,800 lb., this being about 15 per cent lower than the weight that would ordinarily be expected on a car of this size. Incidentally it is worthy of note here that the greater part of this weight reduction has been obtained by the removal of one pair of motors, thus lending support to the saying that a considerable part of the work of a motor consists in hauling its own weight. The second reason for the small motor equipment lies in the use of anti-friction bearings on the main journals. This feature is estimated by G. M. Cameron, master mechanic New York State Railways, Rochester Lines, who is sponsor for the new arrangement, to effect a saving of 15 per cent in power consumption, and where the rate of acceleration is moderate it is believed that the anti-friction bearing should reduce the work done by the motor by at least that much. With a voltage that is maintained close to 600, the small motors would thus become the equivalent of motors of 48 hp. installed on a heavier car with plain bearings, and this equivalent rating is at least an approximation of a motor size that is common with maximum-traction trucks and two-motor equipments.



ROCHESTER CAR—VIEWS OF MAXIMUM TRACTION TRUCKS WITH 24-IN. DRIVING WHEELS

TESTS

As an indication of the manner in which the motors are performing their work the accompanying table is published, this being made up from an all-day test that was recently made upon the new car. The information contained therein is largely self-explanatory, the temperatures in various parts of the motors that are shown having been taken at the conclusion of the day's run, and indicating that the motors were far from being overloaded. The service on the run in question, as indicated in the table, is not especially severe, since the number of stops per mile is 6.3 while the speed is 8.4 m.p.h., and although there are some grades, none of

ENERGY CONSUMPTION TEST ON LIGHT-WEIGHT CAR, NEW YORK STATE RAILWAYS, ROCHESTER LINES

February 24, 1916.
Weather—Cold, some rain.
Track—Fair.
Brake—Fair on high pressure and poor on low pressure.
Weight of car—15.9 tons.
Equipment—Two GE.-247 motors—One K-36 controller—S. K. F. ball-bearing journals.
Gear ratio—15:58.
Time start—6.52 a. m.
Time finish—6.25 p. m.
Elapsed time—11 hours 20 minutes.

Trip No.	Passengers Carried	Stops	Miles	Watt Hours Car-Mile	Watt Hours Ton-Mile	Remarks
1	3	5	0.90	1,722	108	Motorman 362—Rail fair
2	65	28	4.92	2,235	123	
3	89	37	4.92	2,335	123	Rail good
4	35	37	4.92	2,245	126	Weather fair and cold
5	46	39	6.78	1,948	111	
6	51	45	6.78	2,380	135	One and one-half minutes late
7	43	36	6.78	2,010	115	Rail slippery—On time
8	51	43	6.78	2,230	126	
9	84	42	6.78	2,235	119	
10	91	55	6.78	2,735	143	Motorman 1094—Rail good
11	55	54	6.78	2,300	129	Six minutes late
12	42	15	4.53	2,330	134	Raining—Rail good
13	51	22	3.20	2,420	137	
14	44	28	4.92	2,380	137	
15	73	42	6.78	2,250	122	
16	72	38	6.78	2,030	110	
17	116	31	4.92	2,030	102	
18	3	3	0.90	2,275	143	
Totals	1,014	600	95.15			
Averages		6.3 per mile	8.4 miles per hour	2,249	124.0	

Motor Temperatures—Centigrade Degrees

	Motor No. 1	Motor No. 2
Armature	45	42
Main field	40	34
Interpole field	32	37
Commutator	39	40
Pole tip	32	..

Outside temperature 0 Deg.

them is very long and steep. For the run a gear ratio of 15:58 was used, and the acceleration and braking rates were approximately 1.5 m.p.h. per second.

No detailed tests were made to establish passenger loading records. However, the railway company's transportation department considers that the car is very satisfactory in respect to its ability to accelerate passenger interchange. This department, however, has made a request that in the future cars of this type the loading well is to be 1 ft. narrower than in the present cars. Thus there will be given additional space for passengers to pass by those who may be seated on the longitudinal seats opposite to the well when moving from the rear of the car to the front to get at the exit door. As before mentioned, the company believes that the small standing space for passengers who are about to pay their fares tends to accelerate the boarding rate, and since the company's patrons have become accustomed to the arrangement, it is usual for all of them to have their fares ready before the car arrives. However, if considerable space was provided within the car so that the passengers could stand inside while getting their fares ready for payment, nearly every passenger would plan to take advantage of this, with the result that there would be congestion within the car rather than an acceleration of boarding.

Bowling Trophy to Denver Tramway

The bowling league of the Denver (Col.) Tramway has received from the athletic association of the Public Service Railway, Newark, N. J., the trophy of victory in the tournament held during the winter by the bowling enthusiasts of the two companies. Last fall the employees of the Public Service Railway, and of the tramway company, arranged a bowling tournament, which was to consist of three evenings' play. The games were rolled on the evenings of Oct. 23, Nov. 20 and Dec. 4. The New Jersey five began rolling at 9 p. m. on their alleys in West Hoboken, and the tramway five began rolling at 7 p. m., each team telegraphing the score to the opposing five as soon as play was finished. The tramway won the tournament by 322 pins (total pins being the deciding factor), and won two of the three series played. The idea in arranging the contest was to lay the foundation for a firmer friendship and a better understanding between men engaged in the same occupation.

Accident Prevention in Seattle

Discussions with Employees of Preventive Methods and Bogey System Have Effected Reduction in Number of Accidents

THE Puget Sound Traction, Light & Power Company has established the custom of holding regular meeting at the several carhouses for the purpose of explaining to platform men, and inviting their discussion on, the problems which confront the company in preventing and handling accident cases. The schedule of meetings is arranged so that there are two each month during the winter, held at the several carhouses in rotation. The first series of meetings open at 8 p. m. and are attended by the men after coming off duty, while the second series opens at 2 p. m., and for these most of the men come to the depots an hour before their run is scheduled. The meetings are arranged by the head of the department of accident prevention, which is the successor of the claims department in this company, but the general superintendent is present to conduct the meeting, so that with the carhouse foreman and inspectors present there is an official tone about the gathering at the same time that it promotes a feeling of democracy among the men.

The theory is that by careful intensive training of the platform men the company can do more toward preventing the kind of accidents for which it is liable than could possibly be done by any popular educational campaign. The men are told just what certain recent accidents have cost the company, why the company was liable and what may be done to prevent the recurrence of similar liability. Illustrations are shown to facilitate discussion on the more common accidents, and the dangerous curves, crossings and congested districts of each division are analyzed and discussed.

Particular stress is placed on the desirability of as many addresses of witnesses to an accident as it is possible to get, and the peculiar danger to the company from the unreported accident is emphasized. It has been noted that since these meetings have been inaugurated the increase in the average number of witness addresses which the platform men turn in would, of itself, repay the company for holding the meetings. As an adjunct to the discussion of accident problems the bogey system of posting the accident records for each carhouse, described in the issue of this paper for Feb. 1, 1913, is followed. The bogey for each carhouse is determined by a committee and is based upon the accident record for that carhouse in the same month a year previous. The committee takes into consideration any unusual circumstances which may have influenced the earlier record, and decides what can be expected in the month to come. The men show a great deal of interest in these records, and there is keen rivalry to see which carhouse can turn in a record to beat its bogey by the greatest margin.

G. A. Richardson is the general superintendent of the Puget Sound Traction, Light & Power Company and F. M. Hamilton is in charge of the department of accident investigation.

Factors Affecting Duration of Stop

In This Discussion the Author Analyzes the More Important Factors Which Affect the Duration of the Stops Necessary for Handling the Passenger Traffic of a Street Railway System and Presents Some Data on the Subject

By D. D. EWING
Assistant Professor of Electrical Engineering, Purdue University

SINCE with a given track and equipment, the maximum schedule speed which can be maintained depends in part on the duration of stop, a knowledge of this duration is of importance to the electric railway operator and to the engineer whose duty it is to specify equipment.

The time necessary for stops may be divided into three parts: first, the interval between the instant of stop and the instant the first passenger steps on or off the car; second, the actual loading and unloading time (loading and unloading may be simultaneous) and third, the interval between the instant the last passenger steps on or off the car and the instant the car starts. For a given set of operating conditions the sum of the first and third of these intervals is practically constant. The time per passenger, however, decreases as the number of passengers "on" and "off" increases. When but one passenger is handled at a given stop this constant time may be quite comparable to the actual loading or unloading time, whereas when a large number of passengers are handled it is distributed and becomes almost negligible as compared with the loading and unloading time per passenger. The second interval obviously depends on the number of passengers handled.

FACTORS AFFECTING DURATION OF STOP

As regards their relation to the duration of stop, the following factors will be discussed in the order named: Type of car, method of fare collection, class of passengers, load in car, condition of landing at stops, weather, and vehicular and pedestrian traffic.

The location of the car entrances and exits, types of steps and doors and convenience of the entrances affect the first part of the stop interval. Narrow, inconvenient steps and doors tend to increase the interval, as also do step-folding and door-closing devices. Number of entrances and exits and their condition as regards whether they are properly separated or not, height of car floor above the street, and the arrangement of the seats and aisles affect the second part of the stop interval. The third part is affected by the type of doors, brakes and control used. A low-deck car without bulkheads, with ample and segregated passageways, permits rapid handling of passengers. While of very great value from the standpoint of safety, folding steps and doors increase the duration of stop because they increase the first and third parts of the stop interval. The method of fare collection affects the second and third parts of the stop interval. Collection at the car entrance decreases the speed of loading, thereby increasing the second part of the stop interval. The use of a fare box slightly facilitates loading. The third part of the stop interval is usually decreased because the conductor is in position to give the starting signal the moment the last passenger clears the steps.

The class of passengers handled has considerable influence on the first and second parts of the stop interval. Elderly people, shoppers, business men, office workers and clerks usually require a greater total time per passenger than do workingmen and young people on an excursion trip, because the latter classes are more active and more likely to have their fares ready if entrance collection of fares is used, and if it is not used they will tumble aboard without very much ceremony. For example, a group of college students can get aboard a car in a phenomenally short time if the spirit moves them to do so.

The load already in the car principally affects the second part of the stop interval. The first part, however, may be affected where only a few passengers are to be unloaded from a crowded car because they are unable to reach the exits quickly. When a number of passengers board a car which is already fairly well loaded, the loading time per passenger usually increases because the incoming passengers cannot clear the entrances and passageways rapidly enough.

Muddy, snowy or icy crossings, and bad weather which makes the use of umbrellas necessary or coats the car steps with ice, generally increase the first and third parts of the stop interval.

Congested vehicular or pedestrian traffic prevents passengers from getting to the entrances and away from the exits quickly, thereby increasing the first and third parts of the stop interval. Of course, such traffic conditions cause stops which are not necessary for the convenience of passengers, but a discussion of such stops is beyond the limits of this article.

ANALYSIS OF STOP DURATION ON SPECIFIED LINES

The curves presented herewith were plotted from data taken in some traffic studies made under the writer's direction on the local lines of the Fort Wayne & Northern Indiana Traction Company at Lafayette, Ind. A city population of about 25,000 is served by these lines. The data were taken by observers stationed in the cars, the actual duration of stop being measured with a stop watch and the passengers "on" and "off" at each stop counted. All of the studies were made in the winter and early spring.

The curves in Figs. 1, 2, 3 and 4 show the relation between the time per passenger in seconds, and the number of passengers handled per stop. The ordinate of each of the points in Figs. 1, 2 and 3 is the average time per passenger for all observed stops where that particular number of passengers, represented by the abscissa of the point, was handled. For small numbers of passengers the ordinate is the average of a large number of observations. For example, for one passenger the time as read on the curve in Fig. 1 is 2.2 seconds. This time is the average for 781 observations. The ordinates for the larger numbers of passengers are averages of fewer observations and for that reason the points are more scattered. The curve is drawn to average the points as nearly as possible.

It will be noted that the time per passenger decreases rapidly at first but soon becomes practically constant. This is because for more than four passengers, Fig. 1, the first and third parts of the stop interval become practically negligible as compared with

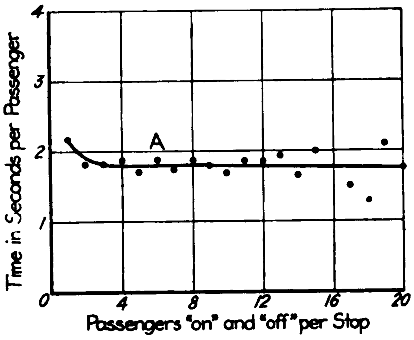


Fig. 1—Near-side, pay-as-you-enter thirty-two-passenger cars, equipped with fare boxes. Normal class of passengers.

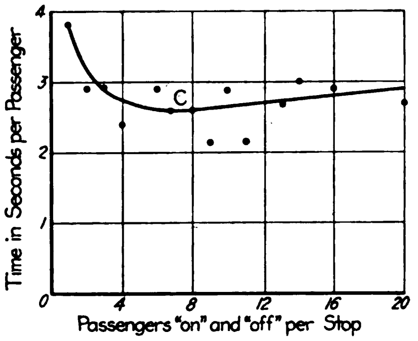


Fig. 3—Interurban line frequented by passengers to Soldiers' Home. No entrance fare collection.

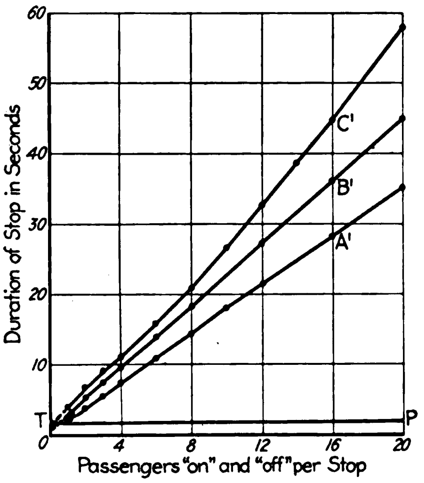


Fig. 5—Relation between duration of stop and number of passengers handled per stop.

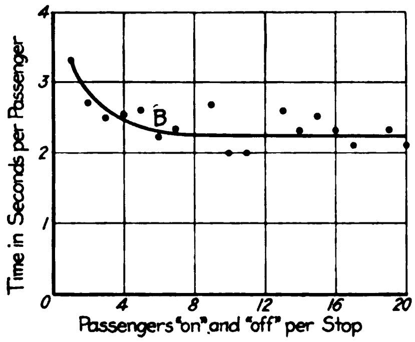


Fig. 2—Old double-end, longitudinal seat, twenty-six-passenger cars. Fares collected at entrance by conductor. University community.

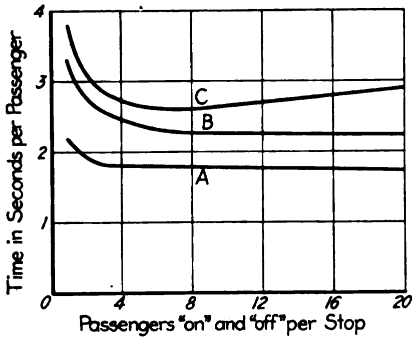


Fig. 4—Comparison of Curves *A*, *B* and *C*.

FACTORS AFFECTING DURATION OF STOP —STOP DATA SECURED ON LINES OF FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY

the second part. The time does not increase as the number of passengers increases because the car passageways are ample and the cars are rarely crowded. The traffic studies showed that on the line on which the data for Fig. 1 were taken the cars were loaded above their seating capacity on less than 7 per cent of the trips. This line carries the class of passengers which might be expected on any average line in a city of the above population. Pay-as-you-enter, near-side cars seating thirty-two passengers carry the traffic. In the collection of fares a fare box was used. The curve shows that for more than four passengers the time per passenger is approximately 1.8 seconds. For the entire number of stops observed in the traffic study on this line the average duration of all stops was 4.8 seconds.

Curve *B*, Fig. 2, is plotted from data taken on a second line which runs through the university community. Old style, double-end cars with longitudinal seats for twenty-six passengers were used. The fares were collected at the entrance by the conductor. All loading and unloading was done through the vestibule door at the rear. On about 10 per cent of the trips the cars were loaded above their seating capacity. One-third of the passengers were students. The average duration of stop for all stops observed was 7.9 seconds. The curve indicates that for more than eight passengers handled the time per passenger is approximately 2.25 seconds.

The data for Curve *C*, Fig. 3, were taken on a short interurban line, 7.3 miles long, connecting Lafayette and Battle Ground, a small town located on the site of the old Tippecanoe battlefield. The major part of the traffic is between Lafayette and the Indiana State Soldiers' Home, which is about 4 miles from Lafayette. The passengers are mostly inmates of, and visitors to, the home. The cars used were of the same type as were used on the second line described. On 20 per cent of the trips the cars were loaded slightly above their seating capacity. The fares were collected by the conductor going through the car, but as the runs were usually long he ordinarily had plenty of time to get back to the rear end of the car before the next stop was made. The passengers were loaded and unloaded from the rear end only. The average duration of all stops observed was 9.25 seconds. As fewer observations were made on this line than on the others the points plotted in Fig. 3 are more scattered.

To facilitate comparison the three curves have been replotted in Fig. 4.

For all three lines the vehicular and pedestrian traffic, condition of crossings at stops, and weather conditions were quite similar. The differences in the curves were therefore produced by variations in other factors. Curves *A* and *B* have the same general shape, the ordinates of each curve at first decreasing rapidly and finally becoming approximately constant in length as the number of passengers handled per stop increases. Curve *A* is considerably lower than curve *B* however and becomes horizontal sooner than does *B*. In each case the prepayment method of fare collection was used. Type of car is evidently the factor which causes the main difference between the curves. The near-side car, with its ample and segregated passageways, permitted much more rapid handling of passengers than did the type of car used on the other lines.

Curve *C* differs from curves *A* and *B* in that for a certain number of passengers handled the time per passenger is a minimum and after this number is passed the time per passenger gradually increases. Comparing Curves *B* and *C* it will be remembered that the same type of car was used on both lines. Prepayment fare collection was used on the second line but not on the third. However, the distance between stops on the third line overcame all the advantages as far as duration of stop is concerned that are offered by the prepayment system. The factors which are left to account for the difference between the two curves are: Class of passengers and load on car. On the second line a large percentage of the passengers were young people and on the third line a majority of them were elderly people often pretty well laden with bundles. Overloads were handled on a much higher percentage of the trips on the third line than on the second. The entrance of a number of elderly people into a car which is already fairly well filled would certainly not permit a stop of minimum time per passenger handled, and this is probably the reason why the ordinates of the curve increase after passing a minimum point.

It may be mentioned here that hand brakes and Type K control were used on all of the cars mentioned and that the near-side cars were equipped with folding steps and door-closing devices.

It is of interest, also, to plot the relation between the duration of stop and the number of passengers handled per stop. Such curves are plotted in Fig. 5. These curves were derived from Curves *A*, *B* and *C* in Fig. 4, although they also could have been plotted from the original data. Except near the origin, *A'* is a straight line. *B'* is practically straight throughout and *C'* is convex downward. By extending the curves until they intersect the time axis the sum of the first and third parts of the stop interval can be obtained. The intercept on the time axis represents that portion of the stop interval which is independent of the number of passengers handled and therefore, as was pointed out earlier in the discussion, is the sum of the first and third parts of the stop interval. The intercept of *A'*, *OT*, is larger than the intercepts of the other curves. The door-closing and step-folding devices account for this. The line *PT* drawn horizontally through *T* divides the ordinates of the Curve *A'* into two parts. The lower part of each ordinate represents the constant portion of the stop interval and the upper part, that portion of the stop interval which varies with the number of passengers handled.

GENERAL CONCLUSIONS

From the data and discussion here presented the following conclusions may be drawn:

The relation between number of passengers handled per stop and duration of stop is quite clearly defined, and for a given road operated with a given equipment admits of fairly accurate analysis.

The duration of stop may be materially affected by the type of car used, the class of passengers handled and the load already in the car.

Of these factors the first admits of control, and the curves show very clearly the saving in time that can be made with a well-designed car.

It is not claimed that the curves here presented are of general application, but rather that they represent the results of the analysis of a particular set of conditions.

The writer wishes to acknowledge his indebtedness to L. E. Stibbe, E. W. Middleton, L. G. Hallawell and D. C. Pyke, graduates of the School of Electrical Engineering, Purdue University, from whose graduation theses the above data were abstracted, and especially to Jack Abbott, superintendent of the Lafayette division of the Fort Wayne & Northern Indiana Traction Company, through whose co-operation the traffic studies were made possible.

The Birmingham (England) Tramways are inquiring into the use of trail cars on the London tramways with a view to their possible introduction in Birmingham because of the shortage of motormen which has been occasioned by the war.

Accounting for Betterments and Replacements*

Need of More Accurate Reporting and More Consistent Classification of Expenditures to Be Charged Against Authorizations—Responsibility of the Engineering Department

BY H. N. BALFOUR
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IN accounting for money spent for new and reconstructive work, the accounting official must place great reliance for correct reports from the men overseeing the physical end of the job. Considerable of the work has its origin in outside departments, and it is of extreme importance to have the divisional reports, such as the distribution of the value of the material issued during the month, distribution of the time spent by track gangs on road work and many other statements and bills covering the outlay of money, receive very careful study on the part of the man in charge so that the final advice to the comptroller is an exact representation of just what happened.

One is likely when under pressure, or laboring under the wrong impression, to give an incorrect classification of the expenditures on construction work in reporting for the cost sheet record. The results of this are obvious. The charges, as made through their various sources, are accepted and placed on record and remain there until the completion of the work. The chances at this time of getting an absolutely correct classification of the expenses are lessened for the very reason that a proper division was not made in the first instance, and therefore cannot be correctly determined by assumption when the final inspection of the cost sheets is made by the comptroller and the engineer. It is not inferred that these omissions are made by any one department, or that they are exceedingly common, but in some cases there is a tendency to overlook the importance of properly classifying the outlay.

To have the work done properly from the physical standpoint is, of course, of prime importance, but no work can be considered as done properly unless the same degree of care is exercised in accurately accounting for the work in dollars and cents. Certainly some improvement could be made along these lines if everyone, and particularly those who make a report of an accounting nature, would vigorously attempt to familiarize themselves with the standard Interstate Commerce Commission classification of accounts. The results of this familiarity would give every man the same basic knowledge for the handling of the accounting end of his work, which would result in a greater consistency and accuracy in all reports and statements from which the cost sheets are written up. This is just the thing needed, as it must be realized that the possession of detailed records from which the separate costs of special work, rails, buildings, new paving and the like, can be expeditiously and accurately worked out, are valuable. The engineer is very much in need of accurate accounting records that reflect a true and permanent history of the performance of any job, so that he may be able to base his future estimates for new work. To get these, there certainly cannot be any confusion in the separate accounting of each job.

There appears to be a general misconception as to just what happens to the heavy charges made against authorizations. It is apparent that there is an underlying belief with some that when the items are placed through their many sources against the authorization, nothing further develops from that expenditure, and the current operating expenses are not affected. This, of course, is wrong and, in cases where the authorization is underexpended, may lead to the inclusion of items that have no connection with the work in question. Not infrequently this has taken place. There is on record a case where the authorization was completed and underexpended a few hundred dollars, although the work did not differ materially from that originally in view. Some time after its completion a fair-sized charge made its appearance from the store report of issues. Investigation brought out the fact that, although the material was used in straight maintenance work in approximately the same location that this authorization work covered, the charge was made for the reason that it was known the authorization was underexpended and could therefore conveniently receive the charge and that consequently it could reduce the maintenance cost.

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*Abstract of paper read at meeting of Company Section No. 7 on April 4, at the Hotel Garde, New Haven, Conn.

There is no decided cash fund set aside to meet the cost of work, as these betterments and replacements must be met and paid for out of the current earnings and surplus, and the over or underexpenditure merely represents that the work was done for more or less than the original estimated cost of the work as outlined by the engineer. The difference between the actual expenditure and the estimate is carefully checked, and if it is not bounded by a certain percentage justifiable reasons will be received from the engineer in authority. After the approval of the authorization a job number is assigned to it, and provision is at once made to keep separate the accounting of the cost of the job under this number or title.

The question of how the expenditures will be divided is the next step, and as the engineer's estimate of the work to be done shows in detail the estimated extent of the additions and betterments and the estimated original value of the things to be replaced, it gives a tentative basis upon which can be estimated the charges to be placed against the maintenance accounts each month. For example, an authorization may call for a total expenditure of $20,000 divided equally as between betterments to property and replacements. If the work covers the reconstruction of track, there is a 50 per cent element of betterments to the property, and the balance is the depreciation on the things replaced. This depreciation on the original cost of the property being replaced represents the charge that will be made to operation. All accounts, however, are not equally affected. In the case of ties, the chances are that it is entirely a replacement, and if an untreated tie is replaced with a treated tie or one of exactly the same class, the entire cost of the new tie, as shown on the store report to Account 506, is charged directly to operating expenses through the distribution given that cost from the authorization sheets. This does not apply to steel ties substituted for wood ties. The rails, on the other hand, may be of a heavier type, and if so the difference between the value of the heavier rail and the existing rail would be charged to betterments, the balance in the account going to operation.

This principle of separating the cost is applied to all improvement work, such as the replacement of power-plant machinery, bridges, etc. Charges are made monthly along this basis during the life of the work, so that if the authorization mentioned was fully expended and the work was accomplished as originally contemplated by the engineer, the net accounting result would be a charge of $10,000 to property account and a like amount to the maintenance accounts. The operating accounts effected would, of course, be those of the division upon which the work was done. It may be found, after completion of the work, that the method used in computing the distribution of the expenditures was not strictly in accord with the actual work done, the work having differed greatly from what the engineer originally had in mind. In such a case an adjustment is necessary.

Some perplexing problems arise at this stage of the accounting, the solutions of which call for very close co-operation between the other departments, particularly the engineering and auditing departments. One very important step, in completing such accounting, is the final revised estimate of the original cost of the work which was actually replaced. The first estimate showed only the estimated original cost of what it was assumed would be replaced, and this figure almost invariably differs from that which results from an estimate made after the work has been performed. If the final statement of the actual cost of reconstruction is used against the preliminary estimate of the original cost of the thing replaced, the classification of the charges into the property and operating accounts will not be correct. An engineer's preliminary estimate for certain track reconstruction might assume the replacement of all the rails and ties, whereas perhaps only two-thirds of the ties and only a part of the rails were actually replaced. Thus the need of having the engineering department revise the estimate of original construction cost, after completion of the work and prior to the final classification of the charges, is apparent. The final classification then gives the proper division of items as between capital account and operating accounts, and the auditing department is fully fortified with the correct accounting for each job, and can at any time furnish the engineering department with reliable unit costs of the work. This true accounting cannot be accomplished properly unless all charges, as received by the auditing department against authorized work, are subjected to a close check as to their right to be in that particular account and as to their classification, and a great deal of responsibility in getting such facts rests with the engineer in charge of the work and with his representatives in the field.

Important Electrification in Montreal

The report of the Harbor commissioners of the city of Montreal, Canada, for the year ended Dec. 31, 1915, describes the proposed electrification of the railways under the control of that commission. These railways serve the docks and comprise 45 miles of track, on which last year 157,480 cars were moved. The commission has recently made a study of the electric freight terminals of the New York Central, Pennsylvania and New Haven Railroads, where it found electric power successfully applied to the movement of freight. For the work in Montreal, the report says that in addition to the primary object of overcoming the smoke nuisance, the application of electricity has proved that it has, among many others, the following advantages over steam for railroad terminal traction: economy in operation and maintenance, flexibility of control, availability for immediate service, fewer units required for equal service, elimination of corrosion of steel and galvanized iron by acid gases, fire danger reduced, and stand-by losses much lower.

The president of the Montreal Harbor Commission, under which this decision was reached, is W. G. Ross, who for many years was managing director of the Montreal Tramways, and later was president of the Quebec Electric Railway. He was also for many years prominent in the American Electric Railway Association, so that he brings an expert knowledge of electrical equipment to the proposed undertaking.

Safety a Real Economy in Columbus

A Description of the Organization, the Work and the First Year's Results Obtained by the Safety Department of the Columbus Railway, Power & Light Company, Columbus, Ohio

FROM the time that it started its safety movement, the Columbus Railway, Power & Light Company, Columbus, Ohio, has looked upon this work in the same light as any other economy measure, and as much attention was exercised in planning its organization as was given to any other operating department. Moreover, the work was not inaugurated as a campaign but was put on a permanent basis from the start. The results of the first year demonstrate that, aside from its humanitarian value, the safety movement has proved to be an economic measure in every sense of the word.

SAFETY ORGANIZATION

Active steps directed toward the reduction of accidents to employees, patrons and the public in general have always received very careful consideration on the part of this company. Just prior to the official organization of the safety movement, frequent talks were given to the employees on the subject of safety, and it was brought to the attention of the public through the newspapers. Safety-first signs were posted in conspicuous places over the property and on the cars, and safety-first lead pencils and watch fobs were distributed among the employees. In these ways the company endeavored to keep the safety idea constantly in the foreground. In connection with the company's original safety work, a great deal of attention was also given to fire prevention and the elimination of fire hazards. The employees and the public were also safeguarded by the installation of various protective devices on the cars, in the shops and in the power stations.

Encouraged by the good results obtained by this unorganized effort, the management concluded that the time had arrived for more thorough and systematic effort. It believed that the closer co-operation between all departments and the employees could be secured by more definite organization, and that this should be followed by a marked reduction in accidents.

On Dec. 22, 1914, all the department heads were called together and a safety plan was discussed and adopted. It was decided that the safety organization should include a central committee composed of the chairman and secretary of the organization and the heads of all the operating departments. Subordinate to this central committee were departmental committees with the department heads as chairman and representatives from the department branches as members. These committees in turn were further subdivided into department branch committees, with the foremen as chairmen and selected employees from the department as members. This brought together an organization consisting of approximately 117 employees, all of whom were members of various committees. These committees meet once each month, except for the special sessions subject to the call of the chairman. The transportation department committee, the inspectors' committee and the carhouse committees are exceptions to this rule, the transportation and carhouse committees meeting every two weeks and the inspectors meeting every week. In connection with the committee work, the usual practice was followed of doing this work outside of regular working hours, but the men are paid for their time at their regular hourly rate.

DUTIES OF COMMITTEES

The duties of the various committees and sub-committees were distributed as follows:

The central committee (*a*) has general charge and supervision over safety work; (*b*) receives and passes upon all recommendations from departmental committees and from the community at large; (*c*) devises standards for safeguards; (*d*) formulates rules for safe operation; (*e*) gathers all available information, and (*f*) carries out educational work.

The departmental committees (*a*) receive suggestions from employees of their departments for the prevention of accidents or for lessening hazards; (*b*) pass upon suggestions received and forward them to the secretary of the central committee with record of the action taken by them in each case, and (*c*) make inspections of their departments.

The inspectors' committee (*a*) receives and passes upon suggestions for accident prevention in connection with the cars and tracks; (*b*) considers reported violations of traffic ordinances, dangerous practices of drivers of all classes of vehicles, and any other dangerous condition, making recommendations for their elimination, and (*c*) forwards all suggestions and recommendations to the secretary of the transportation department committee.

The carhouse committees (*a*) receive and pass upon suggestions from their divisions and forward them to the secretary of the transportation department committee with a record of the action taken in each case.

GENERAL PLAN

To keep all the employees informed regarding the work of this safety organization, bulletin boards were installed in the various departments on which notices, illustrations and other information relating to safety matters were posted from time to time. The employees were asked to make suggestions for changes in methods or equipment, which in their judgment would make operation safer. They were told that suggestions could take the form of reports of conditions which were or might be the cause of accident. They were instructed to make their reports and suggestions to the departmental or branch committees, which were in turn instructed to give careful consideration to any such suggestions and pass them on with their recommendations to the central committee for final action. To insure that the individual employees received credit for the suggestions accepted, a record was carefully compiled.

Instructions concerning the general plan informed the employees that the company expected to receive many suggestions and that the great majority of them would probably be of such nature that they could be adopted and economically carried out. On the other hand, there would probably be a few which would be impractical and so could not be used, and others would require large expenditures or changes in the standards, the approval of which might be delayed for either or were received, the majority of them being approved and the suggested changes made. The disposition of the various suggestions received are shown in the accompanying tabulation.

One factor which has tended to create good feeling among the employees has been the regular practice of acknowledging by personal letter all suggestions approved and ordered put into effect. Employees making suggestions that were disapproved also received a personal letter, explaining to them the reasons leading to such action. The management is satisfied that this "personal touch" system is one of the most potent factors in producing good results. From time to time various forms of safety literature were also posted on the bulletin boards, largely consisting of lists of the suggestions, crediting to their originators and explaining what disposition had been made of them. Samples of these suggestions are given in the above table.

SAFETY SUGGESTIONS ACTED UPON BY CENTRAL COMMITTEE, MARCH 31, 1915

Suggestion by	Suggestion	Disposition of
	MECHANICAL DEPARTMENT	
No. 200 William Naus	Use locknuts on bolts with wood blocks placed on car wheels to deaden sound. Also use softer wood and larger washers to prevent bolts from dropping out on railing.	Being taken care of by leather washers with different method of fastening.
No. 209 E. Brown	Have gong clappers inspected and properly balanced so that gongs will give loud, clear sound.	Taken care of by inspection and by instructions to remove all lugs from gong pins.
No. 213 T. C. Neilson	Replace with removable handles the present levers used in rebuilt cars for operating front exit doors.	Taken care of by installation of latches on these exit doors.
No. 218 J. Devoe	Place guard rail around pump pit in boiler room at West Broad Carhouse.	Guard rail installed.
No. 230 G. W. Ryan	Arrange trapdoor lifts on standard gage cars so they will fit down in groove provided for that purpose.	Taken care of by instructions for cleaning out grooves.
No. 248 A. Feather	On standard pay-enter cars place lock on motorman's exit door to prevent sliding open in case handles become displaced.	Taken care of by latches on these doors.
	TRANSPORTATION DEPARTMENT	
No. 263 J. M. Jewell	Discontinue the selling of newspapers on cars by newsboys.	Newsboys' methods being regulated.
No. 209 H. T. Dennis	On single track from Innis Avenue to Viaduct on Parsons discharge passengers from west side of car.	Scioto Valley car men have orders to use extreme caution when passing our cars on this single track.
No. 210 H. T. Dennis	Bring attention of transfer companies to reckless way in which some drivers approach car tracks.	Under consideration.
No. 220 J. Moore	Give better instructions to motormen in use of sand in stopping cars, as some do not start to apply sand soon enough.	Instructions to be again given to platform men.
No. 236 H. E. Gardner	Use some means to prevent school children jumping on cars at Monroe and Leonard Avenue schoolhouse.	Principal written to; inspector visited school concerning this question. No trouble being experienced.
	WAY DEPARTMENT	
No. 215	Countersink nuts on bolts which project above top surface of loading platforms used in track construction.	Nuts countersunk as suggested.
No. 227 W. H. Lincoln	Place a platform at Hocking Valley crossing—Marble Cliff division — eastbound—for conductors to board cars more easily and safely.	Platform placed.
	POWER DEPARTMENT	
No. 265 J. C. Wheeler	Place longer radius elbow on down spout to roof of a.c. switchboard room, Spring Street. One now in use fills up with cinders. Water might back up and run down on switchboard and regulators.	This is to be changed.

One of the most frequent forms of accidents was collisions between cars and vehicles of various kinds. In August, 1915, some special educational work was undertaken by the various safety committees through the medium of bulletins. The number of collisions of this nature, for which the cars from each carhouse were responsible was tabulated, and a comparison was made of the number of collisions for the same period in 1914. This information was posted in bulletin form in the carhouses and tended to put the spirit of contest into the movement to reduce this class of accident. This campaign resulted in a decrease of 9.3 per cent in the number of collisions for the year 1915 as compared with 1914. The same plan will be followed during 1916, and at the end of each month the records of the various carhouse crews will be posted. The average for the entire system for the month of January, 1916, shows a marked improvement over the same months for 1914 and 1915.

OTHER ACTIVITIES

In the beginning it was thought that much good could be accomplished in the prevention of accidents in connection with car service by working through the city safety council, but it was found that the council's work was too general to be of much aid in such a highly specialized field. In consequence, very little has been done in the way of appealing to the public to assist in the work, and practically everything that has been accomplished is attributable to the hearty co-operation of the employees. It is expected, however, that when the city safety council, which represents the public, takes an active part in the work, even better results will be secured. To reach the public in a general way, the company placed an exhibit in the safety show at the Ohio State Fair, and to obtain information on accident prevention work, the safety inspector of the company was sent to the fourth annual congress of the National Safety Council at Philadelphia, Pa.

The following are some of the details of the several phases of the safety work which has been conducted by this company:

SAFETY SUGGESTIONS—NUMBER RECEIVED BY MONTHS

Month	Number	Month	Number
January	64	July	35
February	127	August	31
March	104	September	28
April	35	October	22
May	76	November	7
June	52	December	38
	458		181
Total for the year			619

Departments to which work was referred:

	Number	Per Cent
Mechanical	205	33.1
Transportation	159	25.7
Way	30	4.8
Power	139	22.4
Line	29	4.8
Meter and distribution	9	1.5
Stores	21	3.4
General	27	4.3
	619	

Final disposition made of all suggestions:

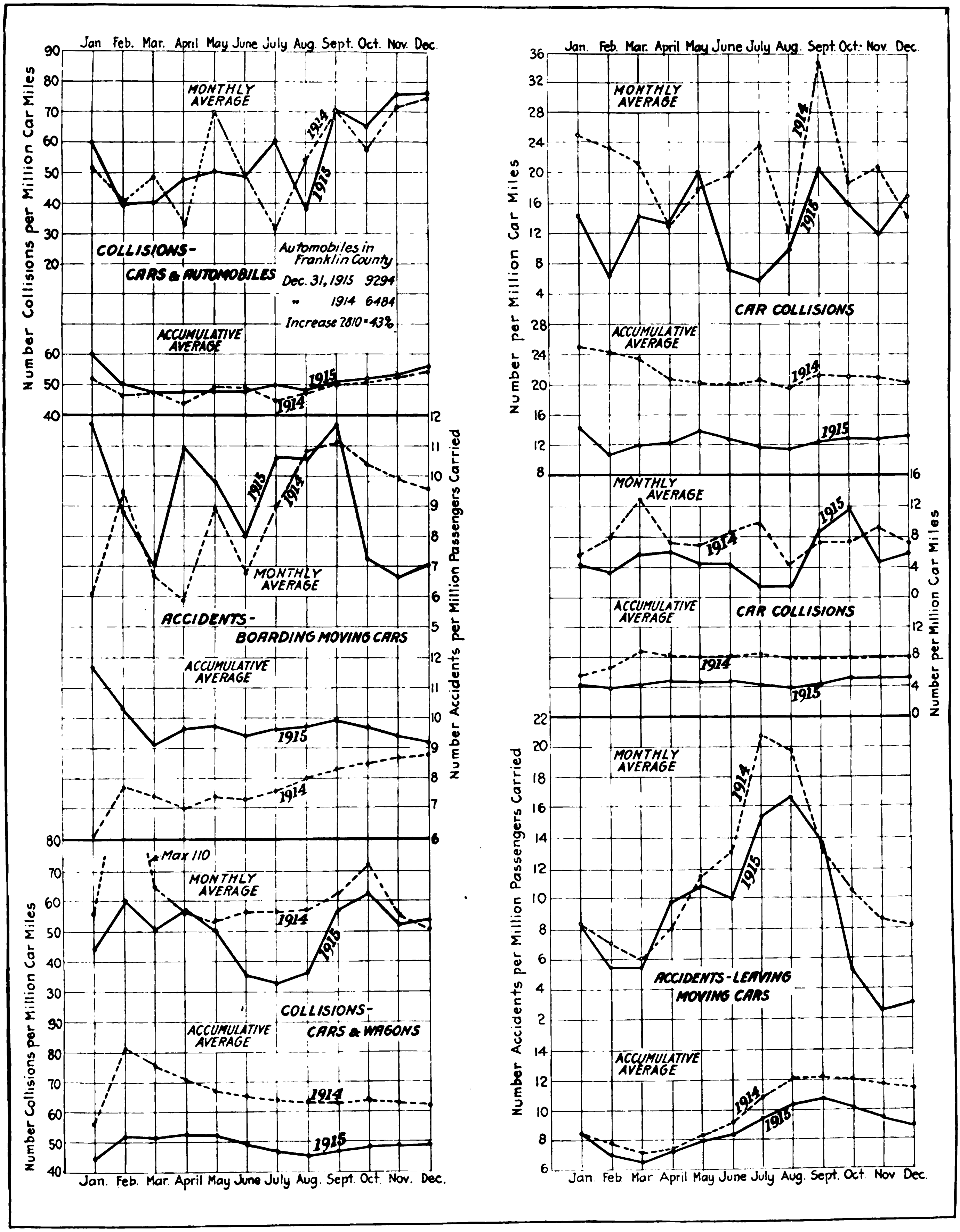
Approved and ordered put into effect	372	60.1
Disapproved	183	29.5
Held for future action	64	10.4
	619	

COST OF SAFETY WORK

In connection with the safety work certain expenses were incurred for committee meetings, literature and wages of the employees. In addition to these quite a large sum was spent in conforming to the suggestions approved by the safety organization. The distribution of the various expenditures to the different departments follows:

both causes. The employees were further impressed with the fact that the company was back of the safety movement and that the management would do all within its power to put into effect the approved suggestions.

After instructions had been issued regarding the plan and organization, a definite campaign of education among the employees was started and special emphasis was laid upon the fact that results could only be accomplished through their hearty co-operation. The employees responded eagerly and helped in every way possible, as the results of the first year's work indicate. Numerous suggestions for the elimination of hazards



SAFETY WORK IN COLUMBUS—CHARTS OF MONTHLY AVERAGES OF ACCIDENTS

1. Meetings			
At general office, Jan. 4		$5.00	
At Roosevelt picture house, Jan. 8		20.00	
Industrial exposition, Jan. 13-16		14.55	
Public meetings, Chamber of Commerce, May 27-28		54.65	
Ohio State Fair, September, safety booth		52.03	
Attendance Annual Safety Congress, Philadelphia		42.25	$188.38
2. Distribution of literature			
(a) Twenty-seven bulletin boards		$232.72	
(b) Safety cards for cars		97.50	
(c) Additional copies National Council Bulletins	$15.43		
Photographic work	45.49	60.92	
(d) Stationery and printing	$151.99		
Office supplies	25.15	177.14	568.28
3. Twenty-six suggestion boxes			48.71
4. Lungmotors—instructions, accessories, etc			41.07
5. Wages:			
Salary of safety inspector		$1,285.50	
Committee members—attendance at meetings		51.88	1,336.42
Total expended			$2,183.42

In addition to these items and not included in the suggestion costs, there was expended for goggles a total of $175.15 which was charged to capital account. The following is a statement of the total authorized expenditures by departments for carrying out the suggestions made:

Department	Total Authorized Expenditures
Mechanical	$1,654.80
Transportation	122.21
Way	417.32
Power	1,545.02
Line	123.67
Meter and distribution	33.23
Stores	76.06
General	339.33
Total	$4,311.64

It is also of interest to note that of these costs, $2,904.57 was charged to capital account and $1,407.07 to various operating accounts.

RESULTS OF SAFETY WORK

The results of safety work for the year 1915 are best shown by the tabulated statement which follows:

EMPLOYEE ACCIDENTS

Number of employee accidents for 1914	234
Number of employee accidents for 1915	413

Number of Accidents	
Mechanical	76
Transportation	73
Way	107
Power	75
Line	32
Meter and distribution	22
Stores	25
General office	3
Total	413

Class of Injury	
Bones broken	6
Bruises	165
Burns	28
Cuts	96
Electric shocks	4
Eye injury	50
Foot injury	5
Internal injury	5
Loss of member	2
Nails torn off	8
Sprains and strains	36
Miscellaneous	8
Total	413

Under the heading of "employee accidents" it will be noted that there was an increase in the number, but this was because the company adopted the policy of requiring reports of all personal injuries, no matter how trivial. Of the total number of accidents, however, those of a serious nature were very greatly reduced. This is made quite evident in an examination of the expenditures of the Ohio Industrial Commission on account of employees' accidents. It will be noted that the year 1915 shows a total decrease of 31.4 per cent over 1914.

AMOUNTS PAID BY THE OHIO INDUSTRIAL COMMISSION ON ACCOUNT OF EMPLOYEES' ACCIDENTS

	Physicians' Fees Hospital Expenses	Employees' Compensation	Total
1914	$2,233.95	$13,911.79	$16,145.74
1915	3,200.64	7,868.13	11,068.77
	Inc. $966.69	Dec. $6,043.66	Dec. $5,076.97

In connection with employees' accidents it is also of interest to note that there were three deaths resulting from accidents during 1914, and there were also three fatal accidents in 1915.

CAR AND AUTOMOBILE COLLISIONS

Accidents constituting the greater majority of those encountered in the operation of the railway system other than those affecting employees included collisions between cars and automobiles, and between cars and wagons, boarding and alighting accidents and car collisions. These are arranged in their relative importance, and it was considered that the best results could be obtained with the least effort by directing particular attention to these classes of accidents. For the first half of 1915, 42.6 per cent of all the accidents were collisions between cars and other vehicles. Of this percentage more than two-thirds were between cars and automobiles. While the company did not expect that it could entirely eliminate collisions, it did believe that the total number could be greatly reduced. Accordingly a strong appeal to the motormen and conductors was sent out in a circular prepared by H. W. Clapp, general superintendent. As a direct result of this, although the total number of automobiles increased 43 per cent, the total number of accidents increased only 3 per cent. The detailed figures on car and automobile collisions follow:

COLLISIONS—CARS AND AUTOMOBILES

	1915	1914
Actual number	463	458
Number per million car-miles	56.4	54.7

As will be noted from the increase in the number of automobiles the records of the Ohio automobile department showed that in 1914 there were 6484 in Franklin County in which Columbus is situated, and this number was increased to 9294 in 1915. In connection with collisions of this nature, the rate of increase in the number in Columbus as compared with other cities is of interest. The records for seven other large cities in the United States showed an average increase of 28 per cent in the number of automobile collisions for 1915 over 1914. A 20-per cent decrease in the number of collisions between cars and wagons was shown in 1915 over 1914. The figures for accidents of this kind follow:

COLLISIONS—CARS AND WAGONS

	1915	1914
Actual number	405	521
Number per million car-miles	49.4	62.2

Accidents over which the company has little or no control include those where passengers attempt to board moving cars. Conductors have been urged to warn passengers against this hazardous practice whenever the opportunity is presented, but this method has not been very effective. The results accomplished in this class of accidents follow:

BOARDING MOVING CARS

	1915	1914
Actual number accidents	700	691
Number per million passengers	9.2	8.8

Other results of the safety work that show a marked improvement in 1915 over 1914 include the number of accidents to passengers alighting from cars, car collisions and car pull-ins on account of collisions.

In connection with the results of the accident prevention work, it is also of interest to note how the number of accidents varied from month to month during the year. These data are plotted on the diagrams on page 773. In connection with each diagram the accumulative average is shown, which is the average for the period of the year up to and including the month for which any average is plotted.

PREVENTING PULL-INS

In connection with the safety work a special effort was made to reduce the number of car pull-ins. The company adopted the practice of reschooling twice a year the old men in the service as well as the new. At first the old men were averse to being examined concerning rules and instructions, but they soon learned that it was to their best interest, because it kept them informed and was a great aid in keeping down the number of car pull-ins. During 1914 the number of pull-ins totaled 15 per cent of the cars in service, whereas in 1915 this was reduced to 3 per cent. This meant an increase in the car-miles per car for an eighteen-hour day from 153½ to 167½. In order to keep the equipment in first-class condition, all cars are inspected on a 600-mile basis and overhauled on a 5000-mile basis.

As soon as the records of the safety work for the year were available a large poster was prepared for the information of the company's patrons. This called attention to the decreases in the various forms of accidents in 1915 over 1914. In connection with the increase in the number of accidents to passengers boarding cars, the public's attention was called to this fact and urged to assist in reducing this class of accidents. To quote this poster, "Every citizen of Columbus should be enlisted in accident prevention work. It means much not only to you individually, but to us as a public service company, and to Columbus as a community to have this city known as the safest place to live and the safest city in which to do business." Taken as a whole, the company is very much pleased with the results of its safety work during 1915, and it will continue to pursue the same plan of accident prevention work during the year 1916.

Street Traffic Signal in San Francisco

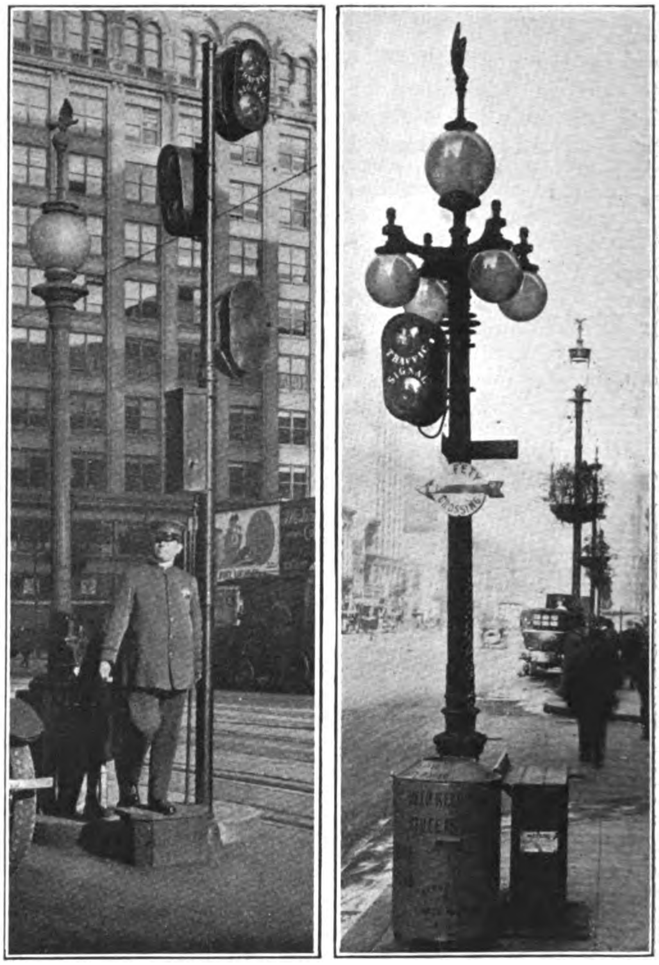
One Officer Regulates Traffic in Three Directions with Electric Whistle and Colored Lights Visible for 300 Ft. in Brightest Sunlight

HANDLING the traffic on lower Market Street in San Francisco presents unusual problems not only because of the heavy traffic which this main artery carries but because of the angular street intersections involved. From the south the cross streets run into Market Street at right angles, but from the north side all streets intersect this thoroughfare at an acute angle. Thus, where streets from both north and south intersect Market Street at about the same point, three streams of traffic must be regulated, and four traffic officers are usually required, or one officer with some mechanical assistance.

Since the advent of the jitney bus the traffic has been particularly difficult to handle satisfactorily, and experiments have been made with a number of signal schemes. One of these, which is still in use at the ferry, was described on page 671 of the ELECTRIC RAILWAY JOURNAL for April 3, 1915. Recently, however, a system of light signals, developed by G. Ghiglieri of San Francisco, has been finally adopted by the police department and is now giving satisfaction at a number of the more congested crossings. In fact Sergeant Charles Goff, in charge of the traffic department, San Francisco police, has affirmed that the new signal system has increased the traffic capacity of Market Street crossings 20 per cent.

The new signal system consists of lights showing in as many directions as there are streams of traffic, in connection with which a whistle is blown as the lights change, all being controlled by a treadle at the traffic officer's stand. The control apparatus consists of a service cutout and meter, whistle and contactor box, and officer's stand with treadle or foot push button, which the officer is shown using in one of the accompanying illustrations. This treadle is connected to the whistle and contactor box by a rod, the mechanism in this box being arranged for two positions. In one the whistle is sounded one blast and the green lights are shown for east and west traffic and the red lights for north and south traffic, while the other position blows two blasts and reverses the signal indications. The whistle is of the standard traffic officers' type and is blown by means of a motor and small rotating pump.

Three lead-sheathed wires run to each signal, lighting 25-watt lamps behind large lenses, an arrangement which centralizes all moving mechanism and simplifies the control. The light is sufficiently powerful to show the color indications plainly at a distance of 300 ft. in the brightest sunlight.



SAN FRANCISCO STREET TRAFFIC SIGNALS

Where the streets intersect at right angles a similar signal equipment regulating traffic in two directions is mounted on a street lighting standard, as shown in the second illustration. The apparatus for a right-angle crossing costs not more than $200, a figure which does not include installation.

F. W. Hoover, general manager of the Nashville Railway & Light Company, Nashville, Tenn., has arranged to show one of the safety-first motion pictures taken in Detroit. Local papers have paid generous attention to the film in their news columns.

A. I. E. E. Discusses Tendencies in High-Voltage D.C. Railway Practice

At New York Meeting of April 14, the History of the High-Voltage Development Was Traced and the Possibilities of Standardization Were Considered—Some of the Factors Which Render Very High Voltages Uneconomical Were Pointed Out

At the meeting of the American Institute of Electrical Engineers held in New York on April 14, a paper prepared by Clarence Renshaw on "High Voltage D. C. Railway Practice" was read by N. W. Storer in the absence of the author. An abstract of the paper is given below. After reading the paper Mr. Storer gave an illustrated description of the equipment of the experimental Grass Lake line of the Michigan United Traction Company. This was covered in an article by Mr. Storer in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 2, 1915, page 660. The points raised in Mr. Renshaw's paper were discussed by Frank J. Sprague, New York, W. J. Davis, General Electric Company, San Francisco, Cal.; W. B. Potter and A. H. Armstrong, General Electric Company, Schenectady, N. Y.; Calvert Townley, Westinghouse Electric & Manufacturing Company, New York, B. F. Wood, United Gas & Electric Engineering Corporation, New York, S. I. Oesterricher, New York; and N. W. Storer, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

High-Voltage D.C. Railway Practice

BY CLARENCE RENSHAW
Railway Engineer Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Ten years ago the idea that approximately 600 volts was the maximum potential to be hoped for in the operation of d.c. railways was almost as firmly established as was the belief in the days of Columbus that the earth was flat. Then suddenly the plan was suggested of coupling four 600-volt motors ordinarily employed on interurban cars in pairs of two in series instead of two in parallel, and of connecting the generators in the station in a similar manner so as to employ 1200 instead of 600 volts. The plan was successful, and the use of voltages from 1200 to 1500 has become so common that to-day we are able to discuss details of high-voltage d.c. practice.

HIGH-VOLTAGE CAR EQUIPMENT

Motors.—Experience has shown that, in the design of motors, no precautions are necessary to provide against abnormal voltage distribution between motors due to slipping of wheels. Insulation and creeping distances on motors must, of course, be made suitable for the full potential. The extra insulation required for 1200-volt operation is now obtained by the use of better quality rather than greater quantity of material, and the extra distances by improved shaping and arrangement of parts. Generally speaking, therefore, motors are produced to-day for use in series on 1200 or 1500 volts with the same dimensions and weights as if made for use on only 600 or 750 volts.

There have been one or two instances where motors have been wound directly for full line potential. Speaking generally, such motors are heavier and depart more radically from standard low-voltage design than motors for operating two in series, and moreover they do not lend themselves as well to the operation of cars partly on 600 and partly 1200 volts, as is so often required. High-voltage d.c. railway practice, in the matter of motors, therefore, may be said to consist in the use of two machines in series, these being identical in construction with standard motors for low-voltage service except in the comparatively minor details of quality of insulation and length of creepage path.

Control.—Our first 1200 and 1500-volt equipment employed thirteen pneumatically operated switches, while with the same current at 600 volts eight would have been sufficient. Experience showed that by improvements in interlocking, and by using no more resistance notches than with 600-volt motors it was possible to cut down the number of additional switches necessary on account of increased voltage to two for small equipments, and three for large ones. In dimensions also, it has been possible to work out designs for 1200 switch groups with the same cross-sectional area and the same weight per switch as those for 600 volts.

Auxiliary Control Devices.—In the first equipments for use on 1200 volts, it was considered undesirable to employ this voltage for auxiliary circuits such as those for lights, control, air compressors, etc., and a dynamotor was included to provide 600-volt current. To reduce the capacity required in the dynamotor, the air compressor motor was next wound for full line potential, and later the two machines were combined into a dynamotor-compressor. In locomotives or other equipments where forced ventilation is required, the blower fan is now mounted on the shaft of the dynamotor.

On cars of small or moderate size even the above arrangement is handicapped in the matter of cost and simplicity as compared with 600-volt equipment, so the next step was to arrange the lighting and control circuits for operation directly on line voltage. These two general arrangements constitute a dual standard, and one of the first decisions to be made in planning any given installation is between these two schemes.

OPERATION ON TWO VOLTAGES

Many high-speed, high-voltage interurban lines enter towns over the tracks of 600-volt systems. High speed in the city is not permissible in any case, so that half speed on 600 volts is sufficient. Under such circumstances, it is usual to provide for reconnecting the lighting and control circuits to receive full voltage on the 600-volt section, so that the main motors will remain permanently coupled in series. If a dynamotor-compressor is employed, the same changes automatically connect it for full speed on both voltages. Where cars which operate in this way employ a high-voltage compressor instead of a dynamotor-compressor, no change is oridinarily necessary for low-voltage operation.

High-voltage cars can, in general, be arranged to operate at full speed on both high and low voltage. When the proper scheme of operation on the two voltages has been decided, the next point to determine is the manner in which the change-over should be affected. The simplest method is the use of a manually operated switch on each car. It is sometimes desirable, however, to have the change-over switch located beneath the car, and arranged for operation from the platform. In other cases, it is desirable to have the switches arranged not only for distant control, but also for simultaneous operation throughout the train. Protective devices are sometimes desired to prevent or minimize trouble, if the car is subjected to high voltage when the change-over switch is in the low-voltage position. These ordinarily consist of relays, which act quickly on excess voltage, and cut off the circuits likely to be damaged.

While the choice between automatic and non-automatic acceleration is not influenced particularly by the use of high voltages, there is a tendency to adhere to non-automatic control for simplicity. The same applies with regard to field control.

ALTERNATIVES IN CONTROL APPARATUS

In designing high-voltage d.c. interurban lines the common questions are: (1) Should the voltage be 1200 or 1500? (2) Should the equipment be of the dynamotor-compressor or of the non-dynamotor type? (3) Will it have to operate on high voltage only, or on both high and low voltage? (4) If required to operate on low voltage as well as high, will half speed be sufficient on main and compressor motors, or will full speed on both motors be necessary? (5) Must the change-over switch be arranged for indirect control, or will manual operation be sufficient? (6) If indirect control is required, will it be confined to the individual cars, or will simultaneous operation throughout the train be required? (7) Is a protective device essential to guard against damage by the application of the wrong voltage, or will this not be required? As far as I can judge, the current practice seems to be turning in the following directions: Where the high-voltage cars must run over existing 600-volt lines to any considerable extent, the exact ratio between 600 and 1200 volts offers some advantages. Since high-voltage motors are made from existing standards also, there is a wider range of choice for 1200-volt operation than there is for 1500-volt operation, especially where small sizes of the motors are required. So far, 1500 volts have been used in sections where 600-volt lines have been established only to a limited extent, that is, in comparatively virgin territory, whereas 1200 volts have been employed in sections where there has already been considerable 600-volt development. It seems probable that high-voltage practice will continue to follow these lines except in the case of the electrification of branch lines on steam railroads or similar instances where connections with existing lines will have little bearing. The general tendency is toward the use of the dynamotor-compressor on large, expensive cars, particularly where full speed is required on half voltage. It is particularly suitable for locomotives where forced ventilation is utilized. In the older sections of the country where distances of 4 miles or 5 miles must sometimes be run on city tracks, equipments are usually required to operate at full speed on half voltage. However, equipments for operating at half speed offer considerable advantages in weight, cost and simplicity. Where large cars are arranged for full speed on both voltages, the tendency is toward the use of full speed for the air compressor. The general tendency is to employ the simple, manually operated change-over switch except where cars are operated at close headway or constantly used in trains. In most cases, devices to protect against the wrong voltage are not considered necessary.

POWER GENERATION AND DISTRIBUTION

Power Supply.—D. c. power for high-voltage lines is generated in 1200- or 1500-volt machines which usually employ a compensating winding as well as commutating poles. Twenty-five-cycle rotary converters producing 1200 or 1500 volts on one commutator are in successful use, but with 60 cycles the maximum voltage so far employed for a single machine is 750, so that two machines in series are still required for high-voltage lines. Common substation practice is to employ single synchronous converters where 25-cycle power is available, and either motor-generator sets or two converters in series on 60 cycles.

Switching.—The principal changes which have been made in handling current at 1200 or 1500 volts have been for the purpose of insuring safety. Switchboard panels have been made higher and circuit breakers and knife switches located out of direct reach, long wood rods leading to insulated handles being provided for opening and closing the circuits. Barriers are placed between breakers to prevent tendency to flash across.

Line Construction.—Catenary construction is generally used, although third-rail is in successful use on several lines. The voltage surges to which the latter may give rise under some circumstances, the difficulty of clearing a car in case of accident and the general accident hazard incident to the maintenance of a large conductor so close to the ground, are likely to limit the use of this form of construction. A growing practice is that of carrying the feeders for a considerable distance from the station before tapping into the contact wire, so as to limit the possible current flow.

Economic Significance.—The high-voltage d.c. railway development has been carried out with ease, success and speed, many of the possible difficulties seemingly having been overestimated in importance, for much of the trouble anticipated has failed to appear. This system has made possible the construction of interurban lines and the electrification of branch steam railroad lines at considerably less expense for a given grade of construction than with 600 volts, or to render possible for a given expenditure the construction of lines capable of handling much heavier traffic.

Voltages of 2400 *and* 3000.—Inasmuch as the 1200-volt systems have been brought about by the use of two 600-volt motors in series, and as a few motors wound directly for this voltage have been produced with no particular difficulty, the obvious procedure was to continue the geometric progression and connect 1200-volt motors and generators in series and operate at 2400 volts. One line installed on this basis has had a remarkably successful record. From a general standpoint, however, while the results have been welcomed as a contribution to the development of the art, similar applications for this particular voltage are apparently somewhat lacking. For trolley roads of the usual interurban class it requires apparatus which departs too widely from existing standards. For heavy traction, on the other hand, this voltage is much too low to solve the problem in a sufficiently comprehensive way. Even a voltage of 3000 does not do so completely. It is regrettable, also, that both 2400 and 3000 volts have been employed, and that in carrying on the upward progress in d.c. voltages, 1500-volt apparatus was not used at once for coupling in series for carrying on the geometric progression without the intermediate step.

STANDARDIZATION OF VOLTAGE DESIRABLE

Ultimate Limits of D.C. Voltage.—The general limits upon which standard practice in any industry is ordinarily settled are usually fixed by broad economic considerations rather than by physical limitations. It is entirely possible, for instance, to operate trains at a maximum speed of 90 m.p.h. or more, while the maximum ordinarily attained is from 60 to 80 m.p.h., and the general average for interurban cars is 50 to 60 m.p.h. These values have been established by gradual increases until, without conscious effort, standardization has been automatically secured. In the voltages which may be employed in the d.c. railway system, there is some tendency toward the same procedure. While in a way such procedure would be the conservative and natural way for progress to come about in the use of higher d.c. voltages, its disadvantages are numerous. The apparently more radical plan of trying to select in advance the voltage where progress would naturally stop, and going at once to this voltage, would hence seem to be the more rational, and it is with this idea in view that our efforts toward the use of that kind of 5000 volts are being put forth. The 5000-volt experimental car on the Grass Lake line of the Michigan United Traction Company averaged 5295 miles per month from Oct. 1 to March 5 on a schedule which allows only 15 m.p.h., and its record would have been better had it not been for numerous mechanical difficulties with trucks, wheels, brake rigging, stove, pilots, etc. From November to February, the average was 5813 miles per month. Only two of the failures were due in any way to the use of 5000 volts.

Conclusion.—The pernicious flexibility of the 1200 and 1500-volt systems and the innumerable alternatives which they present for application to any definite case in interurban work seem to give timely warning of the great desirability of early standardization in the matter of higher d.c. voltages. The comparative ease with which apparatus for each voltage has been developed gives the most encouraging feeling for the future development along the same lines. The possibilities which a d.c. system at 5000 volts would offer were the apparatus commercially available make this voltage seem a logical one, and the results obtained with the experimental equipment now in operation give great hope that this voltage may some day be established commercially as the standard of d.c. high-voltage practice.

Discussion

MR. SPRAGUE ON INCREASES IN POTENTIAL

The discussion of Mr. Renshaw's paper was opened by Frank J. Sprague, who traced the history of d.c. voltage increase, which he had consistently advocated. He stated that in the early days of stationary motor development he had built special machines to operate normally at from 500 to 600 volts, but on which in the exigencies of service the voltage had been boosted to 1000. In the experiment on the Thirty-fourth Street line of the Manhattan Elevated Railroad in the latter part of 1886 he had used 600 volts from the third-rail. The voltage 400 to 450, adopted for Richmond and St. Joseph was regarded as extreme, but the standard was gradually raised to about 600, where it remained for a long time.

Mr. Sprague stated that in the early nineties, he pointed out the possibilities of high voltage, setting a limit for direct current at from 1000 to 1200 volts on single motors, above which it would probably be necessary to put motors in series. In an article in the *Electrical World* in 1903, he suggested that with the three-wire system it might be possible to make use of a maximum trolley potential of nearly 4000 volts. In 1905, he offered to undertake the construction of a third-rail road to operate at not less than 1500 volts, stating that that was not the limit of practical d.c. operation, and he urged upon the engineers of the Washington, Baltimore & Annapolis line that they adopt 1200-volt, d.c. operation. His recommendation of 1200 volts with third rail for the Central California Traction Company was adopted, being the first installation of its kind.

Mr. Sprague stated further that in 1906, in a discussion before the A. S. C. E., he mentioned three radical developments which had taken place in d.c. motor construction; the use of commutating poles which, with additional facilities in control, make possible the construction of motors at from 1200 to 1500 volts, with the further possibility of operating two in series on double potential. He quoted H. M. Hobart as predicting in 1907 that within ten years d.c. systems as applied to railway electrifications would employ line pressure of the nature of 2000 or 3000 volts.

In conclusion, Mr. Sprague said that for practically twenty years the potentials for d.c. railways remained unchanged at 600 volts. In ten years it has jumped to 3000 volts, as used on the Chicago, Milwaukee & St. Paul Railway, one of the typically most difficult, and embracing in its 437 miles of line more route mileage than all the trunk line electrifications in the world. The 11,000-volt, 15-cycle system which some engineers at one time thought would become standard, is non-existent, and no single-phase motors are now being installed except on the few systems remaining.

MR. DAVIS DISCUSSES VOLTAGE LIMITATIONS

Referring to the conditions on the Southern Pacific system, Mr. Davis stated that the electrification there presents no new problems. It has been in operation for seven years with very marked success. He stated that the voltage to be used in an electrification depends upon certain limitations as to tonnage and speed, the former depending upon the number of tracks in service. On a four-track road, the drop in voltage in the track is small, the tracks and third-rails respectively being in multiple, so that lower voltages may be used than on single-track roads having to handle heavy tonnages. Hence, as far as distribution is concerned, lower voltages are satisfactory with many tracks.

Mr. Davis showed that the most desirable voltage depends not only upon saving in copper, but upon the load factor on the substations, and the cost and number of locomotives required to handle the traffic. With single-track freight roads, very little improvement in load factor is obtained if the substations are spaced more than 30 miles to 35 miles apart. With this spacing, the copper required for 3000 hp. to 4000 hp. per train is not excessive, and the size of wire is fixed as much by mechanical considerations as by current capacity and voltage drop. Similarly, substation capacity as applying to the whole system, is not materially reduced because motor generator sets must be large enough to carry three times normal load, and as long as 33 per cent load factor is obtained there is no saving in apparatus.

From the standpoint of locomotive cost, Mr. Davis said that the locomotives of a single-track road cost about one-third of the cost of electrification. If, therefore, there is a material increase in the cost of 5000-volt locomotives as compared with 3000-volt locomotives, this increase might prove the determining factor in selecting the voltage. On the C., M. & St. P. Railway forty-two locomotives are required, and here an increase in cost of 30 per cent to 40 per cent would offset savings in the distribution system due to increase in voltage. On a double-track road, the difference would be still more marked, and would indicate the desirability of a voltage less than 5000.

MR. POTTER GIVES C., M. & ST. P. DATA

Mr. Potter indorsed Mr. Renshaw's statements that economic considerations must govern, and that we are more concerned with the future than with the past. He agreed with Mr. Renshaw's concluding sentence with the provision that the word "available" be changed to "economical." Thus modified the sentence would read "The possibilities which a d.c. system of 5000 volts would offer, were the apparatus commercially economical, make this voltage seem a logical one, etc."

Some of the factors in electrification are but little affected by the operating voltage, *e.g.*, power station equipment, high-tension transmission, bonding, etc. In general the cost of substations with equipment of established character is but little affected, as with the higher voltage there is an increased cost per kilowatt, offset in some measure by the less number of substations due to the wider spacing, but not directly as the individual capacity of each substation must usually be increased to handle the included traffic within the longer section. The feeder copper and rolling stock are the factors which are more directly influenced. In selecting the voltage for the C., M. & St. P. electrification, both 3000 and 5000 volts were considered. While the initial cost was about the same in either case, the saving in copper at the higher voltage was offset by the increased cost of locomotives, and from considerations of maintenance and depreciation it is obvious that, for the same total, the expenditure should preferably be in copper rather than in rolling stock.

The relation of cost for certain factors in the C., M. & St. P. electrification is substantially as follows: High-tension transmission lines, 10 per cent; overhead construction, feeder copper, etc., 28 per cent; bonding, 4 per cent; substations, 18 per cent, and locomotives, 40 per cent, the total for the substations complete, together with the direct-current copper, being less than for the locomotives.

Referring to 5000-volt apparatus, Mr. Potter said that such can be handled without doubt. The B., A. & P. locomotives were operated successfully as an experimental equipment in testing control equipment at this voltage. It is true also that the high-voltage arc burns less than does that produced at lower voltage, as it seems to spread around. Regarding the choice of 2400 volts for the Butte, Anaconda & Pacific Railway, he said that the voltage might have been 3000.

From the standpoint of collection of current, 3000 volts potential is sufficient for the largest locomotive likely to be required. The B., P. & A. has roller collectors, operating with 800 to 1000 amp. For high speed these rollers must be carefully balanced, and as the C., M. & St. P. passenger service involves speeds up to 60 m.p.h., collectors which would not require balancing were found preferable. The wear on the contact wire was found to be due to incipient arcing rather than to friction, and it was reduced by increasing the pressure and by lubrication. Maintenance of contact between the pantograph shoe and the contact wire is necessary, and on the C., M. & St. P. the contact wire is slightly lifted by the pantograph. Currents up to 1800 amp. have been collected experimentally at 70 m.p.h. and up to 3000 amp. at lower speed.

In conclusion Mr. Potter said that the C., M. & St. P. electrification operation has been very satisfactory. The regulators used in connection with the motor-generator sets caused some trouble, easily overcome, due to their being small for the duty. Some of the cam-operated switches caused trouble due to defects in manufacture. An interesting operating feature was the frosting of cold electric locomotives when they were taken into the roundhouse. The regenerative system has been successful, eliminating the necessity for stopping trains for inspection. The use of 3000 volts was only an incident in connection with regenerative operation, the principal value of which is in permitting the making of schedules.

On the general topic Mr. Potter stated that he did not consider 3000 volts the limit, but he emphasized the fact that as railroads are operated for profit, standards cannot be established arbitrarily.

MR. ARMSTRONG CONTENDS THAT STANDARDIZATION CANNOT BE ARBITRARILY IMPOSED

Mr. Armstrong pointed out that some of the statements in the paper by Mr. Renshaw discredited the electrifications for which high-voltage direct current has recently been adopted. The questions to be asked are: "What is the trouble with the voltages in use?" and "What is the purpose in suggesting the use of 5000 volts?" Five heavy electrifications have been put in recently at from 2400 to 3000 volts, three of which are in operation, and two will be so in a few months. The inadequacy of these voltages must be proved before a higher voltage is adopted.

High-voltage equipment is necessarily expensive. From the standpoint of distribution it should be noted that on the C., M. & St. P. electrification, a 500,000-circ. mil feeder is used on most of the lines, and with this the average drop is but 10 per cent, and the maximum not over 20 per cent. This road has nineteen substations of a combined capacity of 59,500 kw., and the aggregate capacity of the forty-two locomotives is 126,000 kw. The substations are spaced about 30 miles apart. A greater spacing would increase the necessary aggregate capacity due to the fact that the trains would be bunched on the substations.

Mr. Armstrong did not agree that 5000 is the proper voltage for standardization. Such standardization is not an easy matter, and must come as a result of long effort on the part of many engineers.

Referring to the Grass Lake experimental line, he commented on the absence of d.c. circuit-breakers, necessitating the opening of the a.c. circuit, with the attendant difficulties. He regarded the 5000-volt line as an interesting experiment, but as leading to no definite conclusion.

Mr. Townley expressed his opposition to any attempt to establish a standard voltage, or to state the limits beyond which progress cannot go. If improvements in what may be termed "the fundamentals" can be carried out, the advance must be welcome. Transmission voltage is such a fundamental. Increase in a fundamental is a permanent advance and equipment can be improved to correspond. Mr. Townley attributed the sudden increase in d.c. railway voltage during the past few years to the demands of heavy traction and to competition with the single-phase system. He regarded the high-voltage development as a step in the direction of interchangeability. Mr. Oesterreicher directed attention to a high-voltage d.c. road in Austria-Hungary designed by Dr. Fisher of the Budapest City Railroads. A storage battery with Pirani control equipment is a feature of this. The speaker described the construction of the road with the aid of lantern slides.

Mr. Wood stated that what the steam railroads want is dependability in operation. Standardization is important to this end.

In closing, Mr. Storer said that he had never opposed the use of the d.c. locomotive, but had advocated alternating current on account of the higher voltage which could be used with it. He said that a system that is reliable will have low maintenance cost, but that no system would be suitable for standardization that is not thoroughly reliable. While the 5000-volt system seems promising it has not yet been proved out. There is no doubt that current collection at 3000 volts is satisfactory, but there is nothing to show that 5000-volt equipment will be more costly than that for lower voltage.

To sum up the whole situation, however, Mr. Storer said that engineers must get together on standards.

COMMUNICATIONS

Efficient Car Operation

NEW HAVEN, CONN., April 14, 1916.

To the Editors:

I have followed with a good deal of interest the recent discussion in your columns on the above subject. The issue between Messrs. Chappelle and Koehler now seems to have narrowed to the consideration of the conditions under which it is economical to run in the series position and avoid moving into the parallel position.

Mr. Chappelle sums up his conclusions by saying "Pausing on the series position with the controller should be discouraged to attain the best efficiency in practical operation." Mr. Koehler, on the other hand, shows that under certain special conditions it proved more economical to make the run in series. Mr. Chappelle bases his opinion on the fact that the gain in time, and consequent saving in energy consumption made possible by more rapid acceleration, may on the whole more than offset the extra losses in the starting resistance caused while moving from the series to the parallel position. It seems to me that both are right.

Some years ago I made a series of tests to establish this very point, and at that time reached the conclusion that for the conditions investigated, and on relatively short runs, there was a net gain by avoiding moving into parallel, whereas for longer runs it was more economical to move into parallel without appreciable delay on the full series notch. I believe that in general this rule holds true and it is entirely a question of the length of run involved.

I am in entire agreement with Mr. Chappelle as to the undesirability of cluttering up the motorman's mind with complicated instructions. A few simple practical instructions will be more effective, but it is not difficult for motormen to be made to appreciate the advantages of series operation for short runs. In fact, in most cases they will do this quite naturally. There is no fixed rule about it, however. The length of run for which it is more economical to avoid parallel operation is different for different conditions. It can only be found by experiment or analysis. In general it would appear sufficient simply to instruct the motormen to avoid moving into the parallel position when it is apparent that a short run will be made and at other times move as rapidly into full parallel as the ordinary considerations of safety, comfort of the passengers and care of equipment will permit. After such general instructions the motorman's judgment and experience will gradually guide him as to the most efficient method to employ at any moment; *i.e.*, providing his interest in the subject is aroused and maintained, and his operation checked by one of the methods available for this purpose. The writer believes this matter of checking the relative efficiency of motormen to be absolutely essential if economical operation is to be realized and maintained. Experience has invariably proved that instruction of itself will produce no permanent improvement.

In 1904, while assistant electrical engineer in charge of the electrified system of the Lancashire & Yorkshire Railway, England, it fell to the lot of the writer to personally train a large number of motormen and teach them the principles of economical operation. The points emphasized were as follows:

1. Accelerate as fast as practicable to full series. Pause there for three or four seconds, then move rapidly to full parallel on all runs excepting those which are very short.
2. Coast as much as possible.
3. Apply brakes at as high a rate and as evenly as practicable, making, when possible, one application do the work; and releasing the brakes just before the final stop in order to avoid the jerk.
4. Conductors were advised to shorten the station stops as much as possible, having regard to the safety and convenience of the public.

There were other instructions but these were the chief ones. Each motorman was thoroughly instructed in the fundamental principles involved. A test train was run to establish the most economical rates of acceleration and braking, and, before being allowed to drive an electric train in service, each motorman was made to operate a dummy controller specially fitted up in the carhouse for instruction purposes. In some cases men were made to operate the dummy controller several hours per day for a period of two or three weeks before being allowed to handle a train. The manipulation was repeatedly checked by stop watch methods until the men acquired the right rate and efficiency. In trolley work ordinarily such careful training is not required. It was necessary in this case, however, for the reason that the operating schedules were unusually severe. This was the pioneer steam railroad electrification of England. The schedules were the most difficult in the world, 30 m.p.h., with stops about 1 mile apart. Acceleration rates of 2 to 3 m.p.h.p.s., and correspondingly high braking rates, were maintained. At this point the writer can bear out what Mr. Chappelle has maintained, namely, that passengers do not object to a high acceleration or braking rate—it is the uneven or jerky start and stop which is uncomfortable. Coasting signs, also, were developed and their location carefully tested for. Since three-, four- and five-car trains made the same schedule, three differently located coasting signs were necessary between adjacent stopping points in each direction. This coasting-sign method of saving power was quite crude compared with the more recently developed coasting recorder. Nevertheless, the savings made in power and brakeshoes were quite material. So far as the writer has been able to discover, this (1904) was the first time that coasting signs were used to save power and brakeshoes on an electric railway.

WILLIAM ARTHUR.

"Manners Make the (Platform) Man"

EASTON, CAL., April 7, 1916.

To the Editors:

I have read the editorial in the April 1 issue entitled "Manners Make the (Platform) Man." Did it ever occur to you that the manners of a platform man may often be molded largely by the treatment accorded to him by his immediate superiors?

I have in mind my own experience as a motorman a few years ago on a large system. After I had worked hardly long enough to know all the rules of the employing company, I was called into the division superintendent's office and in no gentle terms informed I had violated a certain rule the day before. Without wishing to be disrespectful I replied such was not the case, whereupon this official's face assumed an expression of uncontrollable rage, and he glared at me like a wild beast and roared out, "By the eternal it happened yesterday, and don't you dare to deny it or or you go to the cashier's office at once." This particular official, I learned afterward, was in the habit of intimidating every new man the same way.

If politeness is to count in modern railway practice, could one possibly place a greater stumbling block in the path of men new in a company's service than a bullying superintendent or an inspector too big for his job? Should it not be incumbent on company officials to set a good example before the men?

F. P. WILL.

A Plea for Patriotism

DREW ELECTRIC & MANUFACTURING COMPANY
INDIANAPOLIS, IND., April 18, 1916.

To the Editors:

Preparedness, Propaganda and Patriotism are popular words during these piping days of unprepared peace. I think everyone has a vague idea that something ought to be done to protect the country, that the army and navy should be increased and strengthened, that Congress should appropriate $1,000,000,000 more or less to provide more artillery, more ships, more coast defenses, etc. It is, generally speaking, however, a case of "let George do it," while the rest of us go on making money, getting out of debt, earning dividends and trying to win promotion or some other selfish end.

If it requires the continuous operation of fifty lathes to supply ammunition for one 3-in. field gun, should not we (not the other fellow) do something to put our country, the richest prize in the world—on some self-protective basis? Why not let every manufacturer have ready a descriptive list of all machinery, its adaptability and capacity for turning out munitions work, the names and identity of all skilled operators for such machines, and such other information as may be of use?

The members of the American Electric Railway industry are employers of large numbers of men. Thousands of these men, if properly encouraged, would take military training. A great many could become part of the National Guard with little interruption to their duties. For the employer there would be a twofold or probably manifold motive. In the first place, and the most important, he would be serving his country. In the second, he would reap the benefit of the method, efficiency and discipline that military training produces. I do not refer to unskilled men only, but fine mechanics and men from the offices can be used. In recruiting men for a battery of field artillery in Indianapolis recently the commanding officer told us he needed men proficient in mathematics as well as men familiar with horses.

The general press has fairly impressed most of us with the needs of our country. As part of one great branch of American industry, can we not add our full quota to the general campaign? Many great engineers are giving their time. Five of America's greatest technical societies have organized for combined aid to the nation. Organized labor is lifting its ban on guard service. Not one American in a hundred knows how even to pick up a flobert rifle. If one of the warring countries in Europe trained her raw recruits nine months before sending them to the front in a period when they were sorely needed, how long would this country require to recruit and equip a force sufficient to repel a few shiploads of veterans from some enemy country?

I suggest that railway companies and manufacturers put the following notice as bulletins in their plants and property, or as inclosures in their pay envelopes.

> Appreciating the necessity for a greater degree of military preparedness and patriotic spirit in the United States, and desiring to co-operate with such of its employees as are or may be enlisted in military organizations, it is hereby announced that this company wishes to encourage enlistments in the (name of State) National Guard, that time will be granted all employees to attend drills, maneuvers or to perform other military duties, and that no employee shall suffer in his employment or opportunity for advancement with this company by reason of such military service.
>
> It is further announced that employees will be paid by this company regular wages while such employees are attending maneuvers, under orders, not to exceed two weeks in any one year.

The above pay envelope slip is one being offered to manufacturers in Indiana by the military affairs committee of the Chamber of Commerce in Indianapolis.

Pending official united action by the electric railway industry, which surely ought to come in this matter, every individual employer should encourage himself and his men to assist in awakening patriotism and in preparing for adequate protection on land and sea. Put a suitable sized United States flag on every city and interurban car and building. Let us try to live for our country now rather than wait to die in it, unprepared and in vain.

Let us by a little sacrifice of time and money do our part toward enabling the United States of America to enforce on land or sea, at home or abroad, her rights as a world power.

JAMES H. DREW, President.

Electric Roads to Serve Large Market

Newly Formed Company Announces Immediate Start on Construction of Union Market Terminal in the Heart of Los Angeles

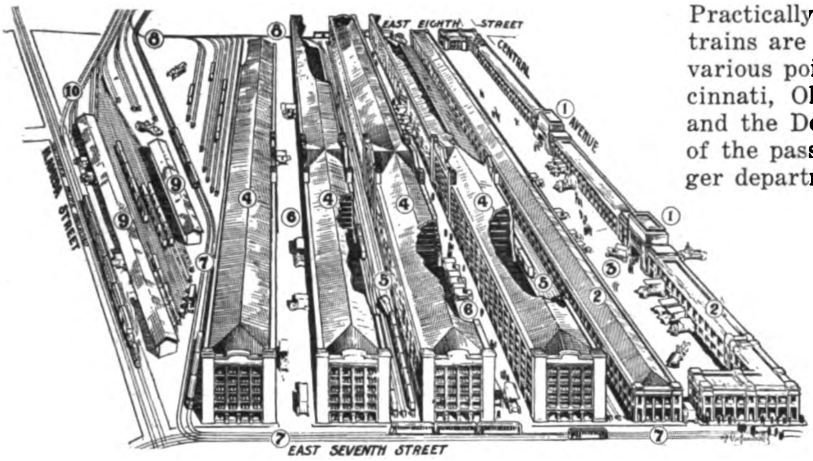
ARTICLES of incorporation have been filed in the California State capital for the Los Angeles Union Terminal Company, which announces that work will be started at once on a terminal in Los Angeles for handling wholesale and market business. The site selected covers the 32 acres bounded by Seventh, Eighth and Alameda Streets and Central Avenue.

The plan was conceived by Benjamin Johnson, president of the Los Angeles public market, as a means of eliminating the costly haul between railroad and steamship terminals and warehouses and markets. Mr. Johnson interested Paul Shoup, president of the Pacific Electric Railway, and through him San Francisco and Los Angeles capital was attracted to the enterprise. The new company has sold $3,250,000 in bonds to a syndicate of Los Angeles and San Francisco bankers headed by Herbert Fleishhacker and including E. H. Rollins & Sons, the Anglo & London-Paris National Bank of San Francisco, and others. The plans, which have been under consideration for almost two years, involve the expenditure of about $6,500,000 in the first unit of construction.

It is planned to construct six buildings, each 1250 ft. long, with a frontage of 100 ft. on Seventh Street, four of which will be six stories high, and two to be used by the Los Angeles public market, two stories in height. These will be supplemented by a market yard 1200 ft. long and 180 ft. wide. Each warehouse building is to have an 80-ft. private paved street on one side and separate tracks on the other. Altogether there will be about 2 miles of railroad trackage involved in the new terminal.

The shops and carhouses of the Pacific Electric Company, which now occupy part of the area involved in the new construction, are to be segregated for transfer to Watts, Vineyard Junction and Covina Junction. As part of the deal the Pacific Electric takes over the present property of the Los Angeles public market on East Sixth Street and transfers to the Los Angeles Union Terminal Company all its equity in the Seventh Street property required for the new terminal.

The Pacific Electric has already entered into an arrangement with the city of Los Angeles to operate the municipally owned sections of railway at the harbor so that with the completion of the wholesale terminal there will be a central point for the collection of all shipments gathered from the harbor wharves, as the terminal will be immediately adjoining the incoming and outgoing freight houses of the Pacific Electric so that practically the entire shipping business with southern California suburban towns will probably center in the new terminal.



LOS ANGELES MARKET AND ELECTRIC RAILWAY TERMINAL.

1. Entrance to market through two-story building.
2. Wholesale market buildings.
3. Market yard.
4. Buildings for wholesale houses.
5 and 6. Two of these streets to be occupied by Pacific Electric tracks, two for auto trucks.
7. Pacific Electric Railway main line.
8. Entrance of Pacific Electric tracks to buildings.
9. Pacific Electric incoming and outgoing freight houses.
10. Connection between Pacific Electric and Southern Pacific.

Work will be begun first on the public market buildings so that the public market can be transferred at the earliest possible date. Construction is to be started this month, it is stated.

How the Detroit United Stimulates Traffic

Methods Used by the Publicity and Passenger Departments Which Have Resulted in Marked Increase in Passenger Traffic

PRACTICALLY a $1,000,000 increase, equivalent to 8 per cent of the gross earnings from passenger traffic on the Detroit (Mich.) United Railway's lines during the year 1915 over the one previous, is a phenomenal showing for a period during which this country was just recovering from a serious business depression. Detroit and the territory contiguous were more fortunate than other parts of the country in that there was little or no evidence of the general business depression which existed elsewhere. On the other hand, the persistence and ingenuity of the traffic and publicity departments of this company did much to stimulate passenger traffic so that approximately 62,000 more revenue passengers were handled daily in 1915 than in 1914.

Publicity in various forms is largely responsible for the success attending the work of the passenger and the publicity departments. Under various headings coming events in Detroit and at points along the Detroit United lines are announced in the *Electric Railway Service*, a paper published by the publicity department of the Detroit United Railway. This keeps the public continually advised of all forms of entertainment in which they may be interested. Banner boards printed in large type and attached to the fenders of the street and interurban cars also direct attention to events of interest.

Remarkable results have also been obtained by advertising the fact that various steam railroads operating either out of Detroit or other cities touched by the Detroit United Railway's lines will run excursion trains. In this connection the passenger department also advertises special rates for those who want to take advantage of these excursions on the steam railroads. Practically every Sunday during the year excursion trains are run over the steam railroads from Toledo to various points, including Cleveland, Columbus and Cincinnati, Ohio, Indianapolis, Ind., and St. Louis, Mo., and the Detroit United Railway delivers a large share of the passengers for all of these trains. The passenger department of the electric line keeps in close touch with the steam railroads so that the passengers it delivers to any of them will be cared for comfortably.

Touched by the various branches of the Detroit United Railway lines are a number of popular summer resorts. Beginning about the first of February, each year, the passenger department advertises on its banner boards and in *Electric Railway Service*, requesting the owners of summer cottages to list them with the department. Upon inquiring as to what information is desired, the department furnishes the cottage owners with standard forms for cottage lists. These contain the name of the owner, the telephone number, the address, the number of cottages for rent, the location of the cottages relative to car lines and other summer resorts, the rates per week, month or season, the number of rooms and the conveniences. Following this request in 1915 a large number of cottages were listed and more than 500 requests for these lists were supplied.

Just as soon as a number of cottages have been listed the printed matter on the banner boards is changed to read "Make your summer reservations at Lake Orion, Phone, Main 4804." The fact that the passenger department has these cottage lists is also advertised in *Electric Railway Service*. At the same time these advertisements are being run, articles suggesting various plans for renting cottages are also published. As a result of this plan of advertising, the Detroit United Railway's interurban lines have become a popular means of reaching the numerous summer resorts in eastern Michigan.

Another plan of stimulating passenger traffic followed by the passenger department, is that of keeping in touch with the activities of the various churches, societies, lodges, graduating classes, etc., in the cities and villages touched by its lines. Early in February letters are sent to each of the way station agents, requesting them to make a list of all these organizations in the cities and towns in which their stations are situated, and also to furnish the name of the president or secretary of each organization. As this information is received it forms a mailing list for all circular matter which is of interest to such organizations. These lists are also supplied to the various boat lines operating on the Great Lakes out of Detroit, and to the various summer and pleasure resort managers. These in turn circularize the organizations, and the combined effort of all has produced excellent results for the passenger traffic department.

The Master Carbuilders' Association is to exhibit the results of educational work carried on by the steam railroads in connection with the annual convention to be held in Atlantic City in June. Jacob Yoder of the Pennsylvania Railroad is chairman of the committee which will have this exhibit in charge.

ASSOCIATION NEWS

President Henry Addresses Membership in Letter on Convention Plans—Association Issues Comprehensive Valuation Bibliography—Membership Committee Plans Aggressive Campaign—Engineering-Accounting Committee Meets in New York—Company Section News

PLANS FOR CONVENTION EXHIBITS AND ENTERTAINMENT

During the present week President Charles L. Henry has sent to members of the association and others interested in the electric railway industry a circular letter on the plans for the convention to be held at Atlantic City on Oct. 9 to 13. In this is explained the new arrangement for the management of the exhibit and entertainment features by the American Association rather than by the Manufacturers' Association, as formerly, manufacturers now being on the same footing as railway companies or members of the former association.

The letter contains the lists of additional members of the company membership committee and of the members of the convention committees, as printed in last week's issue of the ELECTRIC RAILWAY JOURNAL. These comprise a general convention committee and three sub-committees on exhibits, entertainment, and exhibit and entertainment finance respectively. The committees are complete with the exception of the sub-committee on entertainment.

Mr. Henry states that manufacturers' exhibits will be made by member companies in accordance with space rates to be arranged by the exhibit committee. All other privileges of the convention will be open to representatives of all railway and manufacturing companies without payment of fees of any kind other than the company membership dues. Dues of manufacturing member companies for the fiscal year ending Oct. 31, 1916, will be one-half of the full annual dues.

Mr. Henry concludes his letter as follows:

"The new plans for the association and its work, which called for the addition of manufacturing companies to its membership, have been fully discussed and are now well understood. It is encouraging to all interested in the industry to know that the more these plans are considered the more they meet with the enthusiastic approval of all. The new privileges as to membership have already been taken advantage of by many manufacturing companies and the indications point to a very large combined membership for the association. The exhibit committee and others who have begun the work for the October convention feel assured that the exhibits and other features will more than measure up to the increased membership of the association and the broadened work in which all are engaged."

BIBLIOGRAPHY ON VALUATION

The committee on valuation of the American Association is now sending out to the executives of member companies a seventy-two page bibliography on the valuation of public utilities, prepared by the library staff of the American Society of Civil Engineers, under the direction of the sub-committee of the committee on valuation, and published by the American Electric Railway Association. The bibliography is in two sections, the first one, up to July 16, 1913, being that prepared for the special committee on valuation of public utilities of the American Society of Civil Engineers (*Transactions*, Vol. LXXVI, page 2133), while the other is a continuation thereof up to Dec. 23, 1915, for the benefit of the committee on valuation of the American Electric Railway Association. These combined sections, therefore, bring up to a very recent date the various references to the increasingly important subject of valuation, and the book should be very valuable to all member companies. The division of the references under street and interurban railway, railroads, electric light and power, and similar headings makes the use of the bibliography very easy.

Copies have been sent free to company members of the association, and can be supplied to individuals by Secretary Burritt at the nominal price of 50 cents per copy.

COMMITTEE ON COMPANY MEMBERSHIP

The manufacturers' branch of the American Association committee on company membership met in New York on April 18, with all of the members in attendance. A list of these was printed last week. H. C. Donecker, Public Service Railway, and L. E. Gould, ELECTRIC RAILWAY JOURNAL, were also present by invitation. The purpose of the meeting was to organize for an active campaign, the first part of which will be the sending out, next week, of a circular letter of invitation. The work of the committee was apportioned among the members and will be actively pushed.

ENGINEERING-ACCOUNTING COMMITTEE

A meeting of the joint committee representing the Engineering Association and the Accountants' Association was held in New York on April 17 with the following members present: L. P. Crecelius, electrical engineer Cleveland (Ohio) Railway, co-chairman; H. Bates, assistant engineer Connecticut Company, New Haven, Conn.; E. P. Roundey, engineer maintenance of way New York State Railways, Syracuse, N. Y.; F. H. Sillick, comptroller Hudson & Manhattan Railroad, New York, N. Y., co-chairman; J. C. Collins, secretary and general auditor New York State Railways, Rochester, N. Y.; C. H. Lahr, auditor Northern Ohio Traction & Light Company, Akron, Ohio, and H. A. Gidney, auditor Barre & Montpelier Traction & Light Company, Boston, Mass. The meeting was also attended by Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J., who represented the valuation committee of the American Association, and by T. P. Kilfoyle, auditor Cleveland (Ohio) Railway and president Accountants' Association; John Davis, head of the inventory department Cleveland (Ohio) Railway, and Edwin Gruhl, assistant to president North American Company, New York, N. Y., whose experience along the lines of its work the committee desired to know.

The largest part of the session was devoted to the first part of the work assigned to the committee, *i.e.*, the development of a property ledger looking toward the maintenance of a continuous inventory of all the physical property of a company. Messrs. Kilfoyle, Davis, Gruhl and Bates described the advances made by their companies along this line, and after a spirited discussion of the main outline of the proposed ledger a sub-committee, composed of Messrs. Bates (chairman), Collins and Sillick, was appointed to work up the exact details. The committee then discussed its two other subjects—interdepartmental charges and the subdivisions of the accounts covering steam power-plant costs as presented by the 1915 committee on power generation. It concluded the work of the meeting with a decision that this second topic should be referred for consideration to the committee on standard classification of accounts of the Accountants' Association.

HAMPTON SECTION

At a meeting of the executive committee of company section No. 10, held on April 17, the last Friday of each month was selected as the regular meeting time. As announced in a recent issue of the ELECTRIC RAILWAY JOURNAL, Edgar C. Kelly is president of the section and Wilkie F. Collins is secretary. Brief biographical sketches of these men are given below.

Mr. Kelly was born in Huntington, Pa., in 1876, and after receiving a general education in the local public schools, he took a course of study at the Coast Artillery School, Fortress Monroe, Va. He has been in railroad work for nearly twenty years, serving in different capacities, including those of master mechanic of the Westchester, Kennett & Wilmington Railway & Electric Company, and master mechanic of the Hampton Roads Traction Company. At present he is head electrician and pit foreman in the car shop of the Newport News & Hampton Gas & Electric Company. He is very popular among the employees of the company.

GROUP OF OFFICERS AND DIRECTORS COMPANY SECTION NO. 10

Mr. Collins is a newcomer in the electric railway field, having completed a four-year course in civil engineering at the Rensselaer Polytechnic Institute, Troy, N. Y., in 1915. Previous to this time he was for a year in the employ of the Fonda, Johnstown & Gloversville Railroad at Gloversville, N. Y., where he was connected with the engineering and mechanical departments. After leaving school, he entered the employ of the local company in Hampton as assistant engineer, which position he nows holds. Mr. Collins hailed originally from Buffalo, N. Y., where he was born twenty-three years ago.

WASHINGTON R. & E. SECTION

Company section No. 4 held its regular meeting on April 12 in the new assembly hall of the company building, Vice-President J. T. Moffett presiding in the absence of President C. S. Kimball.

The feature of the meeting was an address by L. F. Schmeckbier of the National Park Service, who graphically described the work undertaken by the government in the development of the arid lands of the West, the address being illustrated by means of motion pictures and slides taken under the supervision of this branch of the government's service. An orchestra of four pieces, directed by Herbert Jackson of the engineering department of the company, rendered popular and classical selections during the evening, and a buffet luncheon was served to the 125 members attending the meeting.

Valuation Analysts Wanted

Civil Service Commission Announces Examination for Analyst for the Division of Valuation, Interstate Commerce Commission

THE United States Civil Service Commission has announced an open competitive examination on May 9, 1916, for valuation analysts in the division of valuation, Interstate Commerce Commission. The salaries in the first grade range from $3,600 to $5,000 and in the second grade from $1,800 to $3,300. Appointments to these positions will be principally for duty in Washington, D. C., but some appointments may be made for duty in the field. The duties of this position will be to compile data and to prepare complete, concise and logical reports upon valuation subjects, and to analyze, edit and digest reports submitted by sections of the division of valuation.

Applicants should have had actual experience in the final preparation of financial, statistical or valuation reports upon public utilities, and possess the ability to prepare such reports in a concise, clear and logical form. Applicants for positions under grade 1 must show that they have had at least eighteen months' responsible experience in the final preparation of financial, statistical or valuation reports upon public utilities and must be between thirty and sixty years of age. For grade 2 positions, such experience for at least six months must be shown and the age limit is between twenty-five and fifty years. In each case this experience should have been gained in the employment of a public authority or commission engaged in the effectual regulation of public utilities, or with an important public utility, or in investigations of a similar character. Experience with mercantile concerns, with large utilities in routine positions, or with small utilities with limited operations will not be accepted as qualifying experience in this connection.

Traffic Over the New York Bridges

The Public Service Commission for the First District of New York has received from the bridge department a report of the annual count of passengers using the various East River bridges. The count was made on Oct. 28, 1915, and covered a continuous period of twenty-four hours. The travel in each direction was counted. By far the largest traffic passed over the Williamsburg Bridge, which carried 355,561 passengers in the twenty-four hours. This was an increase of about 28,000 over the previous year, when the total was 327,134. The Brooklyn Bridge showed a falling off of 50,000, the figures for 1915 being 243,617 as against 293,706 in 1914. The Queensboro Bridge showed a slight increase, with 93,654 as against 89,847. The opening of the Fourth Avenue subway line across the Manhattan Bridge is indicated by the large increase in the traffic over that structure. Its total was 111,314 as against 52,395 the year previous. The total traffic on all bridges increased from 763,002 in 1914 to 804,146 in 1915.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

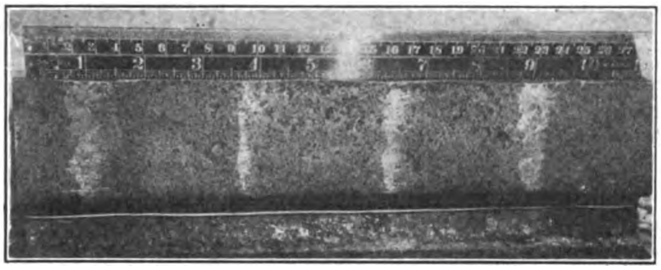
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

A Study of a Corrugated Rail

BY HENRY M. SAYERS
M. I. E. E. (England)

Despite the extensive literature dealing with rail corrugation, very little has been published to show precisely how a corrugated rail is affected in its minute structure. The disease has been studied from the point of causation, but the symptoms of the suffering patient, *i.e.*, the rail itself, have not been investigated or put on record in any detail.

It seems essential to the cure of such a trouble as rail corrugation that a full investigation should be made of the condition of the rail, so that as far as possible the nature of the failure of the material shall be ascertained, which may indicate the direction in which a modification of its mechanical properties should make it more resistant.



RAIL CORRUGATION—FIG. 1—CORRUGATED SURFACE OF RAIL

With this end in view a good specimen of corrugated rail, kindly furnished by A. L. C. Fell, chief officer of the London City Council Tramways, has been closely examined and photographed. The resulting photographs were used to illustrate Stephen Sellon's paper on "Rail Corrugation and Its Causes," read before the Institution of Civil Engineers, England. The rail came from the tramway on the Victoria Embankment, London. It had been in use thirteen months, corrugations had been ground out of it twice, the last time in October, 1913, and it was cut out for examination at the end of January, 1914. It was the outside rail on a long-radius curve. By means of a straight edge laid on the rail table and feeler gages slid beneath in the hollows the depths of the hollows were determined. The depth was found to be as great as 0.016 in. in two places. Fig. 1 is a face view, showing the characteristic appearance of corrugated rail, and also showing by the straight edge a marked detrusion to the outside of the rail at each hollow. Figs. 2 and 3 show the natural or untreated surfaces of a crest and a hollow respectively, magnified 13½ diameters.

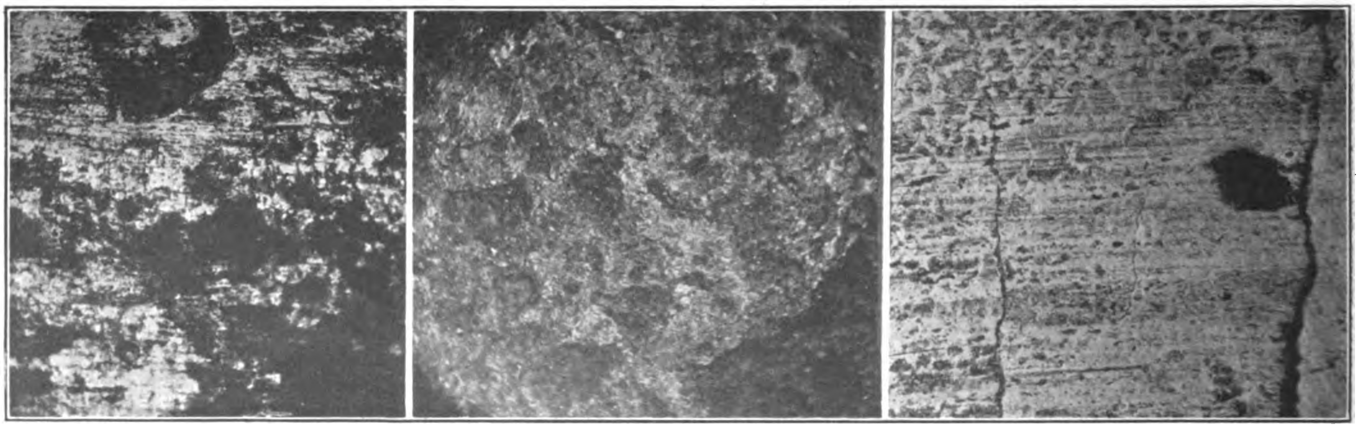
These photographs, which may all be considered as naked-eye views, show clearly that the crests are polished as by combined grinding and rolling action, whereas the hollows are dull and pitted, and that the metal at the hollows has, in part, flowed or detruded laterally, in this case to the outside of the rail. There is some indication, not shown on the photographs, of detrusion to the groove side, but there is considerable wear due to the throat of the flanges bearing on the edge of the groove which does not permit of any precise statement about it.

The micro-photographs described below are from polished and etched specimens showing the minute structure of the steel, and how it seems to be affected in the crests and hollows respectively.

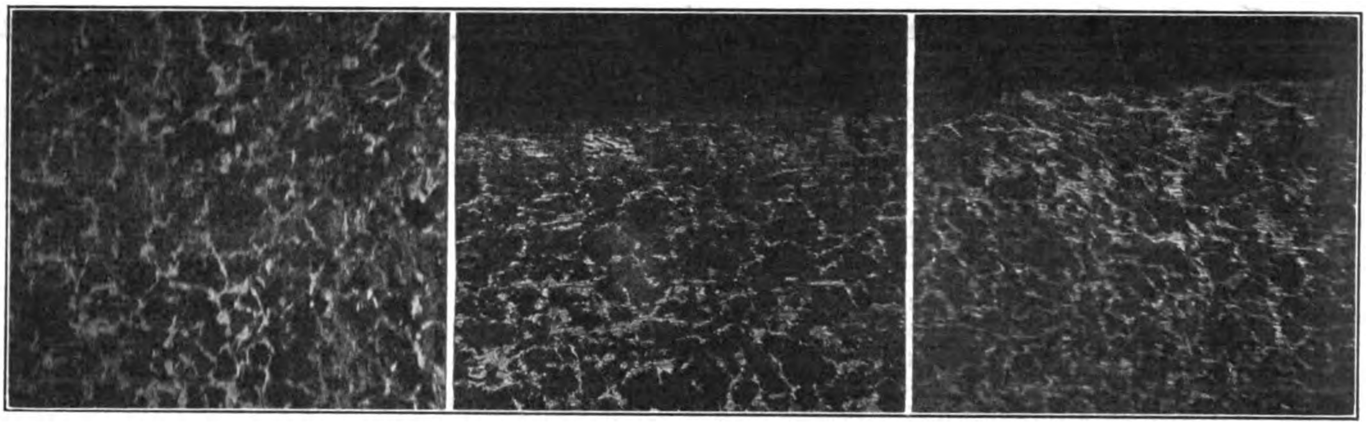
Fig. 4 is the surface of a crest and Fig. 5 that of a hollow, magnified in each case 110 diameters. In the preparation of these surface specimens care was taken to remove as little as possible of the surface metal, but necessarily the surface examined was some very small depth below the working surface of the rail table. Fig. 4, the crest, shows a nearly uniform bright surface crossed by some transverse cracks, while Fig. 5 shows a network surface.

Figs. 6 and 7 are longitudinal sections at a crest and at a hollow respectively, also magnified 110 diameters. They show that the network structure is altered at the crests to a thin skin of structureless material, whereas at the hollows the network structure of the steel persists unaltered to the extreme surface. Fig. 8 is a longitudinal section well below the surface, and may be taken as showing the normal structure of the steel, a "ferrite" network round "pearlite" masses. This specimen is magnified 700 diameters.

Figs. 9 and 10 show the surfaces of crest and hollow



RAIL CORRUGATION—FIGS. 2 AND 3—NATURAL SURFACES OF CREST AND HOLLOW, RESPECTIVELY, OF CORRUGATED RAIL, MAGNIFIED 13½ DIAMETERS; FIG. 4—SURFACE OF CREST, MAGNIFIED 110 DIAMETERS



RAIL CORRUGATION—FIG. 5—SURFACE OF HOLLOW, 110 DIAMETERS; FIGS. 6 AND 7—LONGITUDINAL SECTIONS AT CREST AND HOLLOW, 110 DIAMETERS

respectively, magnified 700 diameters. Fig. 9 has caught one of the surface cracks shown in Fig. 4 at the lower magnification, and both Fig. 10 and Fig. 11 confirm the lower power micro-photograph in respect to the surface characteristics. Fig. 11 is a longitudinal section at a crest, showing one of the transverse cracks in section. The magnification is 300 diameters, and the depth of the crack as shown is about 0.067 in. The crack gets through the altered skin layer into the normal network structure below. Fig. 12 is a longitudinal section of a hollow, magnified 700 diameters, showing one of the smaller pits in the rail table in section.

The high-power photographs confirm the low-power ones, by showing that the lack of apparent structure in the crests is not due to insufficient magnifying power. It is possible that this lack of visible structure is due to the metal resisting the attack of the etching acid, but whatever the exact cause may be, it is clearly altered, while the surface of the hollows consists of unaltered steel.

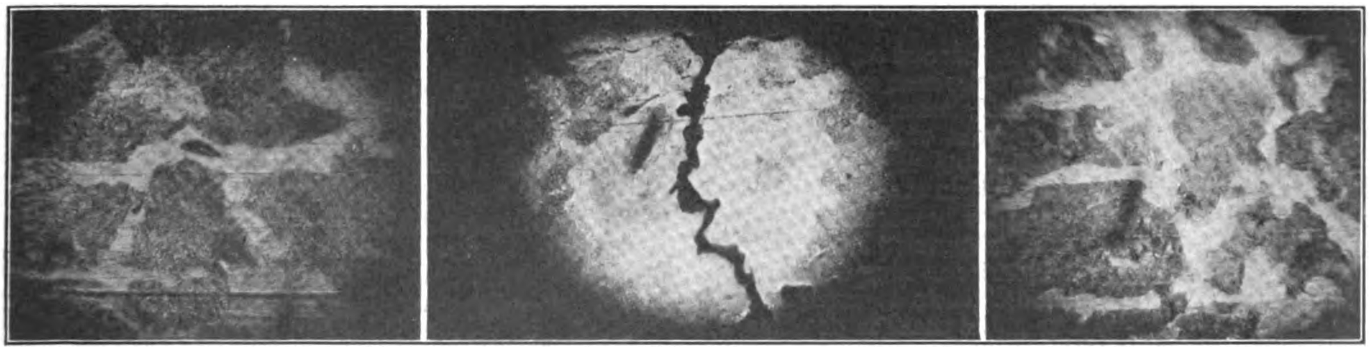
To sum up, this examination of a particular specimen shows the following facts: The corrugations have a pitch of about 2⅜ in., of which the crest occupies about ½ in. (varying slightly in the width of the table, and also as between successive crests). The crest presents a bright surface consisting of metal which has been altered from the normal condition of the steel in the sense that it has for a small depth a greater resistance to acid attack, and is of a finer and apparently more homogeneous structure than that of the body of the rail head. The crest metal shows transverse cracks, especially on the edge of the crests, suggesting that it is more brittle, or that it has been stretched beyond its tensile strength, and it may be added that in the process of cutting and polishing it was found perceptibly harder than the body of the metal. The hollows, on the other hand, show a dull pitted surface, with lateral flow of metal on the free edge, and surface unaltered from the normal structure of the metal, suggesting that particles are torn off or crushed off, leaving a rough fractured surface, which was not perceptibly harder than the body of the steel when it was cut and polished.

There may be some difference of opinion as to what kind of failure these appearances indicate, and there is room for a good deal of discussion as to why the two effects should be produced in such regular alterations, but it seems clear that what happens to the rail is as follows:

At the crests, the surface is cold rolled, and is made harder and more brittle by the cold rolling. It may be that it is stretched longitudinally and cracks under the tension, but it seems more likely that the transverse cracks are due to the surface brittleness, and mark the first stage in the flaking away of the hardened skin from the unaltered metal below. It is certain that the transverse cracks are most plentiful at the edges of the crests.

RAIL CORRUGATION—FIG. 11—LONGITUDINAL SECTION AT CREST, 300 DIAMETERS; FIG. 12—LONGITUDINAL SECTION AT HOLLOW, 700 DIAMETERS

In the hollows the table is subjected to a compressive stress (vertical pressure) in excess of the compressive strength of the material, resulting (a) in detrusion or cold flowing on the free edges, and (b) in crumbling on the surface. If only detrusion resulted, it would indi-



RAIL CORRUGATION—FIG. 8—LONGITUDINAL SECTION BELOW SURFACE, 700 DIAMETERS; FIGS. 9 AND 10—SURFACES OF CREST AND HOLLOW, RESPECTIVELY, MAGNIFIED 700 DIAMETERS cate that the elastic limit of the material had been exceeded, but the crumbling shows that the crushing point is reached.

It seems, therefore, that corrugation will not occur to a rail which, in the first place, does not develop a brittle layer when cold rolled, and in the second place has a compressive elastic limit and crushing point in excess of the maximum pressures to which it is subjected by the wheels. Exactly what degree of resistance to each of the influences named is necessary, and how such resistance can be attained, are questions which can only be answered by experiment, and by the skill of metallurgists and rail rollers; but this seems to be the most hopeful direction in which to seek a cure.

The inferences drawn from the examinations herein set out seem to receive confirmation from the well-known fact that wrought-iron rails did not corrugate, and from statements made in various quarters that neither very soft steel nor very hard steel rails corrugate. This latter statement may be contradicted by certain cases, as is the way with statements about rail corrugation, and particularly in respect to manganese steel, both in special work and in rails; but I should like to suggest that iron-manganese alloys have a very curious set of properties, and that in their case at least hardness is not inconsistent with considerable ductility. It is also well known that the properties of high-manganese steel are remarkably susceptible to heat treatment, and it seems possible that there may be similar peculiarities in respect to change under mechanical treatment, which accounts for hard manganese materials succumbing to this much-debated and very troublesome affection.

Reclaiming Worn Button-End Axles

BY A. H. THOMPSON

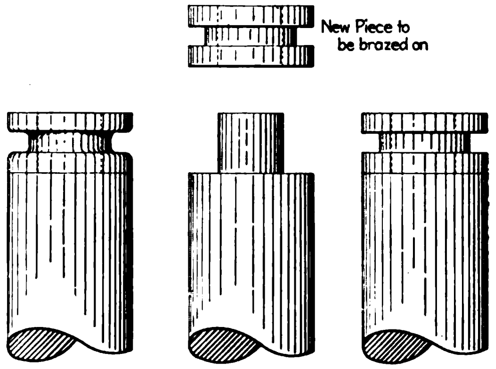
Car-Shed Foreman,* Christchurch (New Zealand) Tramway Board

In the issue of the Electrical Railway Journal for Jan. 8, 1916, page 89, appeared an article on the above subject by J. N. Graham, master mechanic of the Rockford & Interurban Railway. As this item of repair is one which must be faced by all railway men having to do with this type of axle, it occurred to the writer that his experience in reclaiming worn button-end axles might be of interest to the readers of the Journal.

The procedure followed by the writer is this: The axle is placed between lathe centers, and the worn end is turned down to 1½ in. diameter, from the end to a point ½ in. from the inner edge of the check-plate groove. A piece of old axle is cut off to the required length, bored for an easy fit on the 1½-in. diameter end, and brazed upon it by means of a gas blow-pipe connected to the shop air system. The axle is then placed in the lathe, and the new portion is turned flush with the journal. Finally, the groove is cut to suit the check plate.

The above operation has been carried out several hundred times during the past ten years, and has failed only once during that period, when the new part loosened probably owing to want of care in brazing. It appears to the writer that the result obtained by the method described is better than that resulting from the use of Mr. Graham's method because the groove is restored to the condition which existed when the axle was new. By this method the inner edge of the groove is untouched and, being subjected to as much wear as the outer edge, it ceases to do its share in checking the lateral movement of the axle.

In this connection it may be of interest to note that the writer has recently adopted a malleable, cast check plate, which can be refilled at the surfaces, which are in contact with the axle, with fresh liners of phosphor bronze as these liners are worn out. The liners are cast in recesses which are left in the malleable check plate.



WORN AXLE END, AXLE END TURNED READY FOR NEW END, AND FINISHED AXLE END

We pay the equivalent of 36 cents in United States money for castings, and receive 12 cents for scrap. As our driver check plates weigh 3¾ lb., it can be readily seen that a substantial saving is effected by using the body of the check plate over and over again.

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*Note. This is the Australian title corresponding to "master mechanic" in this country.—Eds.

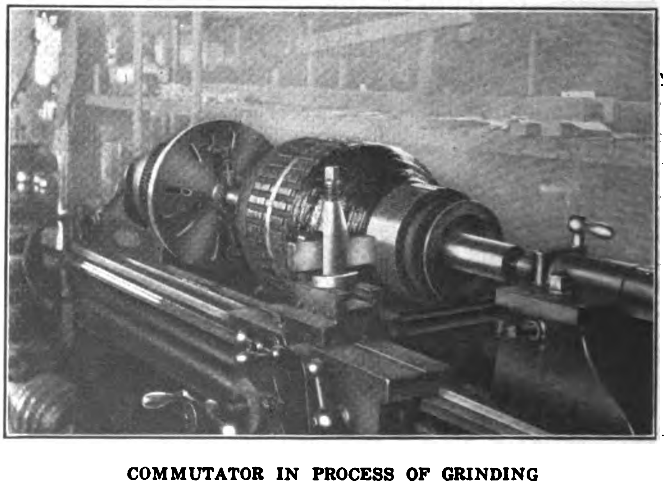
Grinding Commutators in Evansville

BY K. D. LEAVITT

Master Mechanic Public Utilities Company, Evansville, Ind.

Commutator and brush life has been prolonged and the cost of turning commutators has been greatly reduced by the substitution of grinding for the usual cutting operation in the shops of the Public Utilities Company of Evansville, Ind. Grinding blocks especially suited for this purpose were obtained from the Norton Grinding Company of Worcester, Mass.

The grindstone blocks were wedged, as shown in the accompanying illustration, in an ordinary tool rest, the armature turning and banding lathe. The grinding of the commutator makes slotting unnecessary, because the copper in the commutator segments is not carried over the grooves and, at the same time, the amount of metal removed in turning is reduced to a minimum. The finished job has been found much more satisfactory because the surface of the commutator is perfectly true and round and, at the same time, it is highly polished. The accuracy of the finish is reflected in the increased



COMMUTATOR IN PROCESS OF GRINDING

life of the brushes. During the grinding operation the armature is turned at an approximate speed of 500 r.p.m., and where armature turning and slotting usually required two and one-half hours the grinding is accomplished in slightly less than one hour. It is estimated, after taking all the advantages into account, that the substitution of grinding for turning reduces the cost of this phase of commutator maintenance about 60 per cent.

Track Life Extended Three Years by Electric Welding

BY J. H. SUNDMAKER

Chief Engineer Ohio Electric Railway, Springfield, Ohio.

While this company does not own an electric welder, it has had a considerable amount of joint welding done under a contract with the Indianapolis Switch & Frog Company, which is located near by. This work to date has comprised the installation of 437 joints in track which was considerably run down. As a result, we know that the life of the track has been extended for at least three years at a very moderate cost. If it was not that the company mentioned, which makes the Indianapolis welder, is located in Springfield, the amount of work to be done on this property would undoubtedly warrant us in owning a welder. The track which has been repaired is laid with 9-in. tram rail. The cost of installation of each joint, including grinding, has been approximately $5. The time consumed per joint, not including grinding or repaving, has averaged about forty minutes.

The accompanying illustrations are typical of the work which has been done. The first shows the appearance of joints with track laid on gravel foundation, on wood ties, and with ordinary bolted and bonded joints. The rail ends were from 3/16 in. to ¾ in. apart, and they were bent and cupped. When the joints were opened up the splice bars were found to be battered down, resembling compromise joints in appearance. All of the bonds were loose, and in many cases they were entirely off.

The second illustration shows the application of a Simplex joint in connection with the header or supporting plate which is now incorporated in a unit plate, and known as the Apex type of joint. In the joint shown a ½-in. shim has been inserted to close the joint, and hard steel has been welded on to the top of the rail to fill up the cup.

The third illustration shows a finished joint after grinding to the original surface. The head support is easily distinguished, as are also the hair lines showing the insertion of the shim.

As stated before, the results of this work have been very satisfactory, and on a recent inspection we found less deflection at the joints than between them. The conductivity is also equal to if not greater than that of the unbroken rail. There has been no change in the condition of the track since the joint repairs were made in the spring of 1913.

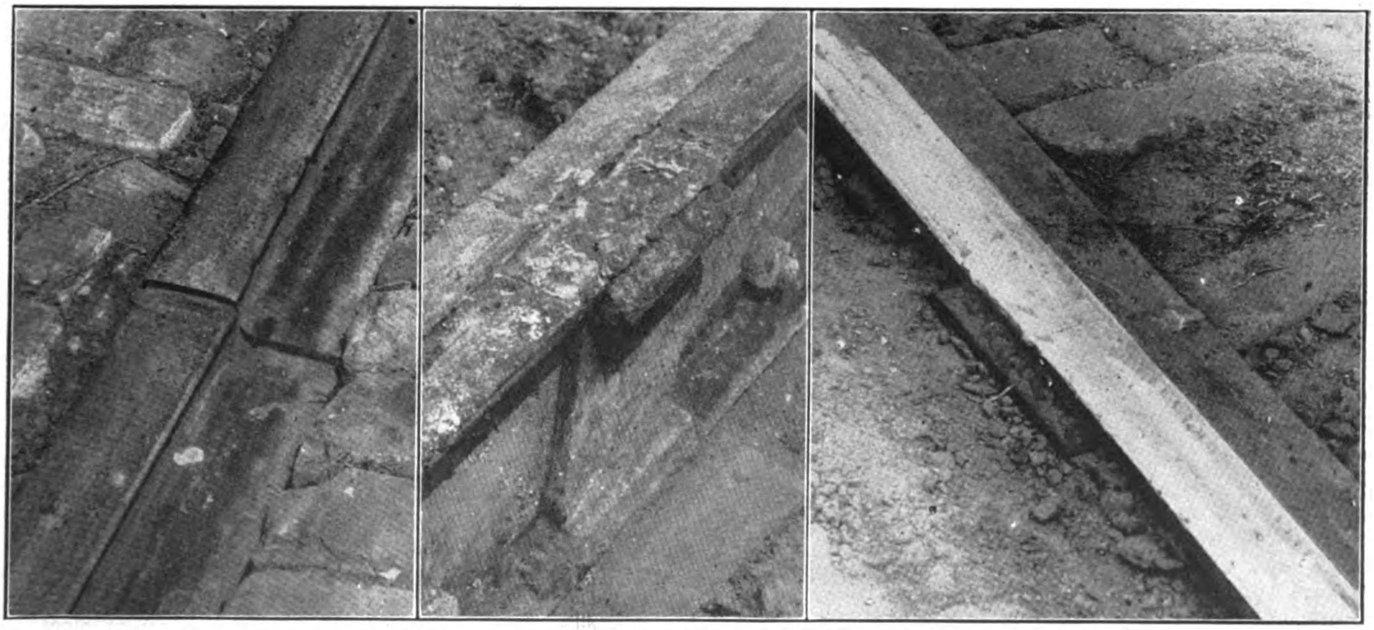
It is an almost universally recognized fact that joint and bonding problems are the most serious items in maintenance work and, in my opinion, it is only a matter of time until the mechanical bolted and bonded joints in paved streets will be a thing of the past.

Steel Newsstands for New York Subway

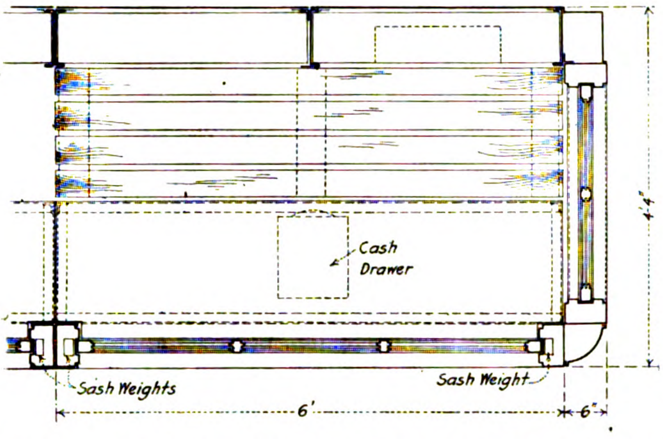
A remarkable improvement in subway station equipment has been effected by the recent installation of eighty-five tastefully-designed and well-equipped steel newsstands in the Interborough Rapid Transit Company's present operating subway in New York in place of the discarded wooden stands.

In addition to a great increase of sales, owing to their clean and inviting appearance, whereby two attendants are now required in certain locations as compared with one formerly, the new stands have proved such a boon to the comfort and health of the attendant himself that a higher grade of employee than formerly has been attracted to this form of work.

The newsstands, shown in the accompanying illustrations, are absolutely fireproof, being constructed entirely of steel. The prepossessing appearance of the stands painted tastefully as they are in Sherwin-Williams "Interborough" light green enamel on the exterior and white enamel on the inside, together with the attractive way in which the periodicals and candy



TRACK LIFE EXTENDED BY ELECTRIC WELDING—BATTERED JOINT IN TRACK ON GRAVEL FOUNDATION, UNGROUND WELDED JOINT AND FINISHED JOINT GROUND TO ORIGINAL SURFACE



PLAN OF STEEL NEWSSTANDS, SHOWING INTERCHANGEABLE UNIT ARRANGEMENT

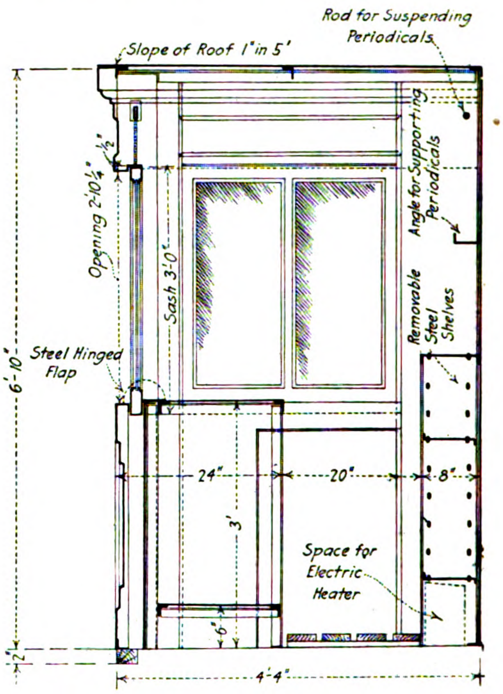
are displayed, is enhanced by the agreeable diffusion of light by indirect lighting. All lights are placed along the recess on the inside of the upper cornice.

Adaptability to different size requirements, according to the business demands, has been secured by designing all the stands with interchangeable sectional units. If the business of any stand increases sufficiently as to require a larger layout, it is only necessary to unbolt one end of the stand and insert another section. At one location, at the Grand Central Terminal express station, one unit includes a ticket office.

The design of the stands meets in every way the convenience and comfort of the attendants. They are easily opened up for business in the morning and closed at night. In opening up the booth, the strong wireglass window sashes may be lowered into a pocket below the level of the counter, or, if the weather is cold, raised up slightly to allow just enough space for handling sales and change. In either case, a hinged steel flap is turned over so as to cover the sash drop opening, thus preventing articles from falling into the aperture. In cold weather, when the front windows are practically closed, proper ventilation is obtained by raising the end window sash 6 in. Under this sash is located a creep door for access to the booth. In order to prevent cold feet from the cement floor of the station, as formerly prevalent, a wooden mat is laid inside the booth. This mat may be easily removed and cleaned. For the comfort of the attendants during the summer season, it is intended to have electric fans furnished. A space under the shelves at the rear has also been arranged for electric heaters if they are found necessary during the winter.

STEEL SUBWAY NEWSSTANDS IN DISPLAY CONDITION

An unusually large area is available for the convenient, neat and conspicuous display of periodicals and confections. On the outside, below the cornice, are bracketed metal rods from which magazines are neatly hung by clips. Literature may also be fastened in front or by the side of each section pier, and laid along the steel counter contained within the stand. At the rear, on the inside, ample provision for displaying periodicals has been procured by the installation of a series of removable pressed-steel shelves, arranged in tiers from a height of 10 in. above the floor to 8 in. above the level of the counter. Above the row of magazines resting on the top shelf projects a small angle for supporting another row, and above this row periodicals are suspended from rods, as on the outside. Confectionery is placed on sanitary glass trays and glass shelves suspended from the ceiling of the booth.



END VIEW OF STEEL NEWSSTANDS

A parcel checking service between 9 a. m. and 7 p. m. has been established at the newsstands, at the rate of 10 cents per parcel. Parcels are stored on a shelf under the counter, placed 6 in. above the floor in order to avoid dampness.

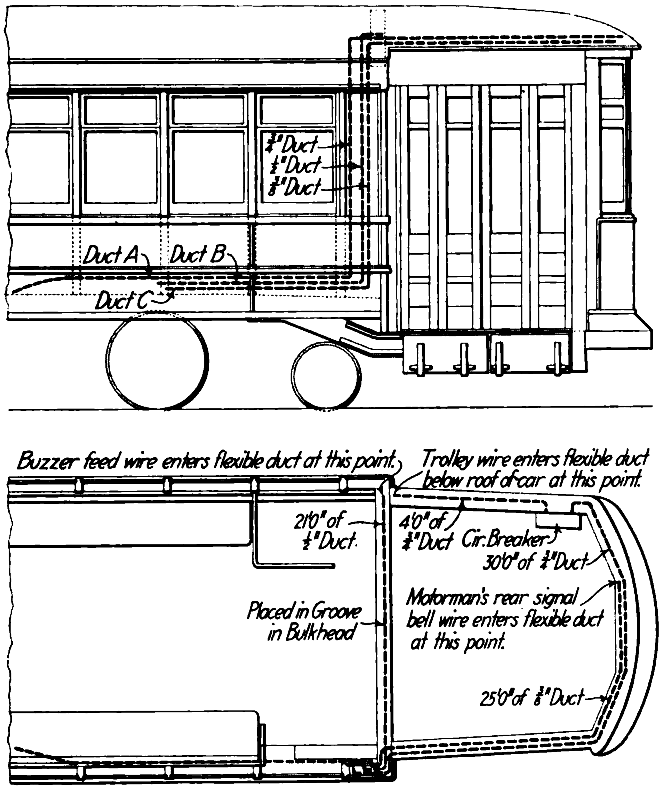
The responsibility for installing the steel newsstands is accredited to C. E. Atkinson, manager, Ward & Gow, New York, which company holds the advertising and newsstand privileges in the subway. The design was prepared and the materials manufactured and installed by the Ellcon Company, New York, together with the co-operation and approval of the Interborough Rapid Transit Company and the Public Service Commission, First District of New York.

At the recent annual meeting of the London & North-Western Railway it was stated that although only a portion of the company's electrification scheme is yet in operation, the number of passengers carried on these lines shows an increase of 16 per cent compared with those carried just prior to the inauguration of electric operation.

Flexible Conduit in Car Wiring

The accompanying diagram shows the location of flexible conduits on the near-side cars of the Philadelphia Rapid Transit Company. In this wiring, ¾-in., ½-in. and ⅜-in. duct is used. The ¾-in. duct is used for the trolley wire from an entry point near the corner post under the vestibule roof, through the circuit breaker to the fuse box, a total conduit run of 34 ft.

The ½-in. duct is used for the buzzer feed wires, a point near that at which the trolley wire enters the ¾-in. line to the interrupter located under one of the longitudinal seats at a point nearly over the rear axle of the forward truck. This run is 21 ft. long.


¾"Duct
½"Duct
⅜"Duct
Duct A
Duct B
Duct C
Buzzer feed wire enters flexible duct at this point.
Trolley wire enters flexible duct below roof of car at this point.
21'0" of ½" Duct.
4'0" of ¾" Duct
Cir. Breaker
30'0" of ¾" Duct
Placed in Groove in Bulkhead
Motorman's rear signal bell wire enters flexible duct at this point.
25'0" of ⅜" Duct

FLEXIBLE DUCT AS INSTALLED ON NEAR-SIDE CARS OF PHILADELPHIA RAPID TRANSIT COMPANY

The ⅜-in. duct is used for the motorman's rear signal bell wire leading from the front of the vestibule to a battery located near the buzzer interrupter. This run is 25 ft.

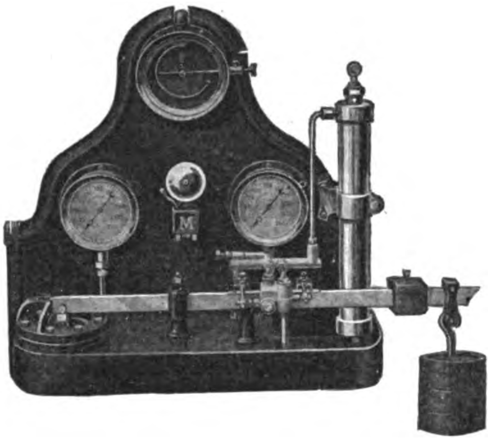
All of the conduit is cleated with galvanized pipe straps, and all ends are left open, as they are all used in a perfectly dry inclosure.

Automatic Damper Regulator for Steam Boilers

An automatic damper regulator for use in boiler plants, particularly in plants where the steam demands fluctuate, has been developed by the McDonough Automatic Regulator Company, Detroit, Mich. This regulator controls the positions of the dampers, regulates the fan speeds and signals the fireman when fires need attention, or controls the rate of fuel feed. The regulation is positive within ½ lb. per square inch variation in steam pressure, and the total pressure variation is held well within the 1-lb. limit. The regulator will control the firing conditions of practically any number of boilers, and in many plants its service is said to be equal to that of an assistant fireman. It is claimed that from $300 to $400 per boiler was saved annually.

This regulator is of the hydraulic cylinder type with diaphragm, lever and counterweight attachments. It is mounted on a cast-iron wall panel containing a steam gage, water gage and electric, low-pressure alarm bell.

The full boiler pressure acts at all times on the lower surface of the diaphragm, and any variation in pressure causes a variation in the deflection of the diaphragm and raises or lowers the balanced lever, thus operating a set of sensitive valves which govern the water pressure applied to the operating cylinder.



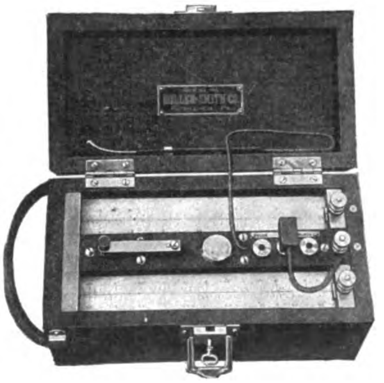
AUTOMATIC DAMPER REGULATOR

For natural-draft, hand-fired boilers the damper regulator automatically controls either the main damper or the auxiliary damper on each boiler, and when the steam pressure falls below a predetermined limit the alarm bell signals the fireman that his fires require attention.

Where forced draft is used the regulator controls the blower motor speed or the engine speed directly, according to variations in boiler pressure. In plants where a combination control of both blower speed and dampers is used, this regulator governs both.

New Ohmmeter for Signal Systems

The accompanying illustration is of a new direct reading ohmmeter which has just been placed on the market by the Roller-Smith Company, New York, N. Y. It is in general a slide-wire bridge having a self-contained galvanometer of sensitive but rugged design, self-contained dry cells which are conveniently located for renewal, galvanometer key, stylus and resistances. There are three ranges, 0-1, 0-10, 0-100 ohms respectively. The scales for these are 15 in. long, each scale being a different color—blue, red or black.



DIRECT READING OHMMETER ESPECIALLY ADAPTED TO SIGNAL WORK

Any unknown resistance, such as that of relay points in an electric signal system, can be measured by connecting to binding posts suitably labelled. A plug is inserted in one of the sockets marked respectively blue, red and black, and the stylus is tapped along the wire which is stretched above the scale. The resistance is then read direct from the scale at the point where there is a zero deflection on the galvanometer. This is a convenient type of a small, light, portable instrument, and its ranges have purposely been changed from those of previous designs to adapt it to signal system testing.

NEWS OF ELECTRIC RAILWAYS

WORK ON NORFOLK FRANCHISE COMPLETED

Committee Which Has Been Considering Blanket Franchise Terms Presents Its Findings

The special committee of the Council of Norfolk, Va., which has been at work since Feb. 8, 1915, upon the terms of a new franchise for the Virginia Railway & Power Company, has presented its findings. The committee held forty-three meetings, twelve of which were conferences with officers of the company. It is expected that the franchise will be presented to the Council this month for consideration.

The first of the present franchises of the constituent companies will expire in 1930 and the last in 1944. The proposal in the new grant on this point is that the new blanket franchise shall expire in 1946. The rates of fare in force at present on the various lines follow: old city division, 5-cent cash fare; railway and light company division in Berkeley, 5-cent cash fare or six tickets for 25 cents on the cars; Bay Shore Terminal line, including line to Berkley, etc., 5-cent cash fare, with 3-cent cash fare or ten tickets on cars for 25 cents, from 5 a. m. to 8 a. m. and 5 p. m. to 7 p. m.; other hours six tickets on cars for 25 cents. School tickets are required on Bay Shore Terminal line. The proposed ordinance stipulates that on all lines the cash fare shall be 5 cents and that for the first three years of the new grant tickets good on all lines shall be sold at the rate of six for 25 cents at thirty places in the city designated by the board of control. Thereafter the strip tickets are to be sold on all cars. The rates just mentioned are to run for ten years, after which they may be changed by the corporation commission. It is expressly stipulated, however, that the cash fare for service within the present limits of the city shall not exceed 5 cents at any time during the life of the franchise. School tickets are to be furnished for all lines on the same basis as heretofore for part of the system.

The transfer situation in Norfolk is somewhat similar to that in other cities in which the various operating companies work under franchise terms that are dissimilar. The new grant stipulates universal transfers, with special provision for additional transfer when necessary to and from the Colonial Palace and the Edgewater lines. Closely allied with this subject is the matter of control of service. At present there are definitely fixed schedules for different lines which prescribe cars not more than ten minutes apart on some lines and twenty-four minutes apart on others. The new grant stipulates that the company shall give "adequate, good service, etc." The question of the sufficiency of service is to be vested with a local public service commission. Provision is made for appeal from the decision of the local commission to the Virginia Corporation Commission.

Some of the lines in Norfolk have 5-ft. 2-in. gage. Others are standard gage. The new grant prescribes that all of the lines shall be standardized.

At present the Norfolk Railway & Light Company is obligated to pay a license tax for the use of the streets. No limit as to the amount of this tax is stated in the franchise. The State law requires the electric light company to pay one-half of 1 per cent on its gross receipts. The city has imposed a tax of $1,500 annually on the Church Street-Ocean View line, and 6 per cent on gross receipts of the Norfolk Railway & Light Company, but has not imposed the license tax on the Bay Shore Company, as there was some doubt about collecting this. The tax at present imposed on all the above business is about $35,250 yearly. The new franchise stipulates that an amount is to be paid on the railway and on the electric light and power business which shall be equal to 1½ per cent of the gross receipts for the first three years and 2 per cent thereafter. The gross receipts for the year 1915 amounted to $1,716,330. It is estimated that this business will increase from year to year so that for the fourth year the 2 per cent rate will make the total payment to the city under the new grant greater than it would be under the present tax.

NEW YORK LEGISLATURE ADJOURNS

Bill Passed Which Arbitrarily Fixes Rates—No Appropriation for Thompson Committee

In the closing hours of the session of the Legislature of New York the Assembly passed the so-called Brooklyn 80-cent gas bill, which arbitrarily fixes by direct legislative enactment a uniform 80-cent price for gas in the Thirtieth and Thirty-first wards of Brooklyn, thus making the rate the same for all companies throughout the borough. The bill was passed by the Senate on April 6 under suspension of the rules. It now goes to the Governor for his signature. The bill is of unusual interest on account of its effect on rate making and was the subject of an editorial in the ELECTRIC RAILWAY JOURNAL of April 8.

In the debate in the Senate on the bill, exception was taken to a message from Oscar S. Straus, chairman of the Public Service Commission for the First District of New York, in which he virtually urged the Legislature to pass the bill, saying that the commission would not interpose any objection to action by the Legislature which will secure the people of the sections previously mentioned reductions in rates that have been delayed by the technical provision of the law as it stands. The case involving the rates for gas in the territory affected has been pending before the commission for six years. Senator Wellington explained that the case once had been carried to the Court of Appeals; that new testimony would have to be taken before a final determination could be reached, and that the commissioners advocated the passage of the measure merely as a short cut to the relief desired. The vote on the bill was forty-six to three.

Commissioner Travis H. Whitney explained why the commission had supported the bill. He said that the commission held that the Legislature must make the law more effective if the responsibility of ratemaking was to be left to it. The commission had sent bills to the Legislature proposing such amendment of the law as it thought necessary. These would prohibit or restrict the court review of rate and service cases by certiorari; would give the commission power to make a new rate effective at any time after a proceeding had been begun; would permit the commission, after complaint, to declare existing charges excessive and to order their repayment, and would change the penalty provision of the law.

By a unanimous vote the Senate on April 17 passed the Thompson committee bills amending the public service law and taking from the Public Service Commission of the First District supervision of the construction of New York City subways and elevated railroads. The measure provides that, after the Board of Estimate has decided upon a subway, the Public Service Commission shall turn over to a commission to consist of one member from each borough, with the Mayor and Comptroller serving as members ex officio, all supervision of construction. The bill is a direct outgrowth of the investigation of the Public Service Commission conducted by the Thompson committee.

Senator Thompson, however, lost his fight to have the use of the writ of certiorari denied to corporations in contesting commission rulings. This measure was ardently supported by the public service commissioners, but was killed in a caucus of Republican Senators when it was decided to amend the law so that a corporation would have the right to one review by the Appellate Division on a writ of certiorari. In the event that two Appellate Divisions differ as to facts, the right of resort to the Court of Appeals is granted.

The Legislature adjourned without appropriating any money for the Thompson committee, which is investigating the Public Service Commissions. Senator Thompson is reported to have said that the investigation will be continued until July 1, the date for ending the hearings as fixed by resolutions passed by both houses some time ago.

REPORT ON "PUBLIC UTILITIES ANNOTATED"

Henry C. Spurr, editor *Public Utilities Annotated*, reports that 5900 opinions and orders were received during 1915. Of this number 990 cases were printed in full, 3861 were abstracted and 1049 not used. The last mentioned cases were largely made up of preliminary orders that decided nothing, many of them being mere notices of hearings or formal dismissals of complaints upon agreement of parties. Some of the cases received also were outside of the scope of the reports, as several corporation commissions have jurisdiction much wider than that of public utilities or public service commissions. All comment received from commissioners so far has been favorable and much of it commendatory. One commissioner, however, wrote that if he had any criticism to make it would be too many cases of little value as precedents were reported. The publishers intend in the future not to publish any case in full which has not some value as a precedent, owing to the rapid increase in the number of cases. There were six volumes in 1915 and there may be seven this year. To publish all of the cases in full would probably require twenty volumes for the current year. The commissioners have given very valuable counsel, and continuation of such help, especially in calling attention to cases that ought to be printed in full because they decide a new question or one that is new under particular jurisdiction, will be appreciated. Chronological order is not followed absolutely in the publication of decisions, as an important case receives preference as compared with one of less value even if the latter is delivered earlier.

Mr. Spurr also reviews the history of the decision to publish these reports. While the need was obvious to those who wish to follow the decisions, the cost was enormous, and no publisher of experience could be found who would undertake to publish such series of reports without some guarantee of subscriptions. To get such a publication, a group of those most largely interested in utility enterprises agreed to take the number of subscriptions which the publishers, the Lawyers' Co-operative Company, Rochester, N. Y., required as a basis for undertaking the risks of the enterprise.

In conclusion the editor adds that in the head-notes care is taken to cover the questions actually raised and decided and nothing more. This is the policy followed by the company in its other legal publications. Where everything is put in the head-notes—argument, discussion, reasons and all—the reader never knows what the case is authority for until he has carefully consulted the opinion. The annual digest for 1915 is now in the hands of the printers and will be issued shortly.

NEW YORK MOTOR BUS APPLICATION RENEWED

The New York Motor Bus Company has renewed its application for a franchise to the Board of Estimate and Apportionment. In its communication to the board the company signifies its desire to carry out the original proposals made by it, and calls attention to the delay of months in taking definite action on its application. The company claims that at the hearings held last fall the need for more motor buses was demonstrated and that no real objection was made to the acceptance by the city of the proposal of the company, which the franchise committee of the board pronounced superior to all others submitted in competition with it. The company said:

"The system contemplated is not large. It is not so great as really to compete with the system of the Interborough Rapid Transit Company. Our company and your board have been through all the required complicated legal formalities to the point of actually conferring and accepting a franchise. After an exhaustive study on the part of your franchise committee of routes, and all questions involved, a public bidding was held and the bid made by this company was approved. We have deposited $60,000 in cash with the comptroller to show our good faith. Our financing is provided for, the type of our vehicle has been determined upon, and we have a factory ready and equipped to duplicate it in large quantities for the early inauguration of the much desired service. Statistics of the growth of traffic proved beyond doubt that the inauguration of an improved and comprehensive bus service could not possibly impair the financial interests of the city in the enlarged subway."

CHICAGO SURFACE LINES HOLD TROPHY DINNER

The annual meeting and the trophy night dinner of the Chicago Surface Lines Club was held on the evening of April 10 at the Mid-Day Club. The Surface Lines Club now numbers 620 members, and more than 350 were present at the annual celebration. W. D. Bartholomew acted as toastmaster. During the year eight bowling teams, representing the different departments of the Chicago Surface Lines, played for the honor of holding the L. A. Busby silver cup. The season lasted twenty-one weeks and included sixty-three games for each of the eight bowling teams. In 1915 the L. A. Busby trophy was awarded to the legal department, which was again successful this year. The team which is awarded this trophy for three years in succession is permitted to retain it permanently. In addition to the trophy, medals were awarded to various members of the bowling teams for high scores made during the year.

At the annual election which followed the dinner and the awarding of the trophy, the following directors of the club were elected for the ensuing year: J. V. Sullivan, statistician, representing the executive department; A. L. Dewey, auditor of disbursements, representing the accounting department; M. C. Morton, bookkeeper, representing the treasurer's department; F. C. Mitchell, representing the engineering department; A. J. Klatte, assistant electrical engineer, representing the electrical department; E. L. Brookman, representing the transportation department; N. M. Thorsson, assistant purchasing agent, representing the purchasing and insurance department; A. R. Peterson, trial attorney, representing the legal department, and W. E. Nemits, assistant general claims agent, representing the claims department. These directors, in turn, will elect the officers of the club at an early date.

TOLEDO COMMUNITY OWNERSHIP PLAN DISCUSSED

The proposed community plan of ownership of the railway property of the Toledo Railways & Light Company, as submitted by the sub-committee of Mayor Milroy's general railway committee, was discussed at a conference in Mayor Milroy's office at Toledo, Ohio, on April 12, and a supplemental report was read.

One matter to which attention was called was as to who would control the property at the end of the five-year period if a majority of the stock were not then lodged with the public. Another was that people who have no stock will bear the brunt of the burden in case fares have to be advanced from the present rates to insure 6 per cent interest to the stockholders, as provided in the plan. Another was as to the status if people who bought stock on the community plan and received 6 per cent on their investment, should refuse to sell their holdings to the city when it desired to take the property over.

Members of the sub-committee explained several doubtful features in detail and said that the Supreme Court would be asked to pass on a number of points before the plan was put into operation. They admitted that fares would fluctuate under this plan and said that there was no way of escaping this if the people wanted service at cost.

The supplemental report provides for the creation of a commission to value the property and a new company to take it over. This company would issue 6 per cent common stock to the amount of the agreed value of the property which would be delivered to the Toledo Railways & Light Company. The company in turn would deposit the stock with five trustees to be selected under a trust agreement, which would provide that the trustees vote the stock for a period of five years, except such as was sold from time to time. Stock would be offered to the people of Toledo in certificates of $10 each under conditions which were outlined at length in the ELECTRIC RAILWAY JOURNAL of April 15, page 746.

The sub-committee recommends that a street railway commission be created by the Milroy committee for the purpose of perfecting the proposed plan, raising funds for employing legal, engineering and such other assistance as may be necessary to secure a valuation, to incorporate a company to issue stock, to buy and take over the street railway property, prepare necessary ordinances and initiate and submit them to the voters.

New Agreement Under Way in Albany.—Officers of the Albany and Troy locals of the Amalgamated Association are working upon a new agreement to be presented to the United Traction Company, Albany, N. Y. The present agreement will expire by limitation on June 30.

Washington Suburban Line to Arbitrate with Employees.—Differences between the Washington & Old Dominion Railway and its employees as to wages and working conditions are to be arbitrated as the result of an agreement reached by the company and its employees on April 18. The agreement is to remain in force for a period of one year. The decision to arbitrate was reached after a series of conferences lasting ten days.

Electrification of Iowa Road Contemplated.—A meeting of the directors of the Muscatine North & South Railway, which operates from Muscatine to Burlington, Iowa, will be held in Davenport about May 1 for the purpose of considering plans to lift the receivership, reorganize the company and electrify the line. The road will probably be operated in connection with the Davenport & Muscatine Railway, a part of the system of the Tri-City Railway & Light Company. E. H. Ryan, Davenport, is president of the road.

Strike in Alliance Settled.—The three-day strike of the motormen and conductors of the Stark Electric Railway and the Cleveland, Alliance & Mahoning Valley Railway, Alliance, Ohio, ended on April 14, when the men returned to work at advanced wages, but without the recognition of the union. The new rates for the city of Alliance are: First six months, 22 cents; second six months, 24 cents; after two years, 26 cents; for the Stark Electric, interurban, 26, 28 and 30 cents, respectively, and for the Cleveland, Alliance & Mahoning Valley, 24, 26 and 28 cents, respectively.

Wage Demands Considered in Pittsburgh.—Demands for an advance of from 20 to 43 per cent in wages have been made by a committee representing the motormen and conductors of the Pittsburgh (Pa.) Railways appointed to arbitrate the wage scale to go into effect on May 1. The negotiations have been going on since April 3, but according to a statement of the company, the employees' committee wants the initial advance guaranteed as a condition to negotiating for a further advance. The company said that it was useless to waste time discussing such an unreasonable request and suggested the appointment of an arbitration board at once to settle any other question than that of wages, upon which the company and the men could not agree.

Illinois Commission Establishes News Bulletin.—The State Public Utilities Commission of Illinois has begun the publication of a bulletin giving news of the activities of the commission. Brief accounts of some of the matters under consideration and a digest of the orders entered during the preceding month comprise the contents of the first number, which is dated April. For the present the bulletin will be issued on the first of each month. It is expected that subsequent issues will include a record of new cases filed with the commission, as well as short reports from each of the departments. The bulletin will be distributed free of charge. It will be mailed to the editor of every daily and weekly newspaper in the State.

New York State Track Laborers Get Eight-Hour Day.—As an outcome of recent arbitration proceedings between the officials and the track laborers of the New York State Railways, Rochester, N. Y., a new wage agreement was reached on April 17. The new contract, which is to go into effect on May 1, and will hold good for a year, specifies an increase in the wages of track employees to 23½ cents an hour, with time and a half if the employees are called after Sunday at 8 a. m., and an eight-hour day instead of a ten-hour day. A tentative agreement has already been entered into between the company and representatives of the motormen and conductors, subject to approval of the local labor organization. This agreement, if ratified, will also become effective on May 1.

Commission Appoints Chicago Elevated Real Estate Appraisers. — Real estate appraisers to revalue the property owned by the Elevated Railroads of Chicago, have been appointed by the Chicago Traction & Subway Commission. A part of the work assigned to the commission was that of revaluing the elevated railroads and recommending some basis of merging their operation with that of the surface lines. In the valuation of the elevated railroads made in 1912 the difference in the real estate values, as found by the representatives of the city and by the railway company, could not be reconciled. The new appraisers are W. W. Baird and W. A. Bond, both former presidents of the Chicago Real Estate Board, and Mark Levy, a member of the valuation committee of the same board. A joint fee of $10,000 has been fixed for their services.

Wage Agreement Arranged in Scranton.—An agreement between the Scranton (Pa.) Railway and its employees covering working conditions was signed on April 6. It is to run from April 1, 1916, to April 1, 1919. Under the agreement which expired on April 1 this year, motormen and conductors received from 22 cents to 26½ cents an hour. Under the new agreement the men will receive 25 cents an hour the first year; 27 cents the second year, and 29 cents after the third year. Employees in uniform are hereafter to be carried free within the city limits on all cars, even including those of the Scranton & Binghamton Railway. Stools will be provided for motormen for use outside of the limits of certain safety zones. All cars used on the system are to be operated with two men in charge. A 10 per cent increase in wages is made to apply to all carhouse, power house and track men.

Strike of Laborers on New York Subway Settled.—About 1000 members of the International Compressed Air & Concrete Foundation Workers Union of America, at work on the new subway lines in New York and Brooklyn, struck for higher wages on April 8. On April 10, the contractors declared open shop, and hired men to fill the places of the laborers and timbermen on strike. Many of the new men who were employed were non-union, and using this as a reason the hoisting engineers of the Broadway section struck on April 11. They were joined by the tool sharpeners and blacksmiths. After conferring for three days in the offices of the Public Service Commission for the First District, the contractors agreed not to discriminate against the union and to an increase of 25 cents a day for the 12,000 laborers and timbermen. The compressed-air workers in the East Riber tubes, however, are still on strike.

St. Paul Operating 220 Miles Electrically.—On Tuesday, April 11, the Chicago, Milwaukee & St. Paul Railroad commenced electric operation on the second one of the four engine divisions comprising its projected electric zone, running trains electrically between Three Forks and Harlowton, Mont. This establishes complete electric operation on the eastern half of the proposed 440-mile electrification, the traffic over this part of the line being handled by eleven freight engines and two passenger engines that are now in service. At the present time the company is hauling a very much increased freight tonnage, the daily traffic averaging 15,000 tons eastbound and 10,000 tons westbound. This is practically 100 per cent increase in freight traffic over last year's figures, and while it is believed that the increase is due in part to the fact that the Panama Canal has been closed, it is thought that a considerable part of it is due to improved business conditions in the Western country, there being a very heavy shortage of empty cars on the Pacific Coast at present.

Mr. Stanley Discussed Cleveland Wage Matters. — J. J. Stanley, president of the Cleveland (Ohio) Railway, on April 14 outlined some of the things the company will demand in case the motormen and conductors insist on an increase of wages such as requested in their original communication. Among other things he mentions abolition of arbitration in cases of discipline of men, doing away with wearing of badges or emblems that are objectionable to the company, continuation of any new agreement for two years without change, semi-annual physical examination of men more than fifty years of age for fitness, and payment of half of all arbitration expenses by the union hereafter. Mr. Stanley said that the company cannot change the service or increase the expense without the permission of the city. Representatives of the union met with the committee on labor disputes of the Cleveland Chamber of Commerce on April 13. In all probability the men will seek a conference with the company officials at an early date. Mr. Stanley has expressed his willingness to meet the men.

Illinois Traction Freight and Fare Franchise.—A bill enlarging the franchise of the St. Louis Electric Terminal Railway (McKinley System) by permitting it to haul freight through St. Louis in trains of four trailers and a motor car and authorizing the company to increase its fare to 10 cents between St. Louis and Granite City, has been introduced in the Board of Aldermen of St. Louis. The measure has been referred to a special committee with instruction to make prompt report. The proposed ordinance grants to the McKinley System a franchise to construct, maintain and operate a single or double track, etc., along and across certain streets. A clause specifies that "no arbitrary" charge shall be made for hauling freight, express or passengers across the McKinley bridge. The fare increase permits the company to charge 5 cents, with half fare for children, between any points on its line between Twelfth Street and Venice. An additional 5-cent fare is permitted between Venice and Granite City. The bill would require the company to sell six tickets for 50 cents between St. Louis and Granite City.

PROGRAMS OF ASSOCIATION MEETINGS

Society for Electrical Development, Inc.

The fourth annual meeting of the Society for Electrical Development, Inc., will be held on May 9 at the executive offices of the society in the United Engineering Societies Building, New York. The board of directors for the ensuing year will be elected. An amendment to the by-laws will also be voted upon. J. M. Wakeman, general manager of the society, will read his annual report and outline the extensive plans for "America's Electrical Week" campaign this fall.

Iowa Street & Interurban Railway Association

The program for the meeting of the Iowa Street & Interurban Railway Association. which is to be held at Dubuque on May 10, 11 and 12, has been issued by H. E. Weeks, Davenport, secretary-treasurer of the association. The program does not, however, include the topics for the combined meetings of the organization with the Iowa Gas Association and the Iowa section of the National Electric Light Association on May 11. The meetings of the Iowa Street & Interurban Railway Association will be opened on May 10 at 1.30 p. m., with the address of the president, R. A. Leussler, Omaha, assistant general manager of the Omaha & Council Bluffs Street Railway. The following papers will then be read:

"The Selection and Training of Trainmen," O. S. Lamb, superintendent of the Waterloo, Cedar Falls & Northern Railway.

"Rail Joints," R. H. Findley, superintendent of track and roadway of the Omaha & Council Bluffs Street Railway.

The session on the morning of May 12 will be opened at 10 a. m. The following papers will be read:

"Inspection and Maintenance of Rolling Stock," by John Sutherland, master mechanic of the Tri-City Railway and the Clinton, Davenport & Muscatine Railway.

The presentation of this paper will be followed with an illustrated lecture on:

"Steel Poles as a Substitute for Wooden Poles," by A. H. Bates, inventor of the pole which bears his name, and manager of the Bates Expanded Steel Truss Company.

The session on the afternoon of May 12 will be opened at 1.30 o'clock. It will be an executive session. The minutes will be read, the report of Mr. Weeks will be presented and directors elected.

The meeting at Dubuque will be the first time the three associations have joined in conducting a convention. It has been the custom to hold the annual sessions of the Iowa Street & Interurban Railway Association and the Iowa section of the National Electric Light Association in the same city, but the two organizations have never united. The Iowa Gas Association has seldom held its conventions in the same city as the other two. Samuel Insull, president of the Commonwealth Edison Company, Chicago, and Gen. George H. Harries, vice-president of H. M. Byllesby & Company, Chicago, will speak on May 11, the only day of the convention when the three organizations will give up their own sessions and join in a combined meeting.

Financial and Corporate

ANNUAL REPORT

Union Traction Company of Indiana

The comparative statement of income, profit and loss of the Union Traction Company of Indiana, Anderson, Ind., for the years ended Dec. 31, 1914 and 1915, follows:

	1915		1914	
		Per Cent		Per Cent
Revenue from transportation:				
Passenger	$2,071,832	83.33	$2,089,785	83.74
Baggage	10.539	0.42	11,009	0.44
Parlor, chair and special car	9,059	0.37	8,709	0.35
Mail	1,070	0.04	1,002	0.04
Express	81,867	3.30	89,854	3.60
Milk	24,724	0.99	25,305	1.01
Freight	223,751	9.00	211,514	8.48
Switching service	......	...	193	0.01
Total	$2,422,842	97.45	$2,437,371	97.67
Revenue from operation other than transportation:				
Station and car privileges	$9,208	0.36	$8,201	0.33
Parcel room receipts	1,146	0.05	1,269	0.05
Storage	3	0.00	58	0.00
Car service	8	0.00	32	0.00
Rents of tracks and terminals	10,692	0.43	11,207	0.45
Rent of equipment	4,577	0.18	3,593	0.14
Rent of buildings and other property	7,682	0.31	7,234	0.29
Power	29,161	1.18	25,505	1.03
Miscellaneous	927	0.04	1,054	0.04
Total	$63,404	2.55	$58,153	2.33
Operating revenues	$2,486,246	100.00	$2,495,523	100.00
Operating expenses:				
Way and structures	$261,192	10.50	$261,258	10.47
Equipment	160,992	6.48	147,544	5.92
Power	229,344	9.22	233,923	9.37
Conducting transportation	456,637	18.38	466,371	18.69
Traffic	23,478	0.94	15,004	0.60
General and miscellaneous	318,407	12.80	311,470	12.48
Extraordinary flood expense charged in 1915	21,500	0.86	20,700	0.83
Total	$1,471,550	59.18	$1,456,270	58.36
Net operating revenue	$1,014,696	40.82	$1,039,253	41.64
Taxes	118,020	4.75	119,430	4.78
Operating income	$896,676	36.07	$919,823	36.86
Other income	17,895	0.72	32,756	1.31
Gross income	$914,571	36.79	$952,578	38.17
Deductions	857,238	34.48	884,783	35.45
Net income	$57,333	2.31	$67,795	2.72

The foregoing amounts and the percentages based on the operating revenues indicate the general results secured by the company during 1915, as compared to 1914. The chief points to be noticed are that the decrease in passenger revenue and as a whole in transportation revenue was met by a perceptible increase in operating expenses, so that the operating ratio rose from 58.36 per cent in 1914 to 59.18 per cent in 1915. Taxes increased slightly, but the decrease in other income was more than counterbalanced by the decrease in deductions from income. It will be observed that the operating revenue in 1915 was $9,277 less than in 1914 and the operating expenses $15,280 greater, but after the decrease of $27,545 in income deductions the net income for the year showed a loss of only $10,462. It is said the loss in operating revenues arose from the decline in the first eight months of the year, the last four showing continuous improvement.

The amount charged for additions and betterments during the year was $46,883. A credit of $16,000 was made to this account, leaving the net charge $30,883. Of the gross sum, $40,502 was spent on way and structures. These expenditures were in addition to $24,251 advanced during the year to the Traction Light & Power Company and expended for light and power equipment for the company. They were also in addition to $53,446 paid out on account of sinking funds.

The total expenditures caused by the 1913 flood chargeable to maintenance were $77,902 up to Dec. 31, 1915. Of this total $41,400 was included in operating expenses of

1913 and 1914, and $21,500 in operating expenses of 1915, leaving the net amount still in suspense $15,002. To this amount it is said several thousand dollars will be added for work yet to be done.

The Oct. 1, 1914, first preferred dividend was passed, and no dividend on this stock has since been paid. No dividends have been declared or paid to date on the second preferred stock. Dividends on these stocks are cumulative. Miscellaneous statistics of the company for 1915 are shown in the following table:

Passengers carried, interurban lines..................	9,037,691
Passengers carried, city lines........................	7,441,844
Total passengers carried..............................	16,479,535
Freight handled (tons)................................	83,841
Express handled (exclusive of Wells, Fargo & Company express) (tons)..............................	6,786
Mileage of cars, interurban lines.....................	6,384,751
Mileage of cars, city lines...........................	1,656,015
Total mileage of cars.................................	8,040,766
Coal consumed at all plants (tons)....................	84,236
Power generated (a.c.) at all plants (kw.-hr.)........	43,975,980
Power generated (d.c.) at all plants (kw-hr.).........	27,043,667

RAILWAY EARNINGS FOR NOVEMBER AND DECEMBER

The information bureau of the American Electric Railway Association has just made public the figures for October and November, as well as those for the last quarter of 1915. A comparison of these figures with the corresponding months of 1914 made by the bureau shows that business improved but slightly during that period, the increase in operating revenues being more than counterbalanced by the increase in operating expenses. This applied to the companies reporting taxes as well as to those not reporting taxes. Those reporting taxes showed large increases in taxes paid. The number of companies reporting for the quarter were 176 and had operating revenues during that period of $62,496,730.

The classification followed is as follows: Eastern district, Mississippi River and north of the Ohio River; Southern district, south of the Ohio River and east of the Mississippi River; Western district, west of the Mississippi River.

An exact comparison of the figures in the accompanying table and those published on page 750 of the issue of April 15 is not possible because the companies are not in all cases the same. Those whose figures are quoted in the accompanying table are larger in number than those quoted last week, but, based on the figures for the final quarter, have less aggregate operating revenues.

FORECLOSURE ACTION AUTHORIZED AT SYRACUSE

Judge also Sanctions Acquisition of Monroe County Line—Committee Formed for Syracuse, Lake Shore & Northern Bondholders

Justice Andrews at Syracuse, N. Y., on April 15, authorized the Equitable Trust Company, New York, N. Y., to bring foreclosure action under the mortgage issued to secure the bonds of the Empire United Railways, Inc. The justice stated that he desired it to be understood that no allowance would be made by the court for any foreclosure expenses unless the proceedings turn out to be advantageous to the general purpose of the receivership.

On the same day the announcement was made of the formation of the Syracuse, Lake Shore & Northern bondholders' committee. The Syracuse, Lake Shore & Northern committee, organized by officers representing the Syracuse Trust Company, is composed of James M. Gilbert, treasurer of the Syracuse Trust Company, chairman; Fred W. Zoller, president of the Union Trust Company, Rochester; Richard B. Young, manager of the New York office of E. H. Rollins & Company; Douglas E. Petit, treasurer of the Onondaga County Savings Bank, and H. M. Verrill, Portland, Me., representing a number of savings banks in Maine, where it is understood some $600,000 of the bonds were sold. Jerome L. Cheney is attorney for the committee and Harral S. Tenney, secretary. This committee does not represent the Auburn & Northern bondholders, and it is stated that probably no such committee would be appointed, as very few, if any, of the Auburn & Northern bonds are in the hands of the public, having been retained by the syndicate that constructed the road. What steps the Syracuse, Lake Shore & Northern committee will take with reference to the mortgage of that company will be determined later. As matters stand now, there has been no default. Justice Andrews, however, some time ago directed the receivers not to pay any interest due on May 1.

On April 15 Justice Andrews announced that he would enter an order permitting the use of funds of the Empire United Railways, Inc., now in the hands of the Columbia Trust Company, to be expended for the acquisition of the physical property of the Monroe County Electric Belt Line in the village of Fairport. A schedule of the present obligations of the Monroe County Belt Line shows that the

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR LATEST PERIODS IN 1915, WITH PERCENTAGE INCREASES OVER 1914

	November, 1915				December, 1915				Quarter, October-December, 1915			
	Companies Reporting Taxes		Companies Not Reporting Taxes		Companies Reporting Taxes		Companies Not Reporting Taxes		Companies Reporting Taxes		Companies Not Reporting Taxes	
Account	Amount	% Inc.	Amount	% Inc.	Amount	% Inc.	Amount	% Inc.	Amount	% Inc.	Amount	% Inc.
United States:												
Operating revenues...	21,802,181	6.91	20,914,406	7.34	11,309,214	4.13	10,385,031	4.55	32,575,309	4.47	29,821,421	5.25
Operating expenses.	11,867,628	5.71	11,328,694	5.77	6,774,754	7.41	6,207,086	7.54	19,745,194	10.23	18,268,157	11.94
Net operating revenue	9,934,553	8.38	9,585,712	9.25	4,534,460	d*0.42*	4,177,945	0.42	12,830,115	d*3.30*	11,553,264	d*3.84*
Taxes	....	...	1,280,329	4.61	....	...	683,126	6.21	....	...	1,926,570	8.62
Operating income.....	....	...	8,306,383	10.02	....	...	3,494,819	d*0.64*	....	...	9,626,694	d*6.00*
Operating ratio, 1914	55.05	...	54.97	...	58.07	...	58.11	...	57.44	...	57.59	...
per cent...... 1915	54.43	...	54.16	...	59.90	...	59.76	...	60.61	...	61.25	...
Number of companies represented	112	...	96	...	97	...	81	...	96	...	80	...
Eastern:												
Operating revenues...	16,171,880	6.99	15,840,430	7.12	6,344,374	8.71	6,005,429	8.87	18,736,422	7.32	17,706,529	7.71
Operating expenses.	9,063,967	6.62	8,870,443	6.69	3,691,356	9.38	3,489,974	9.71	12,042,874	16.95	11,451,275	17.84
Net operating revenue	7,107,913	7.46	6,969,987	7.67	2,653,018	7.79	2,515,455	7.74	6,693,548	d*6.52*	6,255,254	d*6.93*
Taxes	....	...	951,813	2.10	....	...	328,206	0.31	....	...	988,576	2.75
Operating income.....	....	...	6,018,174	8.61	....	...	2,187,249	8.95	....	...	5,266,678	d8.55
Operating ratio, 1914	50.23	...	56.22	...	57.82	...	57.67	...	58.98	...	59.11	...
per cent...... 1915	56.04	...	56.00	...	58.18	...	58.11	...	64.27	...	64.67	...
Number of companies represented	49	...	46	...	41	...	38	...	41	...	38	...
Southern:												
Operating revenues...	847,782	2.81	564,040	0.25	846,461	2.54	554,516	0.93	2,498,138	0.75	1,624,056	d*1.57*
Operating expenses.	489,569	d*4.02*	318,288	d8.84	476,202	d*2.71*	294,523	d9.62	1,434,420	d*4.27*	904,879	d*10.01*
Net operating revenue	358,213	13.88	245,752	15.12	370,259	10.18	259,993	16.31	1,063,718	8.40	719,177	12.20
Taxes	....	...	50,270	20.23	....	...	57,703	36.14	....	...	155,120	26.90
Operating income.....	....	...	195,482	13.88	....	...	202,290	11.67	....	...	564,057	8.75
Operating ratio, 1914	61.85	...	62.05	...	59.29	...	59.31	...	60.43	...	61.07	...
per cent...... 1915	57.74	...	56.43	...	56.25	...	53.11	...	57.41	...	55.72	...
Number of companies represented	22	...	16	...	21	...	15	...	21	...	15	...
Western:												
Operating revenues...	4,782,519	7.42	4,509,936	9.08	4,118,379	d*1.92*	3,825,086	d*1.09*	11,340,749	0.86	10,490,836	2.35
Operating expenses.	2,314,092	4.47	2,139,963	4.51	2,607,196	6.73	2,422,589	6.96	6,267,900	2.46	5,912,003	5.63
Net operating revenue	2,468,427	10.33	2,369,973	13.55	1,511,183	d*13.96*	1,402,497	d*12.47*	5,072,849	d*1.04*	4,578,833	d*1.59*
Taxes	....	...	278,246	11.35	....	...	297,217	8.64	....	...	782,874	13.57
Operating income.....	....	...	2,092,727	13.91	....	...	1,105,280	d*16.82*	....	...	3,795,959	d*4.23*
Operating ratio, 1914	40.74	...	49.52	...	58.17	...	58.56	...	54.41	...	54.60	...
per cent...... 1915	48.39	...	47.44	...	63.30	...	63.33	...	55.27	...	56.35	...
Number of companies represented	41	...	34	...	35	...	28	...	34	...	27	...

various notes total $50,000. Two of these notes, totaling $5,000, are held by the Empire United Railways, Inc. This leaves $45,000 and interest, amounting to some $785, outstanding. This the receivers are now permitted to pay. Previous to the receivership it had been arranged for the Columbia Trust Company, as trustee under the Rochester, Syracuse & Eastern Railway mortgage, to pay this obligation from the funds in its hands arising from the sale of the Lyons power plant. Mr. Hotchkiss stated on April 15 that $46,453 was in the hands of the trustee from this fund.

BAY STATE ISSUES APPROVED

Commission Sets Forth Its Limitations and Company's Responsibility in Matter of Deciding Upon New Security Issues

The Massachusetts Public Service Commission has approved an issue of 7357 shares of 6 per cent cumulative preferred stock of the Bay State Street Railway, Boston, Mass., at $100 a share, and, conditional on the issues of these new shares, issues of $400,000 of fifty-year 4 per cent bonds of the Boston & Northern Street Railway and $300,000 of like bonds of the Old Colony Street Railway. The proceeds will be used for the payment of floating indebtedness and the purchase of property. The commission has rescinded its approval made in August, 1915, of an issue of 12,819 first preferred shares at $112 per share, for the company was unable to obtain bids above $100 per share.

At public hearings on the proposed new issues the city solicitor of Lynn and others asserted that no new stock should be authorized at this time, when the commission is considering the petition of the company for a general increase in fares. It was said that if the outcome of the fare case should be favorable to the company, its preferred stock should sell at prices considerably above par and the issuing of such stock at par under present conditions would merely give the Massachusetts Electric Companies (owner of the Bay State common stock), or allied interests, an opportunity to reap large profits at the expense of the Bay State company. It was argued that the latter company is now carrying its floating indebtedness at low rates, that money on short time loans is very cheap and that therefore the issuance of permanent securities should be postponed. The company, however, asserted that it is now carrying a substantial load of floating indebtedness; that much additional indebtedness of this nature must soon be incurred in providing for the needs of the property; that the European war and financial conditions made the market for securities uncertain, and that the best judgment of the management and its financial advisers is that the issue of permanent securities ought not to be postponed longer than necessary. Moreover, in behalf of the holding company, a written statement was filed to the effect that any new preferred stock taken would be sold by it upon competitive bids, and any profit given to the Bay State company.

In its decision the board holds that it has no authority to refuse to approve an issue on the ground that it could be made to better advantage at another time. Moreover, the statute leaves largely to the discretion of the company such a problem as the substitution of bonds in place of stock. No evidence appears upon which the commission can consistently disapprove the price now fixed by the stockholders, and the board has no reason to believe that the proposed block of preferred stock could now be sold in the open market at a price materially in excess of par. The management of the company is strongly of the opinion that the indebtedness which it now seeks to capitalize can be handled on the most advantageous terms in the way it has adopted, on the ground that an issue of both stock and bonds will open up a broader field of investment. The responsibility for this procedure rests with the company, for the commission holds that it cannot, even if it desired to do so, require the company to issue stock instead of bonds, or vice versa, or to issue a particular class of either. It is asserted, however, that if the directors should take any action at the expense of their company, they would do so at their peril and it would be the duty of the commission in any proceeding involving rates and service to prevent any injurious results to the public from such action.

REPORT OF GOTEBORG MUNICIPAL TRAMWAY

The traffic receipts of the Goteborg (Sweden) Tramway system, which consists of 37.9 miles of surface-line track entirely owned and operated by the municipality, totaled $703,800 for 1914. This sum includes $8,107 for freight, baggage, carrying mail, etc. The gross income totaled $738,156. Expenditures of $526,981 included such items as $231,080 for operating expenses, $16,612 for office expenses, $120,154 for electric energy, $71,672 for rolling stock, $47,068 for trackage, and $12,353 for carhouse and workshop expenses. The net profit amounted to $211,175. This was a decrease as compared to the preceding year, brought about by higher compensation to employees, allowances to employees mobilized for service in the army, and increased upkeep expenses.

The number of fares of the various kinds was 27,311,613 in 1914, as compared with 25,653,574 in 1913 and 10,629,969 in 1902. There were also sold, in 1914, 610 untransferable season tickets good for twelve months and 3094 good for six months at $20.10 and $10.72 respectively, and 456 tickets at $13.40 good only for some particular line.

The rolling stock consists of 119 motor cars, seventy-five trailers and sixteen snow plows, repair cars and cars with ladders. Of the motor cars, 111 are for passengers, five for freight and three are bogies. Of the cars without motors, sixty-one are for passengers and thirteen for freight. The car mileage for the year was 3,657,136 for motor cars, 39,273 for locomotive cars for freight transport, and 870,675 for trail cars, a total of 4,567,084 car-miles. The number of employees in 1914 was 909 as compared to 807 in 1913.

Albany (Ga.) Transit Company.—The Albany Transit Company has certified to the Secretary of State an increase in the capital stock of the company from $52,000 to $75,000.

Alton & Jacksonville Railway, Alton, Ill.—A mortgage for $2,000,000 by the Alton & Jacksonville Railroad, the successor to the Alton, Jacksonville & Peoria Railway, to John J. Cummings, Chicago, and the American Trust Company, St. Louis, trustees, has been filed for record in Madison County, Illinois. According to the mortgage, the loan was authorized on March 20, but dates from July 1, 1915. The loan is to run until July 1, 1955, at 5 per cent interest.

Ardmore (Okla.) Electric Railway.—For the second time since the first of the year the Ardmore Electric Railway was sold recently at receiver's sale. John F. Easley, former secretary of the company, purchased the property for $4,450 and will offer it to the city at the price named, and if it is not operated as a municipal plant, the purchaser will dispose of the property as junk.

Auburn & Syracuse Electric Railroad, Syracuse, N. Y.—The New York Public Service Commission, Second District, has approved an issue of $437,500 of 6 per cent five-year gold notes of the Auburn & Syracuse Electric Railroad, under a trust agreement to the Trust & Deposit Company, Onondaga. The notes will be sold at not less than par and the proceeds used to pay $250,000 of notes matured on Feb. 1, 1916, and $115,000 due on Aug. 1, 1916; to retire car trust certificates which matured on Jan. 1, 1916, to the amount of $7,950; to pay accrued interest on first mortgage bonds due on April 1 and amounting to $36,500, and to apply $28,050 to accounts payable, which amounted to $45,000 on Jan. 31.

Cities Service Company, New York, N. Y.—G. S. Bevin of Ellis & Company, London, England, and Watson B. Robinson and E. H. Johnson, New York, have been elected directors of the Cities Service Company to succeed Mr. William B. Joyce, New York, and William J. Henderson and Lawrence MacFarland, Montreal.

Denver (Col.) Tramway Power Company.—Forty-eight thousand dollars of first mortgage 5 per cent improvement bonds of the Denver Tramway Power Company dated 1903 have been drawn for redemption at 105 and interest on May 8 at the office of the International Trust Company, Denver, Col.

Fresno (Cal.) Interurban Railway.—The Fresno Interurban Railway has filed with the California Railroad Commission a supplemental application for authority to issue $141,000 face value of its stock at $80, and $250,000 of its bonds at $90, to net a total of $337,400. The money is to be used to build the company's line to Sanger from Fresno, and for construction from Fresno to Clovis.

Georgia Railway & Electric Company, Atlanta, Ga.—The Georgia State Railroad Commission has authorized the Georgia Railway & Electric Company to issue $231,000 in bonds, for the purpose of defraying 75 per cent of the cost of improvements within the 7-mile limit, where the company operates in Atlanta, chargeable to capital account. The commission has also allowed the Georgia Railway & Power Company, which operates various power plants in north Georgia, but the bulk of whose property is located outside of the city of Atlanta, to issue $124,000 in bonds for the purpose of defraying 80 per cent of the cost of improvements, additions, etc., chargeable to capital account.

Kansas City Railway & Light Company, Kansas City, Mo.—A meeting of the stockholders of the Kansas City Railway & Light Company will be held on April 28 to take action on the carrying out of the plan of reorganization of the street railway and electric light and heating system at Kansas City, supplemental to the scheme of July 30, 1915, prepared by Federal Judge Hook. Specifically, stockholders are to determine the proportion in which the shares are to be divided into separate participation of the equities of the Kansas City Railways and the Kansas City Light & Power Company. They are to select trustees, and to indicate the character of the contract to be executed.

International Traction Company, Buffalo, N. Y.—A syndicate managed by Bertron, Griscom & Company, New York, N. Y., and Reilly, Brock & Company, Philadelphia, Pa., has sold at prices varying with maturities from a 4¼ per cent to a 6 per cent basis $1,050,000 of serial 6 per cent secured gold notes of the International Traction Company dated April 1, 1916, and due April 1, 1917 to 1926. The proceeds of the notes will be used to retire the floating debt of the company, to pay the accumulated dividends on the $582,100 of 4 per cent preferred stock yet outstanding and for working capital. The notes are secured by the deposit of $1,940,000 of 4 per cent collateral trust bonds and mature $100,000 a year on April 1 from 1917 to 1925 and $150,000 April 1, 1926.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The Youngstown & Niles Railway has asked permission of the Ohio Public Utilities Commission to issue $100,500 of common stock with which to complete its road from Youngstown to Warren through its preliminary stages. The company has spent about $60,000 already on the right-of-way and surveys and $40,000 more is needed to complete the work. It has so far borrowed funds from the Mahoning & Shenango Railway & Light Company.

Monmouth County Electric Company, Red Bank, N. J.—On application made to the United States District Court at Trenton, N. J., by R. M. Porter, Philadelphia, the Monmouth County Electric Company was placed in the hands of Charles F. Sexton, Long Branch, and William G. Bokler, Red Bank, as receivers on April 20. The court has issued an order directing the company to show cause on May 8 why the receivers should not be continued permanently. The financial difficulties of the company are attributed largely to the competition of the jitneys.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.—The directors of the Newport News & Hampton Railway, Gas & Electric Company have declared an initial dividend of 3 per cent on the common stock, payable on July 1 to holders of record of that date.

Pittsburgh, (Pa.) Railways.—A bill in equity was filed in the United States District Court at Pittsburgh on April 15 by Charles E. Estlack, Woodbury, N. J., asking that a receiver be appointed by the court to investigate transactions involving the stock of the United Traction Company. It is understood that the contention of the plaintiff is that under the lease by which the United Traction Company's lines are operated by the Pittsburgh Railways, a dividend of 5 per cent on $3,000,000 of preferred stock was to have been paid annually to the holders of this stock. It is said that the payment of this dividend was discontinued on the ground that expenditures by the Pittsburgh Railways for maintenance of United Traction Company property made the payment of the dividend impossible.

Scioto Valley Traction Company, Columbus, Ohio.—A hearing on the application of the Scioto Valley Traction Company to sell $200,000 of its preferred stock in order to purchase a similar amount of stock in the Columbus Depot Company was heard by the Public Utilities Commission on April 14. E. R. Sharp, vice-president and treasurer of the company, said that $800,000 would be spent on the project.

Seattle (Wash.) Municipal Railway.—A. L. Valentine, superintendent of public utilities, in a report to the City Council, states that Divisions "A" and "C" of the Seattle Municipal Railway were operated during March at a loss of $2,951. Division "A" was operated at a loss of $427, to which is added an interest charge of $1,593. The Lake Burien line, Division "C," lost $930. The two lines will have been in operation two years on June 1, 1916, and the loss has been approximately $3,000 a month, or $72,000 for the two years. This deficit is cared for annually in the general fund of the city.

Union Railway, Gas & Electric Company, Rockford, Ill.—E. W. Clark & Company, Philadelphia, Pa., and Hodenpyl, Hardy & Company, New York, N. Y., are offering for subscription at 98½, yielding 5.5 per cent, $3,000,000 of Union Railway, Gas & Electric Company three-year 5 per cent gold notes, dated April 1, 1916, and due April 1, 1919, with interest payable on April 1 and Oct. 1. The notes are redeemable at 101½ and interest on Oct. 1, 1916, 101 and interest on April or Oct. 1, 1917, and 100½ and interest on April 1 or Oct. 1, 1918. The Bankers Trust Company, New York, is trustee. The present issue of $3,000,000 of notes is secured by a pledge of $4,000,000 of bonds of the Union Railway, Gas & Electric Company and underlying companies. Additional notes can be issued only to the extent of 75 per cent of the par value of bonds to be pledged. The notes are followed by $2,500,000 of 6 per cent cumulative preferred stock and $6,000,000 of common stock, practically all of which is owned by the Commonwealth Power, Railway & Light Company.

United Railways & Electric Company, Baltimore, Md.—At the annual meeting of the United Railways & Electric Company, on April 12, C. E. F. Clark was elected a director to fill the vacancy caused by the resignation of F. A. Furst.

DIVIDENDS DECLARED

Cape Breton Electric Company, Ltd., Cape Breton, N. S., 3 per cent, preferred; 1½ per cent, common.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1¼ per cent, preferred B; quarterly, 1¼ per cent, common.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., 1½ per cent, preferred; 1 per cent, common.

East St. Louis & Suburban Company, East St. Louis, Ill., quarterly, three-quarters of 1 per cent, preferred.

Havana Electric Railway, Light & Power Company, Havana, Cuba, 3 per cent, preferred; 3 per cent, common.

Jacksonville (Fla.) Traction Company, quarterly, 75 cents, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE ELECTRIC RAILWAY, SANFORD, ME.					
1m., Mar., '16	$23,473	*$22,283	$1,190	......	......
1 " " '15	24,780	*20,871	3,909	......	......
BROOKLYN (N. Y.) RAPID TRANSIT COMPANY					
3m., Mar., '16	$6,557,960	*$4,428,157	$2,129,802	$1,401,223	‡$830,914
3 " " '15	6,048,115	*4,069,886	1,978,237	1,170,146	‡913,878
9 " " '16	20,606,405	*13,000,486	7,605,918	3,772,990	‡4,172,448
9 " " '15	19,655,875	*12,451,748	7,204,136	3,520,739	‡4,010,871
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., Mar., '16	$2,255,672	$1,254,493	$1,001,179	$816,555	$184,624
1 " " '15	2,027,910	1,182,265	845,645	812,925	32,720
9 " " '16	18,862,731	10,565,708	8,297,023	7,345,864	951,159
9 " " '15	17,805,207	10,345,667	7,459,540	7,285,439	174,101
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO					
1m., Mar., '16	$330,046	*$195,084	$134,962	$67,862	‡$67,395
1 " " '15	242,236	158,298	83,938	55,244	‡28,697
3 " " '16	958,821	556,478	402,343	201,365	‡201,920
3 " " '15	724,837	459,348	265,489	165,888	‡99,867
WEST PENN. TRACTION COMPANY, PITTSBURGH, PA.					
1m., Feb., '16	$471,176	*$229,697	$241,479	$158,266	$83,213
2 " " '16	949,079	*471,350	477,729	316,882	160,847

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*Includes taxes. ‡Includes non-operating income.

Traffic and Transportation

DISCRIMINATORY FARES ELIMINATED IN INDIANA

Commission Order Entered Directing Substitution of Copper-Zone System for Low Fares in Franchises

The Public Service Commission of Indiana has issued an order which will eliminate the low passenger rates imposed by franchise conditions between such cities as Marion, Gas City, Jonesboro, Fairmount and Summitville and provide for the installation of the copper-zone fare system, which is at the rate of 2 cents a mile. The order is in a corollary proceeding to that in which the company was granted authority to establish the copper-zone rate system on its lines. Members of the commission say that the company will have no option in these particular instances, since the present discriminations in passenger fares are ruled out automatically by the utility law.

In similar instances, however, where no discriminations appear, the commissioners say, the electric railways involved might voluntarily keep the contract rates at former levels, if they so desired. In the Grant County cases, however, it is different, because the commission has determined that discriminations exist there.

The increase in rates will, in some instances, be more than 100 per cent. Where a fare of 5 cents formerly was charged between Marion and the Gas City junction the fare will be increased to 13 cents, and the fare from Marion to Fairmount, now 10 cents, will be increased to 22 cents, while the fare from Marion to Summitville, under the new order will be 33 cents.

Some time ago, when the commission granted authority to the Union Traction Company to install the copper-zone system of fares, officials of the company brought up the question of the franchise contracts in Grant County, and the commission ordered that a separate petition be filed, asking for a ruling on the points involved. This petition was filed and a formal ruling is to be made. Commissioner John F. McClure is having it prepared.

Commissioner James L. Clark stated the position of the commission in the questions involved as follows:

"The law itself (public utility law) makes discriminations unlawful and puts on this commission the burden of removing those discriminations of rates among all utilities in this State. These rates (Grant County franchise rates) being discriminatory, and our attention having been called to them, the Union Traction Company has been ordered to cease giving these rates. The fact that, in granting a franchise, some municipality has fixed a rate through the country to another municipality, we have not considered as interfering with the right of the State to declare that rate void, as discriminatory, for the reason that the legislature never conferred on any municipality the power to fix rates outside of its own corporate boundary. As to rates fixed by the county commissioners in granting a franchise, we conclude that the Legislature never, at any time, conferred power on them to fix a rate in any franchise that would be contractual and, therefore, protected by the constitution, when the State saw fit to fix a different rate."

Commissioner Clark stated that a similar question had arisen in Wayne County, Indiana, in which the utility involved was the Terre Haute, Indianapolis & Eastern Traction Company and that a similar order had been entered by the commission. In this case the matter was taken to court, and in the answer filed by the company it set out the powers and authority of the Public Service Commission, which had been received under the public utility act, and which were handed down to it by the Railroad Commission of Indiana, it being shown that the commission had full authority to establish uniform rates of fare throughout the State of Indiana. The judge before whom the hearing was held confirmed the answer filed by the company, and no further action has since been taken by the county.

SHUTTLE LINE OPERATION DISCUSSED

Brief reference was made in the ELECTRIC RAILWAY JOURNAL of April 8, page 715, to an order of the Massachusetts Public Service Commission requiring the Boston Elevated Railway to restore through service in the East Boston tunnel to and from Jeffries Point. In view of the bearing the board's comments have upon the general relation of shuttle and main-line service, a brief résumé of the decision is given below.

The company formerly operated a line of cars on a fifteen-minute headway during normal hours and a ten-minute headway during rush hours from Jeffries Point, East Boston, a manufacturing and shipping district, to Scollay Square via the East Boston tunnel. Following the completion of the East Boston tunnel extension to Bowdoin Square, the company rearranged the operating schedule by running a shuttle line between Jeffries Point and the East Boston entrance of the tunnel, a distance of about two-thirds of a mile, and by established free transfer privileges at the latter point to and from cars operated through the tunnel. This change was confined to normal hours, the through service being retained during rush hours on the former schedule. The petitioners claimed that this rearrangement of service had resulted in serious inconvenience to patrons of the line and requested the restoration of the former through service.

In its decision the commission states that, of necessity, many lines must be operated as shuttle or feeder lines connecting with the main arteries of travel. But the policy of confining through service to main trunk lines, the board holds, does not represent any inflexible principle which may be blindly followed without regard to the conditions of the particular case involved. Even if the general policy is sound the rule of reason must be used in its application. Where there are convenient facilities for transfer and where a quicker and more frequent service is provided, passengers are compensated for the inconvenience of transfer. But in this case a short line about 2 miles long was broken up into two fragments, the frequency of service was not increased, and owing to the delays from transferring the running time between Boston and Jeffries Point was considerably increased. Moreover it had been shown that the line could be operated as a through line on a paying basis and without interference with the service on other lines, and that if the old plan was followed and a more frequent service was furnished on the shuttle line, the cost of operating the additional car would practically offset any saving made by the company through the discontinuance of the through service. Through service was ordered restored on April 8.

BAY STATE FARE HEARINGS RESUMED

Hearings before the Massachusetts Public Service Commission were resumed on April 17 at Boston in the Bay State Street Railway fare case. The full board was in attendance. Cross-examination of R. M. Feustel, valuation expert of the Bay State company, occupied the sessions, and it is expected that an extended inquiry will be directed into the methods employed in obtaining the investment cost of the property, as previously outlined in this paper. Arthur G. Wadleigh, city solicitor of Lynn, Mass., acted as spokesman for the municipal counsel opposing the fare increase. Mr. Feustel said that by and large the records of the Bay State company were of first-order assistance in the investment cost determination, and that while judgment was used in utilizing such records, the final results represented a close approximation to the actual cost of the property. The witness stated that promotion costs included rough surveys, the cost of efforts to interest financial men, including salaries and expenses of persons thus employed, and cost of options. Other elements to be considered in the way of additional cost of development were deficits of early years, super-normal operating expenses and depreciation due to experiments necessary in getting a new business into working order. Mr. Feustel said that the total cost of the work done for the Bay State company in connection with the valuation was about $120,000. The physical valuation cost approximately $60,000. The hearings were adjourned on April 18 until April 21 owing to an intervening holiday and a legislative committee hearing.

TRACTION CONTEST ANNOUNCED IN SEDALIA

The efforts of Harry D. Frueauff, general manager of the City Light & Traction Company, Sedalia, Mo., operated by Henry L. Doherty & Company, to stimulate the company's railway business have been referred to previously in the ELECTRIC RAILWAY JOURNAL. Announcement is now made that a new idea is to be put into effect shortly, namely, giving the public prizes for guesses on the company's traction revenue based on past and present performances.

The purpose of the contest is to convince the residents of Sedalia that their welfare, as well as that of the company's, is best served by using the street cars at all times. In previous advertising campaigns Mr. Frueauff demonstrated the necessity of additional patronage to maintain and improve the service according to Sedalia ideals. The company will, prior to the starting of the contest, present figures in the newspapers of the revenue and traffic handled for this year and analogous periods of 1915, so as to give all guessers data upon which to base their estimates. Days upon which circuses or other entertainments swell the receipts will be set forth, and announcements will be made when similar occasions may affect the revenues during the guessing period. Prizes will be awarded to those whose estimates most nearly approach the actual returns.

CHICAGO ELEVATED REDUCES EMPLOYEES' ACCIDENTS A THIRD IN ONE YEAR

A comparative statement of accidents to the employees of the Elevated Railroads of Chicago for 1913, 1914 and 1915 shows that a 33 1/3 per cent decrease in accidents of this class occurred during 1915. The following table, taken from the company's April *Safety Bulletin*, shows the number of accidents to employees by departments and by months, for the year 1915:

	Transportation Department	Shop Department	Road Department	Electrical Department	All Departments
January	52	22	11	2	87
February	28	11	8	4	51
March	39	7	3	4	53
April	41	14	8	3	66
May	40	16	12	4	72
June	24	14	7	0	45
July	16	24	6	4	50
August	33	9	17	0	59
September	35	14	17	3	69
October	32	19	20	0	71
November	49	11	17	0	77
December	42	21	16	2	81
Total, 1915	431	182	142	26	781
Total, 1914	546	197	351	72	1,166
Total, 1913	551	203	323	79	1,156

This reduction in accidents to employees is attributed to the company's safety campaign which was conducted more vigorously during 1915 than in years previous. It is also interesting to note that the figures for January and February of 1916 show a marked improvement over the same months for 1915.

THE JITNEY AT SEA WITH ITS BINNACLE LIGHT OUT

Electrogram, a weekly bulletin issued by the Puget Sound Traction, Light & Power Company, Seattle, Wash., printed the following recently:

"In Los Angeles an electric car met a jitney bus with disastrous results, and among the passengers who were called upon to give testimony was a 'jackie' from the monitor *Cheyenne*. His letter to the claim agent, as printed in the Los Angeles *Herald*, follows:

"'I was standing on the starboard fo'castle of the car when the gasoline cutter hove in sight off our port bow. We were making about fifteen knots, and the cutter was coming about the same along another channel. It was clear weather and not much ground swell.

"'Our chief engineer blew his siren and reversed his propeller, but he couldn't heave her to in time to keep from ramming her. There wasn't even time to get out the life preservers or sound the emergency call. We smashed in a couple of the little craft's compartments. Her captain stuck to his post. The jitney went down like a submarine.

"'I think the cause of the wreck was that the jitney's binnacle light was out.'"

Information for Passengers.—The Cincinnati (Ohio) Traction Company will issue a booklet containing a list of the transfer points and other information useful to passengers.

Suggestions Wanted from Employees.—The Kansas City (Mo.) Railways is asking for suggestions from its employees for the betterment of the service. The company has announced that "the best one will be picked out, and for every available one $5 will be paid."

Hoboken Fare Hearing Postponed.—The hearing before the Board of Public Utility Commissioners of New Jersey on the application of the city of Hoboken for an order to require the Public Service Railway to operate there at a 3-cent fare was postponed from April 4, 5 and 6 to April 19 and 20.

Suggested Use for Janitors Approved.—The City Council of Louisville, Ky., has passed an ordinance which will admit of the janitors of schools being authorized to serve as traffic police officers under certain conditions. The board of education has taken the matter up, and it is said to be probable that the janitors of at least some of the schools, where conditions of traffic present dangerous aspects, will be empowered to regulate traffic during certain hours of the day.

Commission Cannot Review Rates Arranged Between Companies Themselves.—The Ohio Public Utilities Commission on April 12 dismissed the complaint of the Dayton & Troy Railway against the Western Ohio Railway filed in an effort to secure a new division of receipts on through freight business over the two lines. The commission held that because it had never fixed freight rates for the two roads it could not review the rates arranged between them. The commission said that the remedy was for the complaining road to ask for the approval of a set of rates over the two roads.

More Fare Collectors in Kansas City.—In an effort to facilitate the loading of cars in the rush hours of the evening, the Kansas City (Mo.) Railways experimented in the Tenth and Main Streets district recently by stationing extra fare takers at the rear end of the cars as well as at the front end. This made three men receiving fares at each car and resulted in a much quicker loading. The count showed that 180 cars were loaded within the hour in the Tenth Street loop section, as compared with about 115 previously. It is said that it is probable the additional fare takers will be placed at all the congested points during the evening rush hours.

Waterloo One-Man Car Case Pending in Court.—The court has taken no action beyond that of issuing a temporary order to prevent the operation of the ordinance passed by the City Council of Waterloo, Iowa, ordering the Waterloo, Cedar Falls & Northern Railway to cease the operation of one-man cars. Since the original ordinance was passed a city election has been held, and most of the Aldermen who were responsible for the passage of the measure were defeated for re-election. With these and other changes in the city administration the situation appears more hopeful for the railway. In the meantime, however, the company is collecting more evidence on one-man car operation.

Chicago Traffic to Be Checked.—The Chicago Traction & Subway Commission will check the origin and destination of all passengers on the surface and elevated lines. The observers who will do the checking will be uniformed and will hand checking slips, punched to indicate point of origin, to each boarding passenger. These slips will be taken up when the passengers leave the car, and again punched to indicate the destination. The commission has explained the plan to the public through the press and requested its co-operation. More than 4,050,000 trips are made daily on the Chicago surface and elevated lines. Of these 2,310,000 are original trips and 1,740,000 are transfer trips. Checks on the elevated lines will be made by observers at the 206 stations, of which twelve are transfer points.

Steam Railroad Abandons Twin Tickets.—The Hocking Valley Railroad has abandoned the use of so-called twin tickets between Columbus and Marion, Ohio. The tickets have been used for several years in competition with the Columbus, Delaware & Marion Railway, and between Columbus and Lancaster in competition with the Scioto Valley Traction line. These tickets were sold in twos at a lower rate than the regular fare, and were good in either direction. The passengers, however, formed the habit of buying the tickets and then leaving the train and buying tickets at Marion and Lancaster for the remainder of their trips. This cut into the receipts of the company very materially, and for some time it has been endeavoring to stop all but local passengers from using the tickets. It was finally decided to withdraw the tickets entirely and charge the full fare of 2 cents a mile from all stations.

Service Only Where Traffic Warrants.—In the matter of the complaint of John E. Judge of Plattsburgh against the Plattsburgh (N. Y.) Traction Company as to non-operation to Bluff Point during the winter months the Public Service Commission for the Second District decided recently that a street railway will not be required to extend the operation of its cars during the winter months for the purpose of developing real estate and improving the value thereof when there is not sufficient traffic to warrant the operation of cars over that portion of its lines where the service is desired; that the operation of street cars thirty minutes apart in a small city for the purpose of carrying local traffic, where no other street car service is given, would be inconvenient to the public and unremunerative to the company; and that the duty of the commission is to require service where the same is necessary for the convenience of the public and the traffic warrants it, but not otherwise.

Protest Against Caldwell Fares.—H. F. Dicke, manager of the Idaho Traction Company, Boise, Idaho, in a communication to the Mayor and the City Council of Caldwell, states that his company has discontinued collecting more than a 5-cent fare within the city limits. The City Council passed a motion recently which had for its intention the revocation of the company's franchise unless the fare was reduced to 5 cents. Heretofore the company has charged passengers riding from College Hill 10 cents, while others who proceeded a few hundred yards further to Rice Station were required to pay 15 cents. Both of these stations are within the city limits. The company's franchise stipulates that not more than a 5-cent fare shall be charged within city limits. Mr. Dicke explained in his communication that it was through a mistake that fares of 10 cents and 15 cents were collected. He pointed out, however, that observance of the franchise agreement worked a hardship on the company, as the mileage between city limits was unusually long.

D. U. R. Submits Rerouteing Plan to Authorities.—A rerouteing plan, indorsed by the Street Railway Commission and following largely the suggestion of the engineers employed by this commission to make a traffic survey, has been submitted by the Detroit (Mich.) United Railway to the public utilities committee of the Detroit City Council. In a series of articles in *Electric Railway Service*, the railway company's publication, beginning with the issue of April 14, the company is placing this general plan of rerouteing before the public. In connection with the plan the following advantages of rerouteing were submitted: "It will permit of the use of more cars. It will result in a greater regularity of service. It will shorten the running time between terminals with a still greater reduction if the cars are operated on the skip-stop system. It will permit of through service between east and west across Woodward Avenue (Detroit's principal traffic artery) being maintained through looping a portion of the car movements on either side of Woodward Avenue, at points convenient to that thoroughfare."

Safety Board Appointed on Interurban Line.—A safety board has been appointed on the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., whose duties shall be the promotion of safety first in all departments. This safety board is composed of the heads of departments and one member from each branch of the service. The heads of departments will act as a permanent board. The members who are appointed from the various departments will serve for a period of six months, at which time they will be retired and will be succeeded by other employees from the same departments. The board organized on April 18. Hereafter meetings will be held on the second Tuesday of every month. The board will consider and investigate all matters brought to its attention which relate to the question of safety on the road. Matters requiring investigation will be handled by committees appointed by the general manager, who will act as chairman of the board. The notice announcing the appointment of the board was published in all the local papers in the territory in which the company operates, with the advice that the company will be glad to receive suggestions from the traveling public.

President Kealy Discusses Fares.—P. J. Kealy, president of the Kansas City (Mo.) Railways, in a recent address to the Real Estate Board of that city, told of details of routeing cars, and in general of plans for the extension of lines. Mr. Kealy referred to the partnership of the city in the street railway, and said that the city might eventually see the necessity of higher fares in outlying districts, and that the Public Service Commission might step in and say that such higher fares could be charged, if the prices of materials and labor continued to rise. Mr. Kealy pointed out that so long as the number of riders in the downtown district more than kept pace with the increase in the long-haul riders, the profit on the short haul would care for the deficit on the long haul. Mr. Kealy thought that the large class that desires 5-cent fares would not live more than forty minutes from its work. The intimation that the Public Service Commission might allow the city to increase fares in distant districts within the city limits, although the franchise provides for 5-cent fares in that area, was used to illustrate the difficulty of granting 5-cent fares on long hauls from outside the city limits as they are at present fixed.

Campaign by Employees Against Motor Vehicle.—The members of the Pacific Electric Railway Agents' Association, composed of employees of the Pacific Electric Railway, Los Angeles, Cal., have passed resolutions to the effect that members notify the superintendent of their respective divisions of any and all accidents to passengers or damage to freight when such accident or damage is chargeable to motor truck or jitney bus transportation; that members learning of any passenger or freight traffic that possibly may be secured in competition with jitney buses or motor trucks notify the traffic manager and the superintendent of the company; that members notify the superintendent when in their opinion changes in the schedules of trains in and out of their station will serve to secure passenger and freight traffic against jitney-bus and motor-truck competition; that members report to city and county officers any and all violations of city or county ordinances by autos, and that members of the association urge city and county officials to pass ordinances that will require motor trucks and buses to give regular service, charge uniform prices for transportation and pay to the city, county or State an amount equal to that paid by the Pacific Electric Railway, which contributes to the public funds 5¼ cents on each dollar of revenue received from the transportation of passengers and freight.

Hearing on Heating in Seattle.—At a recent hearing before the State Public Service Commission, held in Seattle, Wash., on application of the city of Seattle for an order directing the Puget Sound Traction, Light & Power Company to furnish heat in its cars during the winter months, thirteen witnesses, among them three health officials, furnished testimony. Among those who took the stand for the city were Dr. J. S. McBride, city health commissioner; T. T. Tuttle, State commissioner of health, and Dr. B. J. Lloyd, of the U. S. public health service. All three testified that the temperature in the cars should not fall below 40 deg. Fahr., or rise above 60 deg. Fahr. during the cold months. J. P. McCloy, car inspector in the city utilities department, said the cars on longer routes should be heated, but that heat was not required on the cable cars or other cars where passengers rode less than twenty-five minutes. On cross-examination Mr. McCloy said that the cars of Division "A" of the municipal line were unheated, but that the city would furnish heat if the Council would appropriate money for the purpose. He said that cars on the Lake Burien line, Division "C" of the municipal system, were heated. Heat is now furnished on some of the lines of the traction company. The city completed its case on April 10. The continuation of the hearing was set for April 17, when it was intended to hear the corporation.

Personal Mention

Mr. Forrest G. Fogg has resigned as division auditor of the Michigan Railway, Kalamazoo, Mich.

Mr. C. Dwight Baker, who has been general trainmaster of the Long Island Railroad, has been appointed superintendent of the company to succeed Mr. John B. Austin, Jr., resigned. Mr. Baker entered the employ of the company in 1891 as a clerk.

Mr. Garrow T. Geer, editor of the *B. R. T. Monthly*, has been appointed chief clerk of the bureau of public safety of the company, to succeed Mr. A. P. Gumaer, resigned. Mr. Gumaer had been chief clerk of the bureau of public safety since Oct. 1, 1915. He resigned to become advertising manager of *All Out-Doors Magazine.*

Mr. John B. Austin, Jr., for the last eleven years superintendent in charge of operations of the Long Island Railroad, has been elected vice-president and appointed general manager of the Gaston, Williams & Wigmore Steamship Corporation. Prior to his entering the services of the Long Island Railroad Mr. Austin was connected with the Pennsylvania Railroad.

Mr. James Lightbody, formerly on the staff of the Vancouver *Daily Province*, has been appointed publicity agent for the British Columbia Electric Railway, Vancouver, B. C., succeeding Mr. Bury I. Dasent, who resigned recently in order to return to Chicago to rejoin his wife, who is seriously ill. Mr. Lightbody was for three years a reporter on the Vancouver *Province*, and previously was on the staffs of Winnipeg newspapers.

Mr. Clyde B. Aitchison, chairman of the Oregon Public Service Commission, has accepted appointment as chief of the valuation department of the National Association of Railroad Commissioners at Washington, D. C. Mr. Aitchison has been a member of the Oregon commission since 1907. Previous to his appointment on the railroad commission he was, in 1905 and 1906, secretary of the Oregon Tax Commission, appointed to redraft the tax laws of the State.

Mr. William H. Dinsmore, who has succeeded Mr. James Hilton as traffic superintendent for the British Columbia Electric Railway, Vancouver, B. C., started with that company on Feb. 1, 1901, as a conductor. On Nov. 1, 1909, he was appointed inspector and since that time his rise with the company has been rapid. On Nov. 1, 1915, he was made chief inspector of the British Columbia Electric Railway and when Mr. Hilton resigned in March of this year Mr. Dinsmore became traffic superintendent.

Mr. Frank Julian Sprague, representative in the naval consulting board of the American Institute of Electrical Engineers, was invited to witness the 1916 battle maneuvers and exercises of the Atlantic fleet in Southern waters, and he is one of the few civilians, if not the only one, to whom that privilege has ever been granted by the Navy Department. In an article in the magazine supplement of the New York *Times* for April 16 Mr. Sprague, who is a graduate of Annapolis, for the first time since his return, told the story of his experiences with the greatest of all American fleets, and indicated what, in his opinion, should be done to make the fleet one of the most powerful offensive and defensive fighting organizations in the world.

Mr. B. T. Longino has been appointed superintendent of the Jacksonville (Fla.) Traction Company, succeeding Mr. W. E. Wood. Mr. Longino was graduated from the Georgia School of Technology in 1907, and following graduation spent one year in the Boston office of Stone & Webster. He was transferred to the Seattle (Wash.) Electric Company, where he spent about two years in the car shops and transportation department. From 1909 to 1913 he was assistant superintendent of the Tacoma Railway & Power Company, Tacoma, Wash. He left the street railway business and spent one year as cashier in the bank at College Park, Ga. Late in 1914 he accepted a position with the Jacksonville Traction Company in charge of the safety-first campaign, in which work he has since been engaged.

Mr. H. A. Genung, whose appointment as chief engineer of the St. Paul (Minn.) Southern Electric Railway was announced in the ELECTRIC RAILWAY JOURNAL of April 8, was born in Evansville, Ind., in 1863. He has had thirty years of experience in the construction of steam and electric railways. Previous to his appointment to the St. Paul Southern Electric Railway Mr. Genung was in charge of the building of the following railways as chief engineer: Indiana & Lake Michigan; Dallas, Cleburne & Southwestern; St. Louis, El Reno & Western; Vinita & Western; Apelousas, Gulf & Northwestern; Evansville & Rockport Electric; Fort Scott, Iola & Western. He also served as engineer of maintenance of way of the International & Great Northern Railway from Taylor to Laredo, Tex., in 1908.

Mr. Charles Ruff has been appointed master mechanic of the Lincoln (Neb.) Traction Company to succeed Mr. H. H. Lytle, resigned. Mr. Ruff has recently held important positions in steam railroad locomotive repair shops, but before that was engaged in electric railway work. He began his electric railway experience as general foreman of the mechanical department of the Twin City Rapid Transit Company, Minneapolis, Minn., and later was general foreman of shops of the Indianapolis Traction & Terminal Company; master mechanic of shops of the International Railway, Buffalo, N. Y.; master mechanic of the eastern division of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., and master mechanic of shops of the Indiana Union Traction Company at Anderson, Ind.

Mr. W. E. Wood, who has been connected with the Jacksonville (Fla.) Traction Company for a number of years in various capacities, and lastly as superintendent of the company, has been transferred to Houston, Tex., as general superintendent of the Houston Electric Company, succeeding Mr. R. T. Sullivan, whose appointment as manager of railways of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, was noted in the ELECTRIC RAILWAY JOURNAL of April 15. Both the Jacksonville and Houston properties are controlled by Stone & Webster. Mr. Wood was graduated from the Georgia School of Technology in 1907. He spent the year after graduation in the Boston office of the Stone & Webster Company and was then transferred to the Jacksonville Traction Company. He worked in all departments of the Jacksonville Traction Company as a student and in 1912 was made superintendent, holding that position up to the time of his transfer to Houston, Tex.

"OFFICIAL PUBLIC SERVICE REPORTS"

Publication was begun the first of this year on a new series of commission reports by the Law Publishing Company of New York. This company is associated with the Law Reporting Company, official reporters for the Interstate Commerce Commission, New York Public Service Commission of the First District, and the National Association of Railway Commissioners, and the reports are being published under the direction of the latter body, under a resolution adopted at its San Francisco meeting in 1915. The reports will include not only all decisions handed down by State or municipal public service, railway and corporation commissions, but also decisions handed down by State and federal courts reviewing or affecting commission decisions or relating to regulation of public utilities. Each decision has a syllabus, and each volume will contain a subject index and a syllabus digest. There will also be an annual digest and a legislative supplement, and the publishers expect to issue a supplementary digest of commission and court decisions handed down from 1907 to 1914 with references to the present edition.

The reports are issued in two forms, namely, as advance sheets, which are issued weekly, and as bound volumes. The former are furnished for $25 a year, and the bound volumes for $4.50 each. The number of volumes per year will vary, depending on the number of decisions published, but for the present there will probably be about ten. The Law Publishing Company is also planning to issue the decisions during 1915. These decisions will make nine volumes in addition to one volume of digests.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

FRANCHISES

***Elsinore, Cal.**—Charles DeLacour has asked the Board of Supervisors for a fifty-year franchise to construct an electric railway from Elsinore to San Diego, via Wildomar, Murrietta and Temecula.

Moline, Ill.—The Tri-City Railway Company of Illinois has asked the Council for a franchise to construct double tracks along Fourth Avenue, Moline.

New Orleans, La.—The Orleans-Kenner Electric Railway has asked the Council for a franchise to furnish electricity for lighting and power in Kenner.

St. Paul, Minn.—The City Council of St. Paul has adopted the ordinance requiring the Twin City Rapid Transit Company to construct extensions of its St. Clair-Hope Street line and East Seventh-Randolph Street line. The first line must be extended from Oxford Street to Snelling Avenue by Sept. 1, 1917. The second line must have a single-track extension from Snelling Avenue to Cleveland Avenue in operation by Aug. 1, 1916.

Utica, N. Y.—The New York State Railways has received a franchise from the Council to construct an extension on James Street from Elm Street to Neilson Street.

Sharon, Pa.—The Youngstown & Sharon Street Railway has received a franchise from the Council to construct an extension to Buhl Farm. The company is given the option of constructing the line over State Street from Stambaugh Avenue to Tenth Street, or on State Street to Case Avenue and thence northwardly on Case Avenue to the borough limits at Linden Street, and thence to the park.

Jackson, Tenn.—The City Commission is considering an amendment to the franchise of the Jackson Railway & Light Company which would enable the company to double-track its line on Main Street. There is some opposition on the ground that the street is not wide enough.

Spokane, Wash.—The Spokane Traction Company has asked the Council for a franchise to operate and maintain a line on Grand Boulevard from Thirty-third to Thirty-eighth Streets.

TRACK AND ROADWAY

Municipal Railways of San Francisco, San Francisco, Cal.—The construction of an extension across Golden Gate Park, according to revised plans submitted by the city engineer, has been agreed on by the public utilities committee of the Board of Supervisors. The plan provides that the extension shall begin at Tenth Avenue and Balboa Street, extending along Balboa Street to Twelfth Avenue, along Twelfth Avenue to Golden Gate Park. After crossing the park the line will extend along Fourteenth Avenue to Judah Street. The cost of the extension is estimated at $260,000.

Georgia Railway & Power Company, Atlanta, Ga.—This company will construct an extension from the present terminus of its Brookhaven line to Oglethorpe University, about 1 mile.

***Boise-Bruneau Railway, Boise, Idaho.**—This company plans to construct an electric railway from Boise to Bruneau. D. Miller, Kansas City, Mo., president, and B. F. Olden, Boise, treasurer.

***Wallace, Idaho.**—W. H. Herrick, Wallace, reports preliminary steps have been taken toward the construction of a 10-mile electric railway from the Oregon-Washington Railroad & Navigation Company's tracks to the Constitution Mine. Financial arrangements have been completed, and construction will be begun this spring.

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—This company contemplates the construction of an extension to its North Seminary Avenue line.

Springfield & Jacksonville Electric Railway, Springfield, Ill.—It is reported that construction will soon be begun on this company's proposed line from Springfield to Jacksonville, via Berlin. Plans insuring the completion of the line during 1917 have been completed. J. H. McFarlane, Springfield, is general manager of the J. H. McFarlane Company, organized in 1910 to construct the line. [Feb. 22, '13.]

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—The proposition of this company for the restoration of the Broadway Street line in Logansport, from Twenty-sixth Street to Spencer Park, has been approved by the Council of Logansport, and the track will be relaid at once. The track will be laid in a grass plot along the side of the street, and all poles to be used will be of concrete.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—Work has been begun by this company on the construction of an extension to its West Main Street line, Crawfordsville, about ½-mile west from its present terminus.

Tri-City Railway, Davenport, Iowa.—Work will be begun at once by this company on the construction of double tracks on Fifth Avenue, Moline, Ill.

Muscatine, North & South Railway, Muscatine, Iowa.—The stockholders of the Muscatine, North & South Railway have decided to reorganize the company and to equip the railroad for electrical operation. The road will be converted into an interurban line to operate under a traffic arrangement as a continuation of the Davenport & Muscatine Railway.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—The formal contract allowing this company the right to cross the old Kaw River bridge was signed on April 10 by the county commissioners and Karl Klemm, president of the company. The provisions of the contract are that the Kansas City, Kaw Valley & Western Railway is to remodel the bridge for its tracks at its own expense. When the new bridge is completed the company must cease to operate across the old structure and the piling must be removed.

Shelbyville & Frankfort Realty Company, Shelbyville, Ky.—A report from this company states that surveys have been completed and right-of-way obtained for its proposed line from Shelbyville to Frankfort, via Bridgeport, Grafenburg, Peytona and Clay Village, 19½ miles. Construction of the line will be begun some time during the early summer. Overhead trolley will be used. The power stations will be located at Shelbyville and Frankfort. J. W. Gudgel, Shelbyville, secretary. [April 15, '16.]

New Orleans Railway & Light Company, New Orleans, La.—This company has reconstructed its tracks on Prytania Street, from Louisiana Avenue to Robert Street, using 105-lb. rails. Creosoted wood block paving was also used.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—This company will repair its track between Brunswick and Bath, new ties and rails being used. The company plans to build a new bridge over the New Meadows, and will repair the Brunswick and Topsham bridge.

Winnipeg (Man.) Electric Railway.—The Board of Control has instructed the city solicitor to request this company to proceed at once with the extension of its line on Academy Road from west of Ash Street.

Boston, Mass.—Bids were opened by the Boston Transit Commission on April 11 for the construction of Section J, Dorchester Tunnel, in and near Dorchester Avenue and Boston Street, from about 80 ft. north of Dexter Street to about 30 ft. south of Ralston Street, South Boston. The contract was awarded to T. A. Gillespie, New York City, at $346,887. [March 25, '16.]

Bay State Street Railway, Boston, Mass.—This company will relocate its tracks from the side to the center of the street on Elliott Street from Cabot to McKay Street, Beverly.

Boston & Eastern Electric Railway, Boston, Mass.—Governor Samuel W. McCall has signed a bill granting the Boston & Eastern Electric Railway an extension of time of two years in which to construct its proposed line between Boston and Lynn, Danvers and Beverly (April 15, '16).

Boston (Mass.) Elevated Railway.—The city of Boston and the Boston Elevated Railway have asked the Public Service Commission for permission to reconstruct the Brookline Avenue bridge over the Boston & Albany Railroad so that cars may operate over it. On completion of the new bridge the Ipswich Street-Brookline Avenue line will be discontinued, and the cars will operate through Brookline Avenue across the bridge and through the Boylston Street subway.

***St. Joseph, Mich.**—Plans are being considered by M. W. Stock and associates to construct a line from St. Joseph to Michigan City.

Kansas City (Mo.) Railways.—Philip J. Kealy, president of the Kansas City Railways, has worked out a plan which provides for the development of the company's system up to 1930. It embraces the construction of 87.81 miles of new track in Kansas City, Mo., in addition to that agreed upon in the franchise and 30.69 miles in Kansas City, Kan., and Rosedale. In Kansas City, Mo., 8.25 miles will be abandoned and in Kansas 1.182. Before the adoption of the franchise there were 199.3 miles of track in Kansas City, Mo. The franchise called for 25 miles in extensions immediately, making a total of 224.3 miles. Adding the 87.81 miles to be built and subtracting the 8.25 miles to be abandoned, Kansas City will have 303.86 miles in 1930. Kansas City, Kan., now has 56.04 miles. In 1930 it will have 82.40 miles.

Brooklyn (N. Y.) Rapid Transit Company.—Construction work has been begun at Parkside Avenue, by the Intercontinental Construction Company on the four-tracking of the Brighton Beach line of this company. The cut will be widened from Church Avenue to Malbone Street to permit the operation of four tracks. The cost of widening this section will be about $1,000,000.

***Panama Traction Company, Jamestown, N. Y.**—Chapman & Graham, engineers, Jamestown, advise that location surveys will be begun this week for this company's proposed line from Youngsville, Pa., to Jamestown, N. Y., thence to Erie, Pa. R. L. Davis, Jamestown, vice-president and general manager.

New York, N. Y.—A contract will be let by Conners Brothers, 64 West Eighty-eighth Street, for 4 miles of overhead trolley work.

Manhattan & Queens Traction Corporation, New York, N. Y.—The Manhattan & Queens Traction Corporation's line will be extended from Jamaica to St. Albans by the fall. It is expected that the company's line from the Jamaica railroad station to Sutphin Road and Lambertville Avenue will be completed and in operation by May 20.

***Salem, Ohio.**—It is reported that a corporation is being organized to construct an interurban railway between Salem and Youngstown, via Canfield. John Goeppinger, Alliance, is interested.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Work will soon be begun by this company on the reconstruction of its tracks on Wilson Avenue and East Federal Street for about 2½ miles from the eastern city limits to the Diamond. Steel ties and concrete foundation will be used. The Stone & Webster Engineering Corporation has received the contract for the construction.

Youngstown & Niles Railway, Youngstown, Ohio.—This company has applied to the Public Utilities Commission of Ohio for permission to issue $100,500 common capital stock with which to complete its proposed line from Youngstown to Warren. J. P. Wilson, Youngstown, president. (Jan. 15, '16.)

***Baker, Ore.**—It is reported that capitalists of Spokane, Wash., and Lewiston, Idaho, contemplate the construction of an electric railway between Baker and Pine, 45 miles, and Baker and Eagle Valley, 75 miles. The initial construction proposed will be from Baker to Sparta, 40 miles. Alexander Allerdyce is interested.

Southern Oregon Traction Company, Medford, Ore.—It is reported that if the report of the city attorney and the Bar of Medford, regarding the legal status of the proposed bond issue for building an electric railway to the Blue Ledge mine, is favorable, the Council will call a special election to present the matter to the voters. Under the new arrangement, however, the city, instead of building the railroad from Jacksonville to Ruch, 15 miles, will buy the present Jacksonville line, from Medford to the county seat, and also the line operating in Medford, for $300,000. S. M. Bullis, president of the Southern Oregon Traction Company, in return has agreed to build an extension of the line from Jacksonville to Ruch, thence to the Blue Ledge mine. Mr. Bullis also promises to keep up the interest payments on the Jacksonville Railroad's mortgage of $57,000, and at the end of five years buy back the Jacksonville and Medford lines for $300,000. According to reports, the city, as a unit, is in favor of the scheme, provided legal obstacles can be removed.

Oregon Electric Railway, Portland, Ore.—C. O. Jenks, general manager of the Oregon Electric Railway, reports that construction will be begun immediately on stockyards to be built near Junction City.

***Phoenixville, Pa.**—Plans are being considered for the construction of an electric railway from Phoenixville to Norristown via Mont Clare, Oaks, Audubon and Jeffersonville. Thomas E. O'Connell, president of the Phoenixville-Valley Forge & Strafford Electric Railway, is interested.

Beaumont (Tex.) Traction Company.—Work has been begun by this company on the construction of an extension of its Sabine-Magnolia line to the Magnolia Petroleum Company's plant, about 4500 ft.

Intermountain Traction & Power Company, Tacoma, Wash.—This company, which was recently incorporated, reports that it proposes to do an industrial lighting and power business. No railway construction is contemplated in the immediate future. Alfred B. Iles, Valdez, Alaska, manager. [Jan. 15, '16.]

Monongahela Valley Traction Company, Fairmont, W. Va.—A report from this company states that contracts will be placed within the next few weeks for the construction of an extension between O'Neil and Wolf Summit, 2½ miles, and 1700 ft. on Limestone Creek.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—This company reports that contract will be let during the next six weeks for the construction of an extension of about 3000 ft. to its present line.

Wheeling (W. Va.) Traction Company.—A third-rail is being laid by this company between the Top Mill and Richland coal mine on the Panhandle division. This work is being done preliminary to operating the Benwood and North Wheeling cars through to Warwood.

SHOPS AND BUILDINGS

Massachusetts Northeastern Street Railway, Haverhill, Mass.—This company reports that it expects to build a brick carhouse at Merrimac, 100 ft. x 160 ft., the roof to be of mill construction.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—A report from this company states that it expects to build a car shed and extra station facilities.

POWER HOUSES AND SUBSTATIONS

New Orleans Railway & Light Company, New Orleans, La.—This company recently installed a new generator in its power plant and constructed an extension to house the equipment. The cost of the improvements was $450,000.

Morris County Traction Company, Morristown, N. J.—A report from this company states that it expects to purchase one 500-kw. rotary converter.

Burlington County Transit Company, Mount Holly, N. J.—This company has contracted to purchase energy from the Public Service Electric Company of New Jersey and will hold its equipment for generating power in reserve.

Brooklyn (N. Y.) Rapid Transit Company.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for a 30,000-kw., single-unit, turbo-generator set to be installed in its Williamsburg generating station. The turbine will operate at 1500 r.p.m. on steam at 200 lb. pressure and 115 deg. superheat and will exhaust into a 28.5 vacuum produced by a 40,000 sq. ft. Westinghouse surface condenser.

Manufactures and Supplies

HIGH PEAK IN RAILWAY MOTOR DEMAND

An enormous demand for railway motors has attended the great boom in electric car orders during the last several months. The increase in demand over the same period last year is readily shown by the fact that according to our records approximately 1500 electric cars equipped with motors have been ordered in the United States and Canada from the beginning of 1916 up to the present time, as compared with only about 300 motor cars, or only one-fifth as many, for the same period in 1915. In all large territorial divisions of the United States, excepting that of the Southern states, where a small decrease seems to have taken place, the market has widened and intensified tremendously. During the period above stated Western states ordered about ninety cars as compared with about twenty cars in 1915; Central states, about 410 as compared with about 140 last year, Eastern states about 650 as compared with about sixty and New England states about 310 as compared with about twenty-five. Thus the ratios of orders for the Eastern and New England states for the two periods were about 11 to 1 and 12 to 1 respectively. The increase in demand for motors is by no means confined to the railway field but is paralleled by the demand for industrial motors.

In describing an underlying cause for the unusual activity the following explanations find credence among the manufacturers: (1) Greater need for transportation in manufacturing centers, owing to the war industries which have been developed; (2) recovery from the general financial depression of the previous year, (3) the purchase of extra amounts of rolling stock to compensate for the period of retrenchment, (4) anticipation to some extent of future needs on account of fear of delayed deliveries.

Needless to state the conditions in the motor market also reflect this condition of increased demand, increased prices of raw material, and delayed deliveries to the motor manufacturers because of the war demand. The tardy shipments of raw material have in turn wrought procrastination on the deliveries of the finished motors. One manufacturer reports that shipments of smaller motors ranging from 30 to 70 hp. are still fair, being made within three to five months. Deliveries of such smaller motors are not greatly in arrears because the parts required for them are small and can be easily maintained in stock. Orders for larger motors for heavier electric traction, however, have been badly delayed and have taken from five to eight months to complete. In one plant this delay is occasioned partly by the difficulty in obtaining large quantities of such materials as copper bars for commutators from the copper companies, which are already overcrowded with war orders, and some of them are said to require about three months to make copper bar deliveries. Shipments for steel for armature shafts are also extremely sluggish. The delay in the case of the larger motors is also due to the trouble in obtaining additional machinery required for the manufacture of the larger sizes. Another motor manufacturing company's output is being retarded, not so much by the delay in obtaining raw material, as by the congestion caused by the piling up of castings in its own plant, later orders being forced to await their turn. However, efforts are being made by the manufacturer to anticipate the demand by placing orders for castings ahead of time so that prompter deliveries can be made.

The motor manufacturers find it difficult to predict with any degree of confidence what market conditions the future may develop. According to one opinion, the peak in motor orders has now been attained by the larger railway companies, many of which have already closed contracts for their year's requirements, although a strong buying movement is expected to continue among the smaller properties.

The demand for railway motors has been necessarily accompanied by a corresponding need for power station and substation equipment, required by the loads imposed by additional rolling-stock equipment. As in the case of railway motors, great difficulty is experienced in obtaining raw material and shipments are subject to extended delay. The larger units, such as turbo-generators of 10,000 kw. and over, are taking from twelve to eighteen months to deliver. Rotary converters are averaging about six to eight months, switchboard appartus, five to seven months.

Collections on sales are reported as satisfactory in general, payments being made promptly.

ROLLING STOCK

Oklahoma Railway, Oklahoma City, Okla., expects to purchase about three interurban cars.

Hutchinson (Kan.) Interurban Railway is reported as expecting to purchase additional cars.

New York (N. Y.) Railways have issued specifications for sixty-five new standard type storage-battery cars.

Monongahela Valley Traction Co., Fairmont, W. Va., has purchased for August delivery eight single-truck, all-steel cars.

Goldsboro (N. C.) Electric Railway has purchased two summer cars from the Electric Equipment Company. A 100-kw. motor generator set has also been purchased.

Cleveland (Ohio) Railway has applied to the City Council for permission to purchase during 1916 fifty more of the front-entrance, center-exit type motor cars for city service.

Boston (Mass.) Elevated Railway is in the market for fifty-two articulated center sections for use with 25-ft. car units. The design is substantially like previous similar equipments ordered.

Butte, Anaconda & Pacific Railway, Anaconda, Mont., has ordered six additional electric locomotives from the General Electric Company, the type being exactly similar to that described in previous issues of this paper.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va., has purchased one center-entrance, double-truck, combination car from the G. C. Kuhlman Car Company, to be equipped with Westinghouse 323-V four-motor equipment.

Bay State Street Railway, Boston, Mass., is in the market for ten baggage and express cars, similar to previous equipment, about 40 ft. over all, capacity 20 tons, equipped with four motors and multiple unit control and with steel underframes.

International Railway, Buffalo, N. Y., will award contracts shortly for twenty all-steel passenger coaches for the new Buffalo-Niagara Falls express line, delivery to be made in nine months. The cars will be 54 ft. over all and equipped with four 60-hp. motors. The car will weigh 60 000 to 65,000 lb. The side entrance will be 20 ft. from the motorman's cab. The seating capacity will be sixty.

Detroit (Mich.) United Railway has recently placed orders for a large amount of rolling stock equipment, listed below. Some of these orders were previously reported, but are mentioned herewith again in order to avoid confusion. These orders as listed are classified by manufacturers. The Niles Car & Manufacturing Company has received orders for eight 58 ft. 3½ in. single-end interurban cars for fast limited service, arranged to run in trains, seating capacity of fifty and equipped with four 100-hp. motors; two heavy motor cars for freight service, 50 ft. long and with a capacity of 25 tons, equipped with heavy motors to pull loaded freight trailers; three line cars for the power department, underframe of steel and wooden body; one motor car for track department construction work and snow-plow work, 48 ft. long, steel underframe with wooden cab, and equipped with M.C.B. radial drawbar. The G. C. Kuhlman Car Company has received orders for eight motor cars, 53 ft. 11 in. long, and eight trailers of the same length for Detroit-Pontiac suburban service. The motor car will seat fifty-four and the trailer will seat sixty. No smoking compartment will be placed in trailers. The bottom framing is of steel and the body of wood. From this manufacturing company has also been ordered fifty double-truck all-steel trail cars for Detroit city service similar to trailers purchased from the same company and now in operation. The Cincinnati Car Company has received an order for eight freight trail cars, 50 ft. long, capacity 25 tons. The American Car & Foundry Company will build thirty all-steel flat cars, 40 ft. long and equipped with M.C.B. radial couplers on each end and trucks of standard steam road type. The Differential Car Company, Nashville, Tenn., has received an order for eight electrically operated dump cars for track construction, equipped with M.C.B. radial couplers at each end.

TRADE NOTES

Elliott Switch and Frog Company, East St. Louis, Ill., has opened a Western sales and engineering office in Room 516, Central Building, Los Angeles, Cal., where the company is represented by H. W. Renick.

Perry Ventilator Corporation, New Bedford, Mass., has received orders to equip with ventilators the 150 new cars now being built by the St. Louis Car Company for the Pittsburgh (Pa.) Railways.

Holden & White, Chicago, Ill., have been made agents for the Miller trolley shoe, manufactured by the United Utilities Company, Boston., Mass., for Indiana, Illinois, Iowa, Wisconsin and Michigan.

F. J. Petura, purchasing engineer of Henry L. Doherty & Company, New York, is one of the committee appointed by the Merchants Association of New York, which is inaugurating a campaign for additonal members.

Woodman Manufacturing & Supply Company, Boston, Mass., manufacturer of ticket punches, speed indicators, seals, wires and presses, badges, buttons and car pushers, has moved its offices and factory from 63 Oliver Street to larger quarters at 82 Sudbury Street.

Roller-Smith Company, New York, N. Y., has added to its list of agents the Barber-James-Dwinnell Electric & Manufacturing Company, 600 East Fifteenth Street, Kansas City, Mo. This new agent will handle the Roller-Smith Company's instruments, meters and circuit breakers in the territory comprising the States of Kansas, Oklahoma, Nebraska, Iowa and part of the State of Missouri.

Spray Engineering Company, Boston, Mass., reports that the first three months of the present year were the best since the company was organized. Among the recent orders received are included orders for cooling ponds for a number of large industrial companies. Air washers have been sold to three plants operated by H. M. Byllesby & Company, Chicago. The company is now figuring upon an installation with a capacity of 63,000 gal. per minute.

Holden & White, Chicago, Ill., general agents for the Wasson Engineering & Supply Company, have received an order from The Milwaukee Electric Railway & Light Company for eight air-retrieving trolley bases for interurban service. This firm has also made a contract with the Specialty Device Company, Cincinnati, Ohio, to handle the sale of Bierce anchors and guy-wire protectors in Indiana, Illinois, northern Kentucky, northeastern Iowa and southern Wisconsin.

Ohmer Fare Register Company, Dayton, Ohio, has offered cash prizes, amounting to $100, to be divided among the three railway divisions or branches of the Southern Public Utilities Company, Charlotte, N. C., which attain the highest fare register efficiency during the year of 1916. The branch attaining the highest record of efficiency of its conductors will receive a cash prize of $50; the second highest, $30; and the third, $20. These prizes are offered on the condition that the general average of all divisions for 1916 exceeds the general average of all divisions for 1915.

ADVERTISING LITERATURE

Ohio Brass Company, Mansfield, Ohio, has issued a folder entitled "Hard Luck for the Junk Man," in regard to its trolley bases, which have renewable bushings in every bearing.

Cleveland Twist Drill Company, Cleveland, Ohio, has issued a bulletin entitled "Drill Chips," which illustrates its various types of drills, including taper shank drills, three-fluted drills, straight shank drills, oil tube drills, blacksmith's drills, bonding drills and "Paragon" forged drills.

E. I. du Pont Nemours & Company, Wilmington, Del., have printed a clay blasting booklet. It is the first booklet ever issued on this subject and contains valuable and interesting information. Some of the phases covered are "Digging Clay," "Stripping," "Blasting Down Shale," "Digging Plastic Clays," "Mining Flint Clays," "Draining Clay Pits," as well as full information on the use of explosives.

Rudolph Guenther, Inc., New York, N. Y., has issued a booklet entitled "What Advertising Can Do for Public Utility Securities in Awakening the Public to Their Values as Investments." The subject is discussed under the following headings: "Economy in Public Utility Production," "Growth in Service and Revenue," "The Investor and Public Utility Securities," "Investors' Need of Information" and "To Derive Greatest Efficiency from Publicity."

General Railway Signal Company, Rochester, N. Y., has issued bulletin No. 132 describing the details of its 2 B and 2 C electro-mechanical interlocking machines. The company has also issued Bulletin No. 128 A describing its absolute permissive block system for single-track railways. This system is shown to be in use by the Fort Wayne & Northern Indiana Traction Company; Indiana Railways & Light Company; Lehigh Valley Traction Company; Puget Sound Electric Railway; New York State Railways, Rochester Lines; Terre Haute, Indianapolis & Eastern Traction Company and Union Traction Company of Indiana, the electric railways using this system thus comprising a total trackage of 309 miles, as well as 2014 miles on steam railroads.

Messer & Company, Philadelphia, Pa., have issued a catalog describing and illustrating their oxy-acetylene apparatus. This company has standard sizes of "automat" type generators, ranging from 5 lb. to 100 lb. of carbide per charge, but is prepared to build sizes ranging up to 2400 lb. and over. This company also furnishes a portable tank equipment which embodies a compact unit for welding and cutting, using acetylene and oxygen compressed in tanks. Regulators are attached to the tank and reduce the gas pressure. Two lengths of tubing connect the regulators with the welding or cutting blow pipes. The welding blow pipes are designed for use in either high or low pressure acetylene generator or tank equipment. The cutting blow pipes are designed to make a clean, narrow cut, consuming the least possible amount of oxygen. The adjustable guide keeps the proper distance between tips and cuts and makes it easy to cut straight as well as in any angle.

International Oxygen Company, New York, N. Y., has issued Catalog No. 3 describing its bipolar oxygen and hydrogen generators. Their efficiency of generation is rated at 4 cu. ft. of oxygen and 8 cu. ft. of hydrogen per kilowatt-hour, using caustic potash as the electrolyte. Oxygen produced is claimed to be at least 99.6 per cent pure and hydrogen at least 99.8 per cent. Patented bimetallic electrodes are used, giving long life and high efficiency. Wear and tear on diaphragms, owing to the rapid circulation common in ordinary filter-press-type generators, is eliminated. Oxygen and hydrogen off-takes are independent and isolated, so that any leakage escapes to the open air and cannot mingle with the other gas. Water feed to the generator is automatically controlled by and proportioned to the rate of gas generation. Each machine is externally protected against grounding and loss of current by means of glass insulators. Purgers on each generator automatically free the gas from water or caustic that might be entrained.

Chicago Fuse Manufacturing Company, Chicago, Ill., has issued Catalog No. 28 describing the "Union" line of electrical supplies. This company has previously published separate catalogs, one for fuse material and one for switch and outlet boxes, but the present No. 28 edition combines both under one cover, making an attractive book of 132 pages, divided into four sections and profusely illustrated. All descriptions have been carefully revised and many new features introduced with a view of making the book a handy reference guide for the buyer's desk. N. E. C. fuses, cutouts and fittings are shown in Section 1. The corresponding catalog numbers of other manufacturers are given on the pages opposite the listings, where they can be readily consulted. Section 2 is devoted to "Old Code" fuses; Section 3 to automobile fuse material, telephone and open fuses, and Section 4 to stamped steel outlet boxes and covers and switch boxes. Four styles of mounting ears and clamps are shown. Descriptive and numerical indexes complete the book.

Electric Railway Journal

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THE THINKING PART

As we view the conduct of practically every large business, there are two duties which have to be performed by those occupying executive positions. One of these is to plan the work to be done, the other is to carry out the plans, or see that they are carried out, after they are made. Our observation of the work of many electric railway officials is that there is a tendency to neglect the planning for the routine of seeing that the work is carried out, in other words, that the executive too often becomes so much wrapped up in details as to be unable to take the broad general view which the property under his direction requires. This situation to which we refer applies to department heads just as much as to general officers. The best results cannot be secured while one keeps his face at the grindstone continuously. No man can properly plan his own work and that of those under his direction unless he has opportunity to view the whole situation in perspective, to study the practice of others in the same line and compare the results they secure with those which he is getting, and to review the objects for which he is striving and consider whether he is attaining them in the most efficient manner possible. In our opinion, the man who does the thinking is working just as hard as the man who does the things which come to him every day, and the chances are that he is accomplishing more for his company. The electric railway business is one which peculiarly calls for the man who can think and takes the time to think.

NEWARK'S NEW TERMINAL OPENS TO-DAY

A fitting prelude to the celebration of the 250th anniversary of the founding of Newark, N. J., is the opening of the new Public Service terminal in which service is being inaugurated as this issue of the ELECTRIC RAILWAY JOURNAL is mailed to its readers. The terminal building is the most conspicuous element in an undertaking which has involved the expenditure of nearly $6,000,000. This project is being carried out on schedule time, and it will give immediate relief from a most embarrassing congestion of traffic at the business center of the city nearby. The management of the Public Service Railway estimates that it will be twenty-five years before the congestion will again increase to the point where it was a few days ago. The crossing at Broad and Market Streets was one of the most congested points in the country, the rush-hour street car traffic there being as high as 488 cars per hour. After to-morrow this will have been reduced to 326 cars by the rerouting which the terminal makes possible. The terminal project is a boon to the city, to central New Jersey, of which Newark is the metropolis, and to the company. It also furnishes an inspiring example of foresight and enterprise to the entire industry. The city gains by the reduction in the number of cars on the streets, by the stimulation to business which must result from the arrangements for delivering the passengers from outlying towns conveniently and comfortably at the business center, and by the substantial addition to the group of show places in the community. Central Jersey, through which radiate the railway lines from Newark as a center, gains also, because the terminal is designed largely to expedite the interurban traffic. The railway company gains through the increased facilities for getting cars through the congested center, the decrease in the transferring of passengers and the advertising value of an attractive, busy and convenient traction center.

EDUCATIONAL TRAINING FOR RAILWAY WORK

The letter from G. M. Cameron, who is master mechanic of the New York State Railways, Rochester lines, which is printed elsewhere in this issue, is prompted by a sympathetic and practical interest in the development of young men. The facts advanced are the result of a systematic effort extending over a period of years. A prominent railway manager who has had still wider experience in the same direction has contributed his ideas to the discussion started by Prof. A. M. Wilson's article printed in our issue for April 15. These ideas, with others suggested by Mr. Cameron's letter, are incorporated in this and the following paragraph. On all hands we have criticism of our educational system from the kindergarten up, some of it merited, much of it otherwise. Employers and teachers agree, however, that schooling and working in gainful occupations must be brought closer together, and for at least two reasons: First, pupils must get something of the working atmosphere while they are still in school, and, second, they must carry the spirit of study into their later work. In the one case their studies are abstract and comparatively meaningless, and in the other they fail to grow. With the best that the schools can do, however, the graduate of the grammar school, the high school, the college and even the industrial school is an unfinished product. He must have a post-graduate course in the school of experience. The manufacturing companies and many operating companies are providing this by means of apprentice schemes of one sort or another. The utilities are coming to the same plan, although the difficulties in this field are much greater than in that of manufacturing. These difficulties, however, must be overcome if the big problems of the future are to be most effectively solved.

THE RAILWAY'S DUTY AS AN EDUCATOR We realize that one of the obstacles in the way of training young men for railway work, and for other lines of work as well, is their attitude toward work and toward life in general. They do not fully appreciate what schooling is for, anyway. The result is that employers are disgusted many times and conclude that the "3 R's" comprise all the essentials of education, and that the boys who get to work earliest are the most competent employees in the long run. The employer feels that in filling their heads with book knowledge, granting for the purpose of argument that they do this, they lose the ability to get results from people and to realize the true character of every-day problems in this field. On the other hand, and after deeper thought, employers realize that the grade of work to which the average employee can aspire is determined by his education. If, therefore, they are not willing to trust to chance for the backbone of their organization, they must select new human material as they do inanimate material, with a view to its possibilities, and then make the most of it. Among the definite things that can be done are these: Some man or men in each organization can make it a special duty to keep in touch with the efforts of the employees to improve their minds. Some of the latter can be encouraged to do more, and even to stop work for a time to pursue further studies in school. Co-operation with local schools can be fostered by the railway managers. Ambitious young men can be encouraged to consult their superiors to obtain needed counsel. Conditions differ, but the fundamental principle is the same.

A PUBLICITY POLICY NEEDED

Why cannot the electric railways as a whole make a beginning and do something in the way of real publicity? The steam railroads have done excellent work along this line in the past, and they are continuing it at present. During the time when the question of rates was uppermost, the steam railroads sent to the newspapers some excellent material giving facts which told their side of the story. Again, on the question of compensation for carrying the mails, and now in connection with the dispute on wages with their trainmen, they have followed the plan of concerted action for "free and frank publicity." We have recently commented on the practice of the Rockefellers and of other important interests in the same direction. Even departments of the United State government assiduously cultivate the daily papers in the promotion of their policies.

The subject has frequently been discussed at meetings of the American Electric Railway Association, and the plan has always evoked enthusiasm. Companies which understand the value of local publicity work in the case of their own properties have been anxious to have the work carried on in a more general way. Delegates at conventions agree that the electric railway companies have a convincing story to tell to the public, but the story rarely gets much beyond the convention hall.

The only way to secure publicity is to go at it seriously. Spasmodic attempts are of little or no use. It is something which must be kept up every day in the year and one year after another. There is no mystery about the right way to secure publicity, and if the story is true it is certain to have its effect if told patiently, consistently and thoroughly. The railways believe that their position is just and that they have a real story to tell, but they don't tell it.

The logical body to conduct a campaign of this kind is the American Electric Railway Association through its committee on public relations. A year and a half ago this committee formulated and published the code of principles. This was a step in the right direction, but it was not followed up. Efforts which would have produced results in this field were expended in other directions which are not so important to the industry or to the association. With the membership of the association being increased now by the affiliation of the manufacturers, it is a good time to review the entire question of publicity. With its present composition, the association has a larger scope than it had a year ago, and its policies in all directions should reflect this fact.

WHAT AILS THE ELECTRIC RAILWAYS?

That the electric railways in the United States are not at the present time enjoying unalloyed prosperity is not news to electric railway operators. As we showed in the issue of April 15, sixty-two representative electric railways in 1915 reported a decrease of 1.02 per cent in gross and 0.62 per cent in net. These figures, for companies publishing both annual and monthly reports, are naturally not conclusive as to the entire industry, as we then stated, but our general conclusion that the industry suffered appreciable losses in 1915, even though less than anticipated, is substantiated by a current review of the annual reports of 290 electric railways by *The Commercial and Financial Chronicle,* which calculates a loss of 0.07 per cent in gross and about 1 per cent in net. Coupled with this suspension of the customary progress of electric railway earnings is the fact that new construction is falling off, for the new track built in 1915 was less than in any year since 1907, with a steady decrease since 1910, and the new cars ordered in 1915 were the fewest since 1907, with a similar decrease since 1912. As a natural corollary we are not surprised to find, as noted elsewhere in this issue, that new issues of electric railway securities decreased in amount $56,658,600 or about 30 per cent in the last year.

Of course, there is the brighter side of this picture, for in the first quarter of this year earnings have shown a marked improvement, car orders have increased in number and volume, and new financing has already gained $13,115,400 over last year. Yet electric railways are not showing the same prosperity in earnings that other utilities, notably electric light and gas companies, report, and it does not seem as if the new developments were being viewed with a general feeling of optimism by investors. To a certain extent, to be sure, electric railways have probably passed their long period of a necessarily large percentage of new construction, and it is hardly to be expected that they will continue the same proportional or actual growth as in the early days. On the other hand, there is still an opportunity for extended development in some sections and for extensions in most localities to take care of population growth, but the indications are that these are being restricted by a number of causes that have reduced the profit in electric railway enterprises and thus made them less attractive propositions in the field of competition for capital. The full understanding of these causes and the determination of the proper ways to remove them constitute without doubt the most serious problem now confronting those who are interested in future electric railway development in this country.

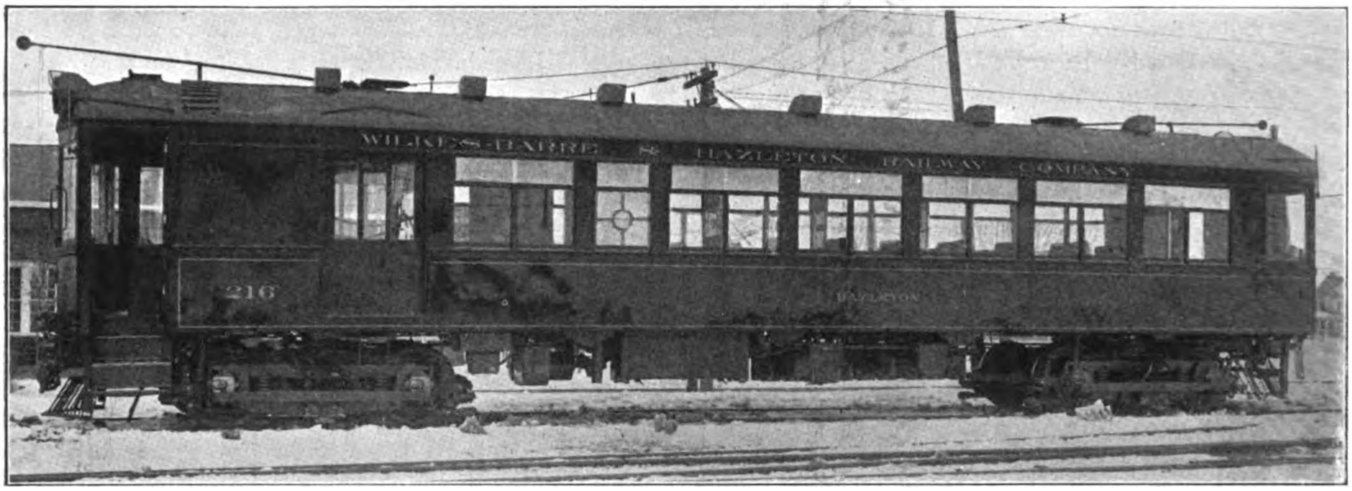
In the report of the Bureau of Fare Research recently published, F. W. Doolittle announced several conclusions, based on a study of census statistics, that summarize clearly the most important causes of the present situation. He finds that during the last fifteen or twenty years there has been a great increase in the length of ride for a single fare, while at the same time there has been a reduction of the single fare on account of the increased use of transfers. During this period, construction costs, operating expenses and taxes have risen on account of the increased perplexities of urban life and the substantial character of municipal requirements. During the same time, also, the cost of capital has increased, because of the general rise of interest rates, competition with other forms of investment and agitation against the electric railway industry. As to detailed operating expenses, Mr. Doolittle notes that labor costs have increased, and that the costs of materials entering into the construction and operation of electric railways have also grown, while this latter increase has been accompanied by the necessity on the part of the railways to use more and better materials.

Since 1912, the census year on whose figures these conclusions were based, there has been no improvement in the condition of the electric railway industry. In fact, it is a matter of common knowledge that since that time the cost of labor has gone still higher, and there has been a recent wide increase in the costs of material, accompanied by destructive competition from jitneys and private automobiles. The former competition may pass, but the latter is bound to stay and may even increase with returning business prosperity.

Some of the causes of these increased burdens on electric railways are due to the widespread operation of natural economic forces, and the public could not change them even if it would. Since it suffers, however, from the consequent retarding of railway development through such means, it should be vitally interested in at least the amelioration of the burdens wherever possible. But for some of the other causes of the present situation the public is directly responsible, such as for more rigorous service requirements, higher expenses for paving, as mentioned in the recent petition of the California electric railways to the State Railroad Commission, and for higher taxes. The restrictions thus placed upon electric railway profits through both natural and artificial causes have been aggravated by propaganda started by self-styled advocates of the public interests—mainly ill-considered plans to control and even cut down the rate of return on electric railway investments through limitations on the earning power of the utilities.

The clearly evident fact is that the public as a whole is still without a clear idea of the hazards of the electric railway business and of what the allowed rate of return should be as a basis for fares and as an attractive proposition to investors. In some directions, it is true, there seems to be a growing appreciation of the fact that the industry should not be burdened in its efforts to overcome natural economic changes, but broadly speaking, we believe that the present situation is too widespread for the companies passively to await the general development of a proper public attitude toward transportation lines. If the public must be more fully educated in regard to the causes and the needs of the present situation, the railways owe it to themselves as well as to the public to assist in all possible ways in bringing about a full knowledge of all the factors involved. If the public is beginning to show an awakening conscience against corporation baiting, now is the time to make systematic and concerted efforts to educate the public to a fuller understanding of the whole transportation question.

For instance, the public has for years deemed the 5-cent fare an essential part of street railway practice, but now if the railways are to receive adequate pay for the service rendered, the need of higher fares on some basis to offset the depreciation of the 5-cent fare must be demonstrated. The real cost of transfers, rush-hour service and similar privileges, the effects of increased wages and material costs, etc., should also be thoroughly explained, and an effort should be made to establish the fundamental principle that revenues should be increased whenever new expenses are loaded on carriers by commissions or legislatures. The necessity should also be shown of allowing interurban lines to secure rights for the development of freight and express service in cities, so as to increase their revenues. A campaign throughout the country should be made for a simplified and standardized tax system, so that electric railways may be able to show any inequitable incidence of taxation. Lastly, the public should understand the importance to itself of allowing a rate of return sufficient to attract new electric railway capital in competition with all other industries. These are simply detailed suggestions along certain lines about which we feel there might well be a sustained and more nearly universal publicity. If it were possible to sum up the present situation in one clause, we would say that the public as yet has not been made to understand what electric railway service really costs, and to show this with all fairness and truthfulness is the present and future problem of the industry.

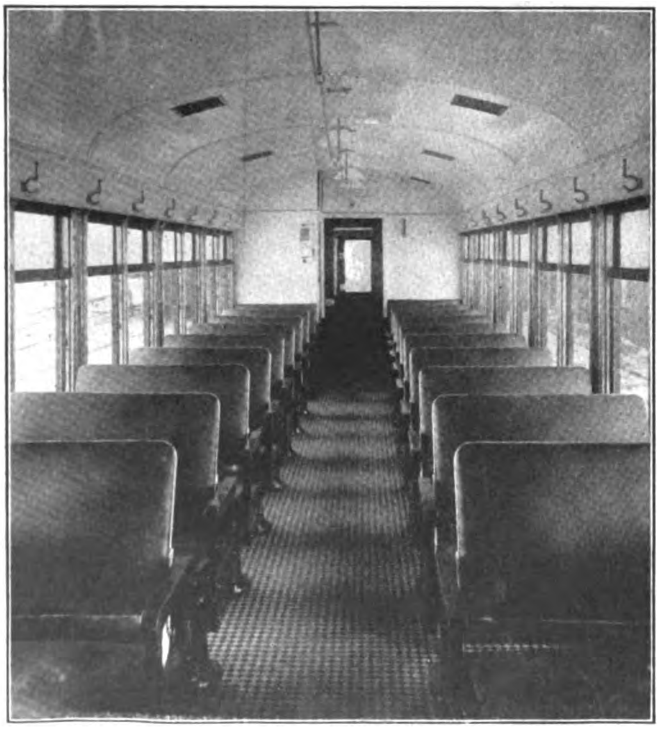


WILKES-BARRE & HAZLETON CAR—EXTERIOR VIEW OF CAR

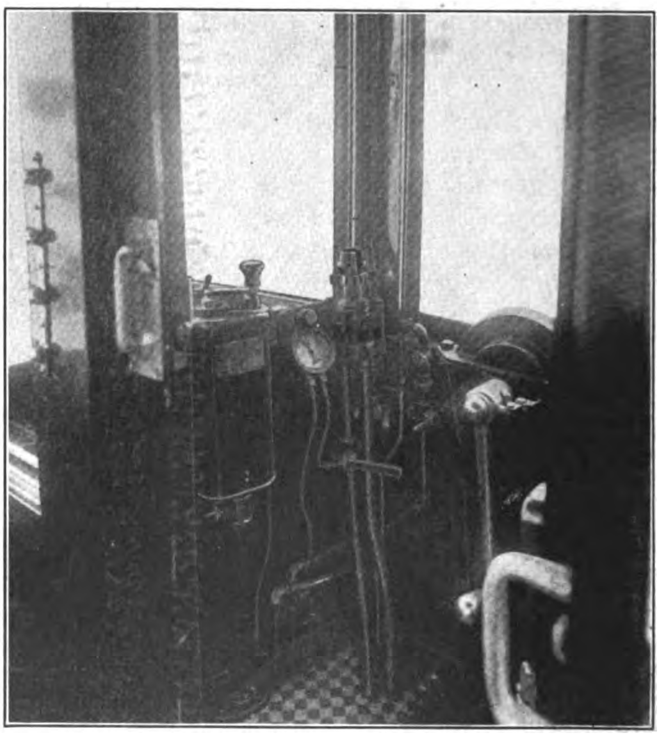
New All-Steel Cars for the Wilkes-Barre & Hazleton Railway

The Ten All-Steel Combination Passenger and Baggage Cars Recently Delivered Embody the Latest Principles in Construction and Equipment for Cars Designed Especially for High-Speed Interurban Service

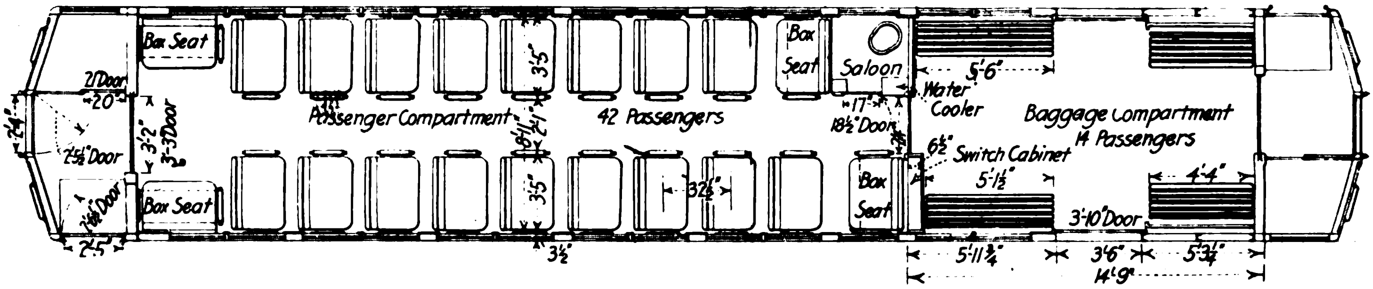
THE Wilkes-Barre & Hazleton Railway, Hazleton, Pa., has recently received from The J. G. Brill Company ten all-steel interurban passenger and baggage cars, which embody the latest principles of interurban car construction, both in their general design and attractiveness, and in the completeness of the detailed equipment applied. These cars were built simultaneously with an order for ten all-steel city cars for the Lehigh Traction Company, which is under the same management. The city cars were described in the ELECTRIC RAILWAY JOURNAL of Jan. 22, 1916. The interurban cars were shipped to the Wilkes-Barre & Hazleton Railway on their own wheels. They are for service between Hazleton and Wilkes-Barre, a distance of 30 miles. This run will be made in forty-five minutes by express cars and one hour by locals. The territory includes a district of unusually attractive scenery, and several stations are much patronized by campers and picnic parties. At Nuangola and Blytheburn are large lakes which form an especial attraction during the hot season. During



WILKES-BARRE & HAZLETON CAR—INTERIOR VIEW OF PASSENGER COMPARTMENT



WILKES-BARRE & HAZLETON CAR—END VIEW OF CAR, SHOWING RADIAL COUPLERS AND COUPLER SAFETY CHAINS


Box Seat
Box Seat
2'1" Door
20"
2'4"
2'5½" Door
3'-2"
3'-3" Door
2'5½" Door
2'5"
3'5"
3'5"
2'1"
18¼"
3½"
32½"
Passenger Compartment
42 Passengers
Box Seat
Box Seat
Saloon
17"
18½" Door
Water Cooler
6½"
Switch Cabinet
5'6"
5'1½"
Baggage Compartment
14 Passengers
4'4"
3'10" Door
5'11¾"
3'6"
5'3¼"
14'9"

WILKES-BARRE & HAZLETON CAR—SEATING PLAN OF CAR

the vacation season there is also a considerable commuters' traffic from cottages near points along the line to Hazleton or Wilkes-Barre. The general dimensions are as follows:

Length of body	46 ft. 3½ in.
Length over vestibule	54 ft. 3½ in.
Width over sills	9 ft. 6 in.
Height, rail to sills	3 ft. 7 7/16 in.
Height, sill to trolley base	9 ft. 4⅞ in.
Truck centers	35 ft. 9 in.
Wheelbase of trucks	7 ft.
Weight of car body without electrical equipment	36,500 lb.
Weight of electric equipment	3,842 lb.
Weight of air-brake equipment	1,950 lb.
Weight of trucks	22,600 lb.
Weight of motors	17,040 lb.
Total weight	81,932 lb.

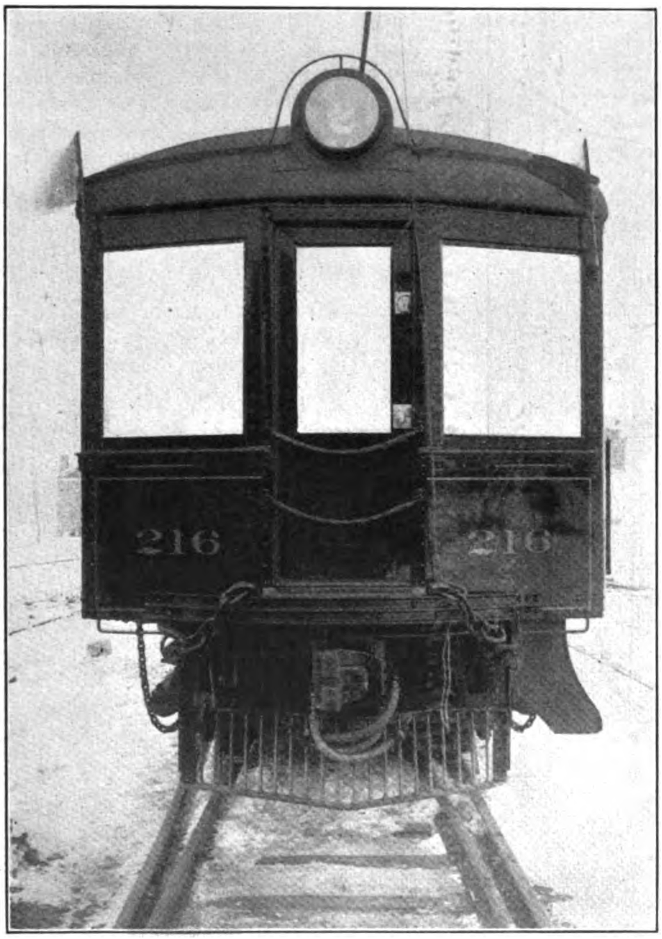
FRAMING

The car bodies, which are of all-steel construction, are mounted on steel underframes designed to keep the weight of the car within a reasonable limit. Side sills of 5-in. x 3½-in. x 5/16-in. angles are secured to 7-in. 15-lb. I-beam crossings, and to 6-in. 8-lb. channels and sills. At the baggage doors these side sills are reinforced properly to take care of the strain that may be thrust upon the sills, owing to the cut-away side girders. The body posts are of 1½-in. x 2-in. x 3/16-in. and ¼-in. T's, the table of T-iron being riveted to the angle side sill and reinforced at the belt rail. Side sheets are riveted to the table of T-posts and consist of 3/32-in. blue annealed steel. Window construction is of the pier post and intermediate post type, with a single T-iron representing the intermediate post and a double T-iron representing the pier post. Pier posts are finished on the inside with sheet steel, nickel plated.

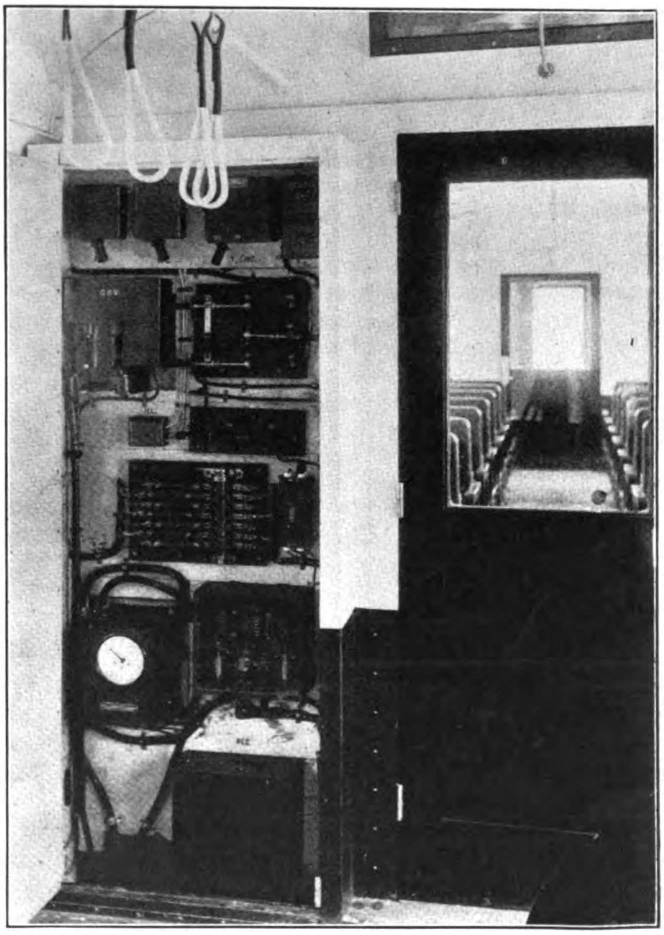
INTERIOR CONSTRUCTION

A transverse steel partition divides the body of the car into a passenger compartment, 31 ft. 5½ in. long, arranged to seat forty-two persons, and a baggage compartment, 14 ft. 4 in. long, with longitudinal slat folding seats to seat fourteen persons, thus giving a total seating capacity of fifty-six.

The interior of the passenger compartment presents a light and pleasing appearance, with its enameled steel and Agasote finish, together with the glazed, ornamental prism glass of the upper window sashes, each of which



WILKES-BARRE & HAZLETON CAR—VIEW OF TRUCK SHOWING THIRD-RAIL CONTACT SHOE AND BEAM



WILKES-BARRE & HAZLETON CAR—SWITCHBOARD CABINET IN BAGGAGE COMPARTMENT extends in Pullman style over two lower sashes. In this compartment there are nineteen Hale & Kilburn reversible cross-seats, upholstered in Pantasote material, nine on one side and ten on the other, separated by a 25-in. aisle. A longitudinal seat is placed at each side of the vestibule end. The flooring of the passenger compartment is composed of a ¾-in. layer of compressed cork on No. 12 sheet steel, over which is cemented a sheet of linoleum of green and white block pattern.

This compartment is equipped with a saloon adjacent to the baggage-room partition. An alcove containing a double-walled portable cooler is formed in the wall of the saloon. Sanitary drinking cups are supplied from a drinking cup machine attached to the outside of the saloon wall. Window curtains are made of Fabrikoid material and are equipped with Curtain Supply Company's Ring No. 88 fixtures and Rex all-metal rollers. At each pier post and each intermediate post there is a single-prong, nickel-plated coat hook.

The baggage compartment is provided with hardwood slat seats on each side. These are hinged so as to fold up, and are fitted with a substantial slide bolt to hold them in a raised position. The seats are so hinged that supporting tripod legs are not required, leaving a clear floor space for baggage. The baggage compartment is equipped with twenty hand straps covered with Rico sanitary strap covers. The hand straps are hung from a steel tubing supported by substantial brackets of brass, nickel-plated. Above the compartment partition door, in a glass-incased cabinet, is located an emergency tool outfit.

Hooks for eight mail bags and a support for one portable telephone pole to be used with a Western Electric telephone outfit are attached to the side wall of the baggage compartment. The circuit breaker, governor, switches, watt-meter, heater switch, air and light switches and fuses and other switchboard equipment are located in a cabinet placed against the partition. Vending machines are also installed in the baggage compartment.

Access to the vestibule at each end of the car is by three steps, equipped with Stanwood automobile-type treads. An O. M. Edwards trapdoor covers the step opening when the vestibule is closed. Two porter's hand-step boxes are supplied for each car. Each platform is equipped with Lindstrom emergency brakes. The front of each vestibule has a train door in the center and a stationary window on each side. Entrance to the motorman's cab, which is on the right-hand side of the platform, is by means of a single sliding door with a 20-in. opening.

A Dayton window cleaner is installed on the front window of the cab. Other equipment installed in the cab includes the master controller for the GE Type M multiple-unit control, the control apparatus for the GE straight and automatic air brakes, a conductor's signal valve and whistle, and Electric Service Supplies Company's 12-in. alarm gong operated by air pressure, and a Lord differential, staffless handbrake. Wyoming air sanders are installed under the motorman's seat. Vestibule buffers are protected with Hedley anti-climbers. Below the platform are supplied Tomlinson M.C.B. radial couplers for train operation and metal pilots. Coupler safety chains are also provided for connection between cars.

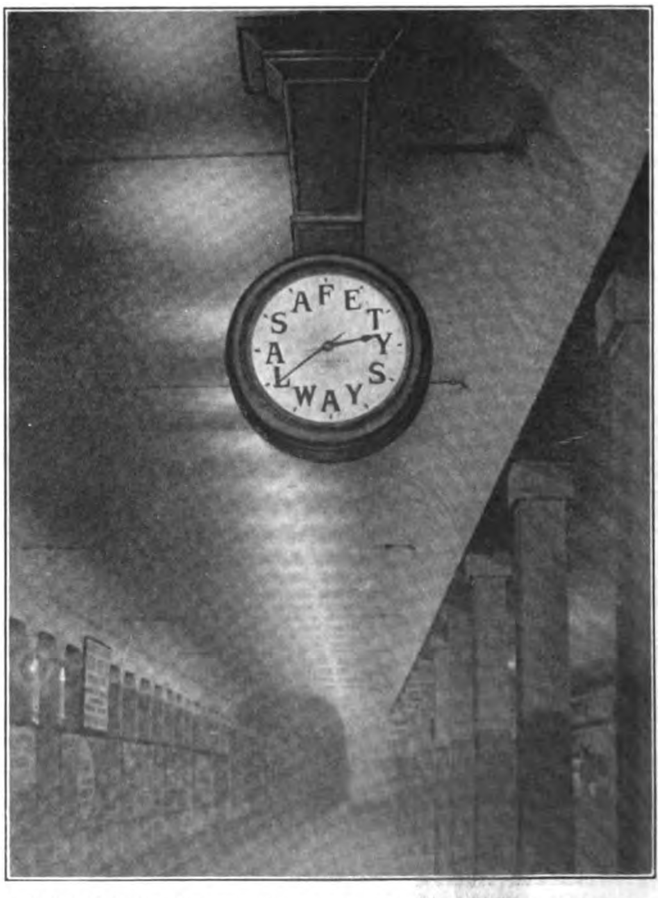
Control wires and cables are installed in Sherraduct conduit. The heating system is furnished by the Peter Smith Heater Company. The electric heaters are controlled by Railway Utility Company's thermostat set. The lighting arrangement includes seven lamps in the passenger compartment, one lamp in the baggage compartment, and two lamps in the vestibule. Semi-indirect lighting is obtained. Shade holders and trimmings are of aluminum alloy. Each car is equipped with a Pyrene fire extinguisher.

The exterior of the car is painted black with gold striping. Each car has an individual name and number. The roof is of the plain arched type, and consists of U-shaped carlines of pressed steel, covered with ⅜-in. Agasote. The Agasote roofing has one coat of metallic paint and is covered with No. 8 cotton duck. Ventilation is supplied through six Railway Utility "Honeycomb" ventilators on each side of the roof. General Electric Form J-28 headlights are recessed in a hood at each end of the roof, and covered with sheet-steel housing. Trolley bases are of the US-13-D type.

The car bodies are mounted on Brill 27 M.C.B. 3-X trucks, equipped with four GE-254-A interpole ventilated motors, 160 hp., each inside hung. The trucks have third-rail contact shoes and shoe beams. Wheels are Midvale rolled steel. Side bearings are of cast steel integral with the bolster, and arranged to accommodate the Stucki side bearings. Trucks are provided with clasp brakes, two brakeshoes on each wheel. Smith-Ward slack adjusters are installed.

Safety-First Clock for Boston Subway

AT the suggestion of James Smith, superintendent of Division 8, Boston (Mass.) Elevated Railway, the "safety" clock illustrated in the accompanying halftone has been placed in the Copley Square Station of the Boylston Street subway. The clock has two 24-in. dials and is equipped with five 10-watt, 120-volt tungsten lamps installed in the casing, which is located about 9 ft. above the platform and in full view of all passengers using the west-bound side of the station. As "Safety First" ran one letter short of the requisite dozen, the hour points were marked to read "Safety Always."



ILLUMINATED "SAFETY" CLOCK, COPLEY STATION, BOSTON

Saving Power with Watt-Hour Meters

A Description of the Methods Employed to Effect Reduction in Power Consumption and the Results Obtained by the Tri-City Railway Company, Davenport, Iowa

By F. V. SKELLEY
Assistant Superintendent Tri-City Railway Company, Davenport, Iowa

THE cost of power is one of the largest items included under operating expense and, since it is of such importance, some means should be employed to keep a proper check on the power input for each car. With this idea in mind the management of the Tri-City Railway Company had Sangamo watt-hour meters installed on eighty-eight of its regular cars. The management believed that the average motorman did not realize that he was using more power than necessary and it decided to bring the facts to his attention by comparing his record with those of other efficient motormen who were working under practically the same conditions.

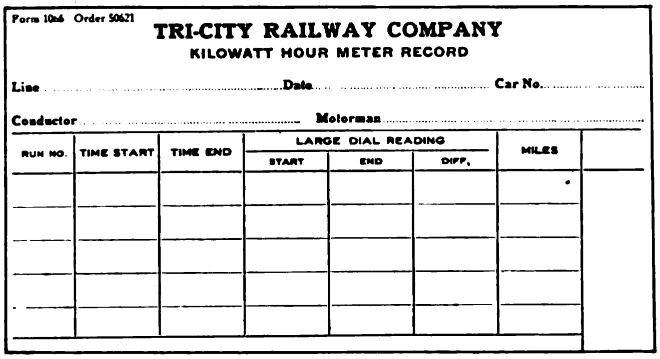
The work of installing meters was started in March, 1915, and by May 15 all cars were equipped and ready for taking energy consumption records. All of these cars are of the double-truck, pay-as-you-enter type and the average car weight is 21 tons. The meters were placed on the vestibule side of the bulkheads of all but ten cars. These did not have bulkheads and the meters were placed on the arch at the end of the monitor roof. The two installations are shown in two of the accompanying illustrations. Cars that had two trolleys required about 40 ft. of No. 0 wire, and the cost of the installation was about $6.50 per car. All meters were connected in such a way that the power for lights, heaters and compressors was not recorded. This placed the entire responsibility on the motorman for the energy consumed as indicated by the meter.

METHOD OF KEEPING RECORDS

A special blank form, such as the one shown in the accompanying illustration, is supplied each motorman. On this he records his name, car number, run number, the time and the meter reading at the beginning and end of his run. Motormen are also required to give the miles operated by each car used, and to aid them in computing this, the mileage for each run is posted at the carhouse. When the car is turned in at night a barnman records a check reading of the meter on the dial form, which is shown in one of the cuts on the next page. These records and those of the motormen are sent in each day, and they give the meter department a continuous record of power consumed and miles operated by each car and motorman.

At the end of every fifteen-day period all records are checked to see that the meter readings are correct and that there are no omissions. Following this the reports for each motorman are collected, and his total miles and kilowatt-hours added for the period. Since the power input of cars working under similar conditions is compared, it is necessary to group the motormen in divisions. After this is done the average kilowatt-hours per car-mile for that division is determined. The mileage for each motorman is then multiplied by the average kilowatt-hours per car-mile, and a constant determined, which is called "K" on the record sheet. This constant is the total kilowatt-hours the man would have used if he had been of average ability. The ratio of "K" to total kilowatt-hours consumed gives the motorman's standing.

Records of the standing of all motormen are posted at the carhouse on the first and fifteenth of each month. This is frequent enough to hold the interest of the men, and at the same time it gives average kilowatt-hour per car-mile figures for different kinds of weather and traffic conditions. Frequently these reports are supple-



Form 1046 Order 50621

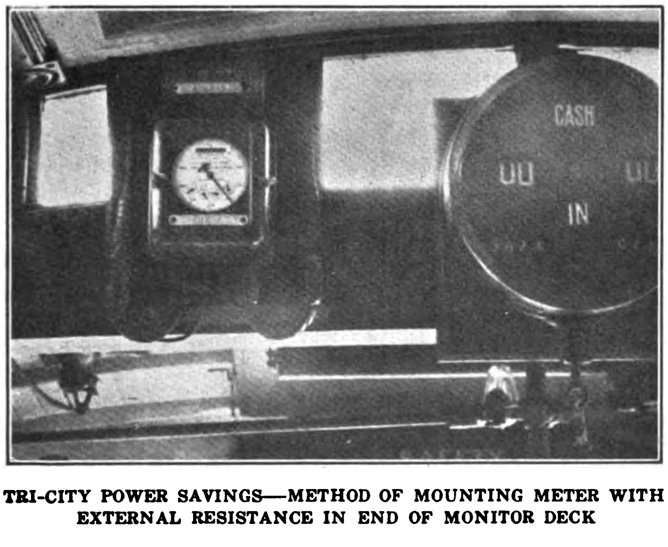
TRI-CITY RAILWAY COMPANY
KILOWATT HOUR METER RECORD

Line .... Date .... Car No. ....

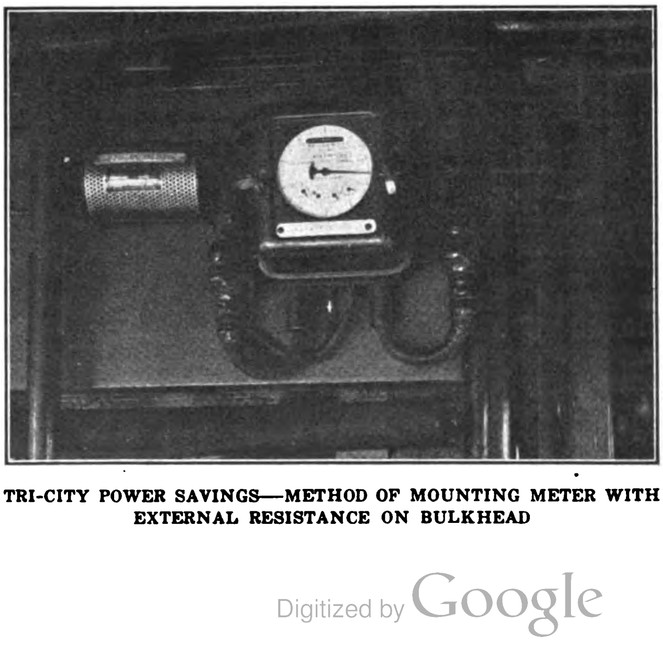
Conductor .... Motorman ....

RUN NO.	TIME START	TIME END	LARGE DIAL READING			MILES	
			START	END	DIFF.		

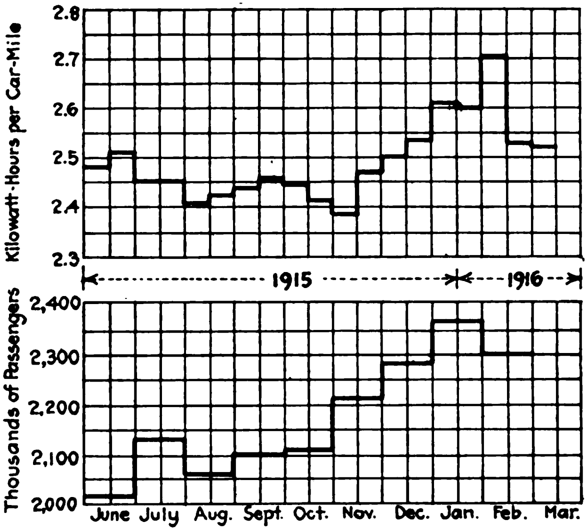
TRI-CITY POWER SAVINGS—MOTORMAN'S DAILY RECORD SLIP



TRI-CITY POWER SAVINGS—METHOD OF MOUNTING METER WITH EXTERNAL RESISTANCE IN END OF MONITOR DECK



TRI-CITY POWER SAVINGS—METHOD OF MOUNTING METER WITH EXTERNAL RESISTANCE ON BULKHEAD mented by including the number of passengers hauled per car-mile for each man, or the number of stops made per mile by his car. This adds interest to the report and supplies the office with valuable information. The accompanying table is typical of one of these bi-monthly records. The chart below shows the energy input at the car and the number of passengers carried each month from June, 1915, to March, 1916.

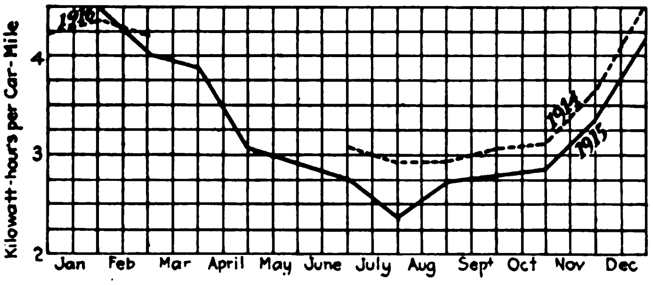


TRI-CITY POWER SAVINGS—GRAPHIC RECORD OF ENERGY INPUT AT CAR AND OF PASSENGERS CARRIED

No special method was adopted in coaching the motormen how to save power. Bulletins were posted at the end of each fifteen-day period, instructing the men in the proper use of the controller and the air brakes, and advising them when to coast. After the meters had been in service for several months the men with low standings were singled out and encouraged to do better. This produced very satisfactory results in saving power without incurring any great expense.

RESULTS OBTAINED

The decrease in energy consumption taken from the substation record of energy supplied to the d.c. busbar, shows that for the year 1914 it was 3.5 kw.-hr. per car-mile, and for 1915 it was 3.34 kw.-hr. per car-mile, or a decrease of 0.16 kw.-hr. The total revenue car-miles for the year 1915 was 4,716,501, making a total decrease in energy consumption of 754,640 kw.-hr., valued at $10,187, which represents a saving of 4½ per cent. The meters were not in use until June 1, 1915, so that the actual period of saving was confined to the last seven months of the year. All of this saving could not, however, be credited entirely to the use of meters on the cars because there was also a decrease in the total number of passengers hauled, which had some effect on power consumed. This record of savings for the seven months in 1915 as compared with the same period in 1914 is shown in one of the accompanying charts.



TRI-CITY POWER SAVINGS—ENERGY CONSUMPTION PER CAR-MILE MEASURED AT SUBSTATION BUS FOR 1914 AND 1915

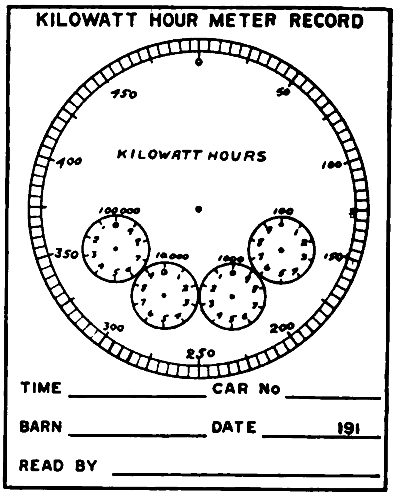
TRI-CITY RAILWAY COMPANY MOTORMEN'S CAR METER RECORDS. FEB. 16 TO 29, 1916

Bridge Line

Name	Total Miles	Total Kw.-Hr.	Kw.-Hr. per Car-Mile	K	Total Passengers	Passengers per Car-Mile	Kw.-Hr. per Passenger	Standing
B. Geertz...	928	2,105	2.268	2,432	12,444	13	0.169	1.155
Hoffman ...	531	1,280	2.410	1,391	9.308	17	0.137	1.086
Guenther ...	1,036	2,520	2.432	2,715	11,852	11	0.212	1.077
Schroeder ..	228	585	2.565	597	2,964	13	0.197	1.020
Boxwell	817	2,150	2.631	2,141	12,335	15	0.174	0.995
MacMillan ..	924	2,440	2.748	2,421	10,689	11	0.228	0.992
Padeskie ...	1,001	2,650	2.647	2,623	12,718	12	0.208	0.989
Sarsgard ...	1,000	2,723	2.725	2,621	10,839	11	0.251	0.960
Carstens	841	2,295	2.728	2,204	11,154	13	0.205	0.960
Gerls	1,077	3,000	2.785	2,822	11,380	10.5	0.263	0.940
Dicks	1,002	2,845	2.839	2,626	12,333	12	0.230	0.923

Average kilowatt-hours per car-mile..........................2.621

There also has been a remarkable improvement in the adjustment of brake tension at the carhouse during the period the meters have been in use. At the present time when a car leaves the carhouse with improper brake tension, the motorman immediately reports the defect, because if the brakes are tight they increase the power consumption and reduce correspondingly the standing of the motorman. In 1911 this company used an average of 23.95 lb. of brakeshoes per 1000 car-miles, and in 1915 this was reduced to 22.53 lb., which represented a saving of 5¾ per cent.



TRI-CITY POWER SAVINGS—CARHOUSEMAN'S DAILY RECORD SLIP

In one class of service six cars were operating on a line under practically the same conditions, five cars were equipped with modern interpole motors and the sixth car was equipped with less efficient motors of non-interpole type. In order to determine the efficiency of these motors the motormen were interchanged several times and their average energy consumption for each class of motor determined. In this way and by the use of meters it was found that the old motors were 11.7 per cent less efficient than the more modern ones and that the company was losing more than $200 a year per car by continuing them in use.

Some very interesting and valuable information was also obtained from the meter records in determining the schedule speed best suited to one particular line. Five cars were operated on a fifteen-minute headway and at a schedule speed of 10.7 m.p.h. The average energy consumption was 2.47 kw.-hr. per car-mile. The service was not satisfactory and it was decided to add one more car and reduce the schedule speed to 8.9 m.p.h. As a result the energy consumption was reduced from 2.47 kw.-hr. per car-mile to 1.93 kw.-hr. The increased platform expense amounted to $160 per month, but the reduction in total power purchased amounted to $258, thus making a net saving of $98 per month. This result was not anticipated, but it shows plainly the necessity of having a check on power consumption when considering a change of schedule speeds.

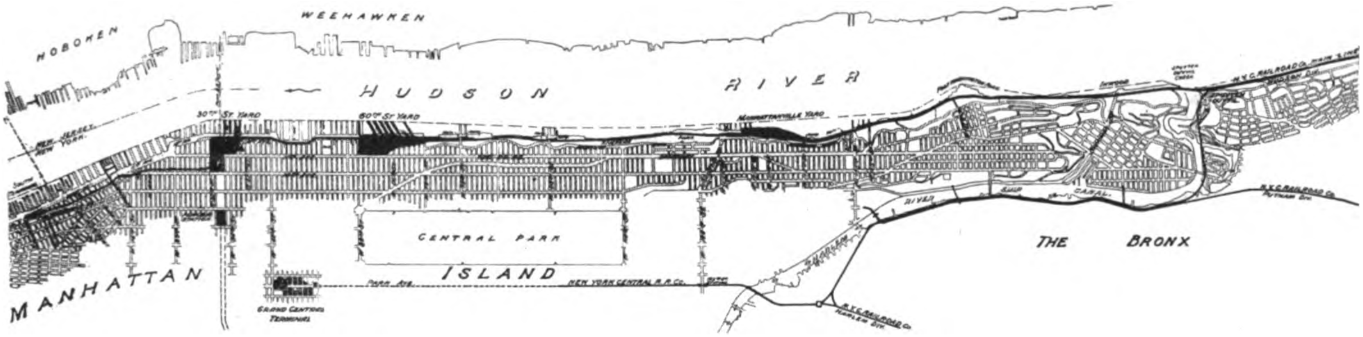
At the present time the cost of operating the meter department is about $60 per month. This amounts to approximately 1 cent per day per motorman, and includes the salary of a clerk and the cost of stationery. Meter failures have added but little to this expense. One has been grounded by lightning, one by water and six were removed to be tested. In connection with the last cause for removal this company has found it advisable to test the meters occasionally to determine the accuracy of the results, because this is very necessary if the interest of the motormen is to be maintained. In keeping these records it has been found that for speed and accuracy the Monroe calculating machine is best adapted for the work.

Electrification of Freight Yards in New York

Plans for West Side Improvement of New York Central Railroad Call for Extensive Reconstruction and the Electrification of All Tracks on West Side of City

DETAILED plans for the West Side Improvement in New York City have been filed by the New York Central Railroad in anticipation of a public hearing to be held on Monday, May 1, the main features of the project, which covers the railroad's 12-mile freight entrance to the city, involving extensive relocation, track elevation, extra trackage, reconstruction of yards, the covering of tracks through several miles of parks, and the electrification of the entire line. The plans, which were outlined in a preliminary account published in the ELECTRIC RAILWAY JOURNAL for Jan. 22, 1916, call for an expenditure of approximately $50,000,000, only part of which is involved by the electrification.

However, as shown by the accompanying general plan of the proposed changes, the project will constitute an electrification of great magnitude and special interest because of the large scale of the freight switching operations that will be involved. Only 12 route-miles are included in the plan, but within this distance there are no less than four important yards whose facilities are to be materially elaborated.



WEST SIDE IMPROVEMENT PLANS—MAP SHOWING LOCATION OF PROPOSED FREIGHT TRACKS AND YARDS TO BE ELECTRIFIED BY NEW YORK CENTRAL RAILROAD

At the present time, the railroad company's freight line along the west side of the city leaves the main line at Spuyten Duyvil, where this line turns away from the Hudson River. It crosses Spuyten Duyvil Creek on a low swing-drawbridge, and from this point south to Sixtieth Street it is in the open on the water's edge for most of the distance, crossing at grade two busy thoroughfares that lead to ferries. It runs along the full length of the foot of the slope of Riverside Park, between the park and the river, and complaints of smoke and offensive odors from cattle trains have been rife. From Sixtieth Street south where the line occupies city streets, operation is restricted to low speed with special boxed-in locomotives. In spite of this, there have been numerous accidents, mainly to persons stealing rides on the trains, and the agitation to remove the tracks from the streets has really been the foundation of the entire improvement. At the present time the whole line is operated by steam.

As compared with the foregoing conditions, when the project is completed, there will be a four-track electrified line for the entire distance. Along the present city parks and a new park that is to be created at the north end of Manhattan Island, the tracks will be covered, and much of the waterfront will be released to the city. The grade crossings will be eliminated, and the tracks will be removed from the streets south of the Sixtieth Street yard, being replaced by an elevated system on Twelfth Avenue from Sixtieth to Thirtieth Street, and on private right-of-way south of the latter point. The yard and local freight facilities will be much improved.

RECONSTRUCTION OF FACILITIES

The reconstruction will begin about 1 mile north of Spuyten Duyvil, where the existing freight tracks will be led up on an elevated structure so that there will be no crossing at grade with the existing tracks where they turn to the east. This elevated structure will connect with a four-track swing bridge, beyond which the tracks will be laid in a cut-and-cover tunnel under the high sections of the island and on elevated structures elsewhere, so that grade crossings will be eliminated. A new yard will be established between 133rd Street and 153rd Street, this providing storage and switching tracks for 700 cars, and below this point six main tracks will be provided. Along Riverside Park the tracks will be completely covered so that the city property may be made available to the water's edge.

At Sixtieth Street the large yard now in existence will be remodeled so that it can be made to accommodate eighty-car trains in halves, new tracks occupying the site of the present engine terminal which will be rendered unnecessary by the electrification. Further south the present Thirtieth Street yard will also be reconstructed to form a double-decked terminal with warehouses and driveways systematically arranged on both levels and with connections between the two. This structure will occupy eleven city blocks. From this point south there will be only two main tracks which will reach a new terminal bounded by Canal, West, Houston and Washington Streets, the tracks in this section being elevated and on private right-of-way, alignment being sacrificed to bring the road on the cheapest land.

The plans for the improvement have been developed through the collaboration of the engineering department of the New York Central Railroad, and a board of consulting engineers acting for the port and terminal committee of the City's Board of Estimate and Apportionment, consisting of Ernest P. Goodrich, C. W.

Staniford and John F. Sullivan. For the railroad company, G. A. Harwood, chief engineer of electric zone improvements, has been in general charge of all matters pertaining to the permanent construction, the electrical equipment being in charge of E. B. Katté, chief engineer of electric traction.

ELECTRICAL EQUIPMENT

An interview with Mr. Katté in regard to the plans for the electrical equipment that will be used within the newly electrified district brings out the fact that the locomotives that will have to be provided for the electrification will handle two classes of service, namely, road-freight and switching. The former includes the through-freight trains hauled between the yards on Manhattan Island and the steam locomotive terminal at Croton, which constitutes the northern end of the present electric zone. The switching service will cover operation in the various yards, and also most of the local freight work that involves setting out and picking up cars at the towns along the electrified route. At the present time the details for the design of the electric locomotives for these purposes have not been definitely determined, nor has it been decided how many of each type of locomotive will be needed in the different classes of service. However, present indications lead to the belief that approximately seventy-five locomotives will be required for all of the operations involved in both switching and road work.

Under present conditions of operation trains up to seventy cars in length and reaching 3000 tons weight are handled on the West Side tracks. However, most of the trains are 1500 tons or less in weight. Much of the freight traffic is handled at a relatively high speed, not only because the freight is largely of a perishable character, such as foodstuffs, but also because the dense passenger traffic requires the freight trains to keep out of the way of frequent fast movements. These conditions impose rather unusual requirements for the electric locomotives that are to be used. In addition, the runs in all cases will be short, even for the road locomotives, which will operate only between New York and Croton, a distance of 34 miles.

All of the electrical equipment for the locomotives will be insulated for 1200-volt operation, according to the practice adopted by the New York Central Railroad in connection with its last purchase of electric passenger locomotives. This provision has been made on account of the possibility of extending the electric zone farther northward. Pending such extension, the voltage to be used in the new electrified district will be either 1200 or 600 volts, a definite selection not yet having been made. In the event of adopting 1200 volts for the working conductor on the West Side tracks, the voltage on the existing electrified tracks would not be changed, because the new freight locomotives would be designed to operate either on 1200 volts or 600 volts.

Power for the new electrified district will be supplied from three new substations, all of which will be installed on the route covered by the proposed electrification and generally near the large yards. A new 20,000-kw. turbo-generator also will be installed at the railroad company's Yonkers power station, which supplies the northern end of the present electric zone, the southern end being supplied by a station at Port Morris. An interesting fact that appears in connection with this new unit is that although its capacity is 20,000 kw. it will be installed in a space that was originally provided for a future 5000-kw. unit, the saving in space being affected by the extraordinary advances in the state of the art that have been effected within the last decade.

Suggested Regulatory Changes

Committee Appointed by Philadelphia Trade Bodies Makes Preliminary Report on Reasonable Regulation of Railroads

FEDERAL incorporation of interstate transportation companies, the subjection of such companies to federal regulation only, and the reorganization of the Interstate Commerce Commission constitute the main changes suggested by a committee of Philadelphia business men for the improvement of railroad regulation. On March 15, 1915, representatives of ten of the leading trade bodies of Philadelphia met in conference, and a month later a joint committee was organized and a sub-committee appointed to study the question of regulation. The sub-committee communicated with the leading commercial organizations of the country and formulated a report which was recently adopted by the joint committee.

The report does not do more than suggest possible solutions of the regulatory question, and leaves the matter open for further consideration. Among such possibilities are the granting of federal charters to such railroads as might elect to incorporate under the provisions of a federal railroad act, with or without the right to retain certain privileges contained in some of the State's charters, legislation by Congress designed to vest the federal commission with exclusive control of rates whether interstate or intrastate, and to limit carefully the State control over administrative and operative points to matters of purely local concern, and legislation by Congress amplifying the powers of the federal commission so as to intrust to that body all questions whatever, whether of rates or of administration and operation. In order that the federal commission might to better advantage handle the work thrust upon it, it is suggested that one practical method of meeting such a condition would be to create a new body dealing with the administrative matters and working in conjunction with the present commission, which would deal exclusively with rate matters. The country could be divided into districts, and in each district a branch of the commission could be established to deal with local matters, there being an appellate body in Washington to determine questions of fundamental principle and to harmonize the actions of the district tribunals.

The sub-committee concludes that governmental regulation means the assumption by the government of responsibility for the success or failure of railroads, for attempts at regulation which fail in the appreciation of the true afflicted, in constructive method or in technique, may result in the complete disorganization of the lines. Furthermore, regulation cannot be conceived from the narrow point of view of merely reducing rates, for that point of view loses sight of essential needs, both of the railroads and the country at large, and thus naturally defeats its own ends. A proper view of governmental regulation must take into account the encouragement of railroad building and operation, the better mobilization of present facilities and the modification of harmful competition, as well as the prevention of inequalities of service to the public and the enactment of rates greater than those properly chargeable in an open competitive field.

The publicity department of the Illinois Traction System, Peoria, Ill., announces that in order to provide for the proper laundering of the linen head rests used on car-seat backs and other linens used in the company's sleeper and parlor car service, the company will erect its own laundry at Springfield, Ill.

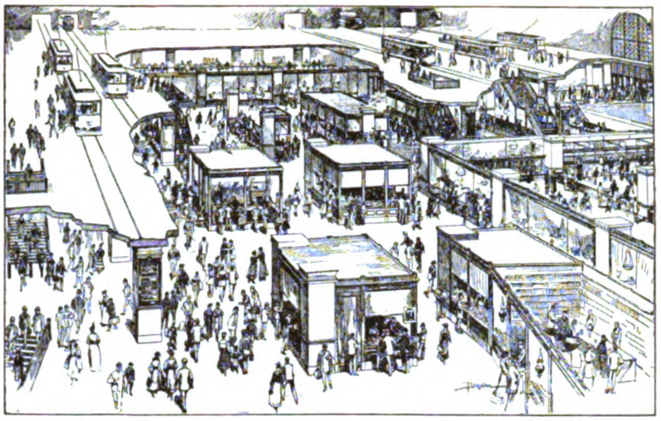
Newark $6,000,000 Terminal Project an Accomplished Fact

Rerouteing of Cars of Public Service Corporation, Made Possible by This New Terminal, Will Eliminate Congestion in Newark's Busiest Centers

EXTENSIVE rerouteing plans are being carried out to-day as a result of the completion of the new Public Service Terminal Building in Newark, N. J. Progress on this terminal has been chronicled from time to time in the ELECTRIC RAILWAY JOURNAL,* so that the readers are familiar with the details of this great project. In a later issue the history will be reviewed and details of the routeing and signal system will be given. The accompanying illustrations show the present appearance of the building and general layout of the ground and elevated floors. The subway floor is not shown in the line drawing.

The terminal building is located less than 1000 ft. from the corner of Broad and Market Streets, one of the most congested two points in the city. It is in the heart of the business district facing on Park Place and within easy walking distance of the Hudson & Manhattan Railroad Terminal. Electric cars enter the terminal from the east over an elevated structure and from the west through a subway. The ground floor, or concourse, is free from tracks and contains the showrooms of the Public Service Gas Company and Public Service Electric Company, checking booth, newsstands, etc.

Above the elevated train floor are six office floors for the use of the Public Service Corporation and of the subsidiary companies which comprise it. Each office floor has an area of 30,000 ft. These floors are of a rather irregular form, due in part to the shape of the plot of ground, which is completely covered by the ground floor, and partly by the desire to secure perfect lighting of the rooms.



PUBLIC SERVICE TERMINAL, NEWARK, N. J.—SECTIONAL VIEW OF CONCOURSE AND ELEVATED TRAIN FLOOR

In considering this terminal and the rerouteing of which it forms a part, the peculiar situation of Newark with respect to the surrounding towns must be kept in mind. All of this part of New Jersey is almost continuously built up. Thus while the population of the city itself is but about 400,000, there is a surrounding population sufficient to give a total greater than that of Cleveland, if an equal area was covered within the city limits. These surrounding cities are connected with the new terminal by ten lines. It is to accommodate the traffic to and from these outlying points and to prevent interference between it and the local traffic that the terminal undertaking has been carried out.

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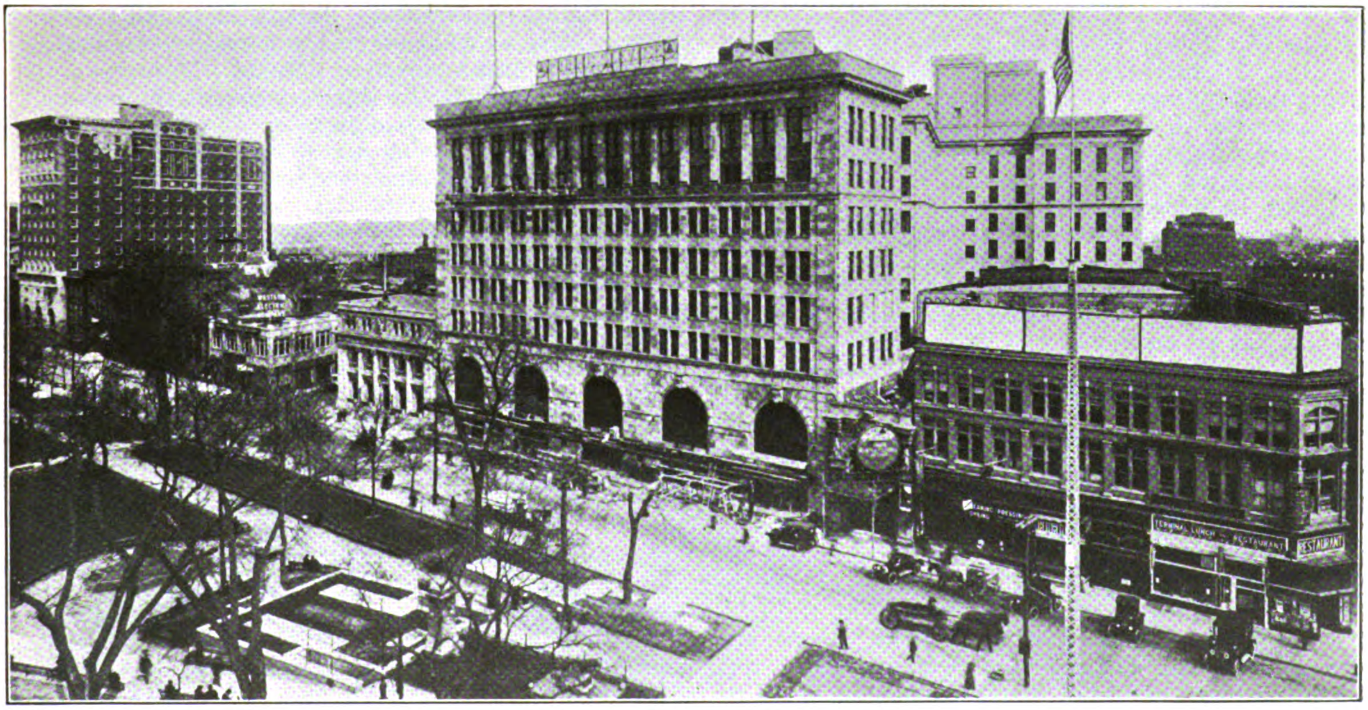
*The following references cover in detail the history of the terminal project: ELECTRIC RAILWAY JOURNAL, Vol. 41, 1913, Feb. 1, page 223; Feb. 8, page 246; April 26, page 77; May 17, page 904; June 28, page 1173; Vol. 42, 1913, July 26, page 127; Nov. 1, page 992; Vol. 43, March 28, 1914, page 740; Vol. 44, 1914, July 25, page 180; Sept. 5, page 454; Nov. 28, page 1190; Vol. 45, April 24, 1915, page 793; Vol. 46, July 24, 1915, page 151.

Statistics of the Imperial Russian Technical Society show the available water power in European Russia, including Finland, the Urals and Caucasia, to be, roughly, 30,000,000 hp. The potential water power of Germany is about 1,000,000 hp., that of Switzerland 2,500,000 hp., and that of Sweden more than 6,000,000 hp. Of the latter, about 3,500,000 hp. is not yet utilized. In Switzerland 300,000 hp. and in Italy more than 400,000 hp. are utilized, whereas hardly 250,000 hp. is utilized in Russia.



PUBLIC SERVICE TERMINAL, NEWARK, N. J.—PARK PLACE ELEVATION—SHOWING ENTRANCES TO CONCOURSE AND OFFICE BUILDING

Car Design Discussed in Boston

Massachusetts Commission Conducts Hearing at Which Best Car Types for Various Classes of Service Are Considered

A CONFERENCE on car design from the transportation point of view was held by the Massachusetts Public Service Commission at its offices in Boston on April 20. Representatives of all the larger electric railways of the State were present. The conference was called by the board in connection with a petition of the Massachusetts Northeastern Street Railway for approval of plans for twelve new semi-convertible cars resembling in general features the latest type of semi-convertible car designed by E. W. Holst, superintendent of equipment, for the Bay State Street Railway. D. A. Belden, president of the Massachusetts Northeastern, said that the cars desired are planned to meet the average needs of service on the suburban and interurban lines of his system. The seating capacity proposed is forty-four, there being twelve cross and four longitudinal seats. The weight of the car would be about 42,000 lb., and it would be equipped with four motors of about 40-hp. rating each.

Mr. Belden said that instead of passengers entering and leaving by the rear door as at present, the new cars will provide for entrance at the rear and egress from the front door. The cars can be readily adapted to prepayment service. The platform length, 6 ft. 6 in., is somewhat longer than that on the Bay State cars. Straps covered with "Aero" metal are to be used over the longitudinal seats and handles will be provided on the corners of the cross-seats. Mr. Belden said that it is a decided advantage for the conductor's station to be the rear vestibule in case of losing the trolley from the wire during high-speed operation. The estimated cost of these new cars is about $7,000, complete, and it is planned to operate them between Haverhill and Lawrence, Mass., and also between Haverhill, Amesbury and Newburyport, Mass. It is expected that these cars will furnish satisfactory service in handling the through traffic to and from the shore resorts in northeastern Massachusetts and southern New Hampshire.

ONE-MAN CARS DISCUSSED

Ralph S. Bauer, chairman of the Lynn (Mass.) Chamber of Commerce, then addressed the commission upon the advantages of one-man car service in communities of all but metropolitan class. He contended that every modern street car should be equipped with a fare box, saying that an increase in receipts of 15 per cent may be expected to follow such an installation. Mr. Bauer estimated that if fare boxes should be installed on the entire Bay State system, the receipts of the company would be increased by $2,000 a day. He urged the commission to require the adoption of the one-man car in cases where it is applicable and cited observations of its utility gathered in a recent trip to Spokane, Wash., Topeka, Kan., Duluth, Minn., Quincy, Ill., Detroit, Mich., Toronto, Ont., and Cleveland, Ohio.

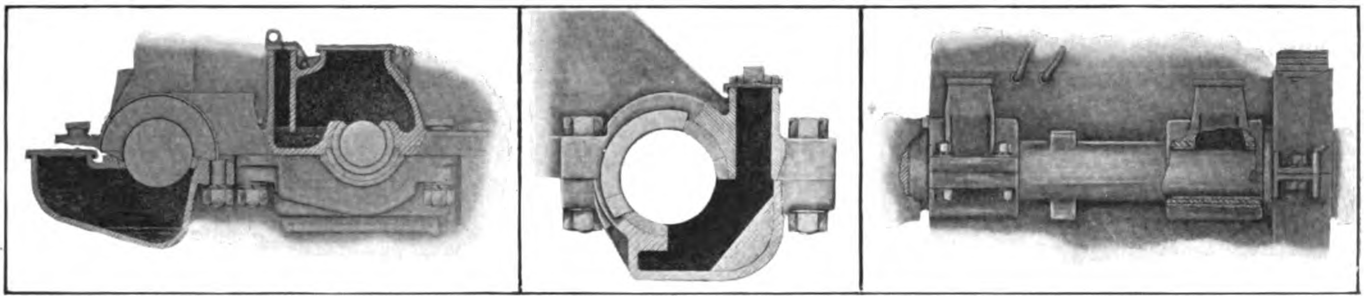
A. Stuart Pratt of the Stone & Webster Management Association, Boston, told the commission about the Birney one-man car, recently described in this journal. The speaker regretted Mr. Birney's enforced absence in the West at the time of the hearing but pointed out that while most traction men looked rather askance at the light-weight, one-man car until recently, it is believed that the anticipated difficulties with it have now been solved. The element of danger resulting from the employment of but a single person on a rolling stock unit is overcome by the automatic facilities by which, in case the motorman should fall unconscious at his post, the controller handle will cut off power, the brakes will be applied, sand discharged upon the rails, the doors opened and the steps lowered. Mr. Pratt said that too many cars weighing from 40,000 to 50,000 lb. are being hauled about in non-rush hours at present, often carrying but from seven to twenty passengers. The single-truck car, he stated, is not well adapted to interurban service. Answering an inquiry relative to the adaptability of one-man cars on the Blue Hill Street Railway, Mr. Pratt said that this line serves a suburban and rural area south of Boston and that it has no business of a strictly interurban character. Its peak loads occur on Sundays and holidays in the summer, when a heavy traffic is handled to and from the Blue Hill Reservation and other outdoor points. The company could not handle its traffic with one-man cars. It now has nineteen cars and its normal schedule weekdays calls for but five. To handle the peak traffic extra men are employed from local factories.

H. B. Potter, assistant to the vice-president Boston Elevated Railway, said that very little opportunity exists for the use of one-man cars on the Boston system, which has few lines not characterized by heavy peak loads. Possibly on a very few lines it could be tried out with some promise of success, but the particular problem of the Boston company seems to be better solved through the use of heavy equipment adequately powered to haul trailers in the rush hours. The center-door trailer used in the prepayment area is giving remarkably good service at Boston. Comparatively few single-truck cars are now used in Boston.

In a discussion on ventilation which then followed, John Lindall, superintendent of rolling stock and shops Boston Elevated Railway, said that preliminary experiments with forced ventilation under the seats had not worked out very satisfactorily at Boston, the present service being largely accomplished by the use of monitor sashes and Perry ventilators. Frank A. Barbey, Boston, discussed the advantages of deck ventilation. In passing, Mr. Lindall remarked that the Boston company has been making studies for a center-entrance motor car suitable for train operation.

Bentley W. Warren, counsel for the Massachusetts Street Railway Association, Boston, stated that street railways have no escape from the necessity of reducing expenses or increasing their income. More "net" is absolutely essential. In this connection, the one-man car is a very important subject for consideration, especially on lines not having a rush-hour traffic. The use of one-man cars on branch and side lines would enable companies to put on more cars and utilize men on the lines of heavy traffic to better advantage. It is a question of redistributing labor rather than of getting along with less men. Some of these cars are now being operated in places as large as any in Massachusetts, except Boston, and the percentage of accidents appears to have actually diminished. The hearing closed with a statement by Mr. Bauer to the effect that in four States where one-man cars had been put on, the opposition of labor was soon overcome when it was found that such equipment shortened the feasible headway, creating more business and leading to the employment of more men.

In thanking the various officials of the electric railways present for attending the conference, Chairman McLeod requested that the commission be kept informed in future as to all contemplated developments of significance in rolling stock design, as the board is desirous of maintaining the most up-to-date possible knowledge of the subject.



TYPE OF AXLE BEARING PERMITTING WASTE TO FALL AWAY FROM AXLE; AXLE BEARING WITH WOOD BLOCKS TO PREVENT WASTE FROM FALLING AWAY FROM AXLE; CAST-IRON SLEEVE CONTAINING AXLE BEARINGS

Progress in Car Equipment Lubrication*

The Gist of the Author's Contention is That "High Maintenance Costs and High Lubrication Costs Go Hand-in-Hand"

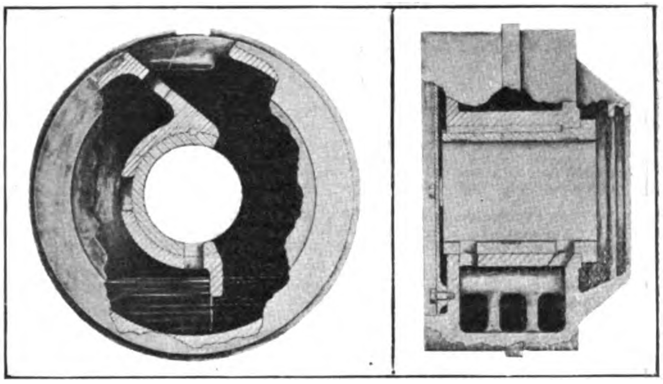
By **ALFRED GREEN**
Mechanical Expert Galena Signal Oil Company, New York

TO insure reliable and economical maintenance, the item of proper lubrication is always important, for no matter how mechanically correct a rapidly-moving part of an equipment may be in design, it will ultimately be doomed to failure if the supply of lubricant for that part cannot be relied upon. The matter of providing proper lubrication has been allowed to drift more or less, having been considered of secondary importance. Concerted action has not been required of those who should be vitally interested in eliminating direct or indirect failures due to lack of proper lubrication.

OLD MOTORS CAN BE ADAPTED TO MODERN LUBRICATION

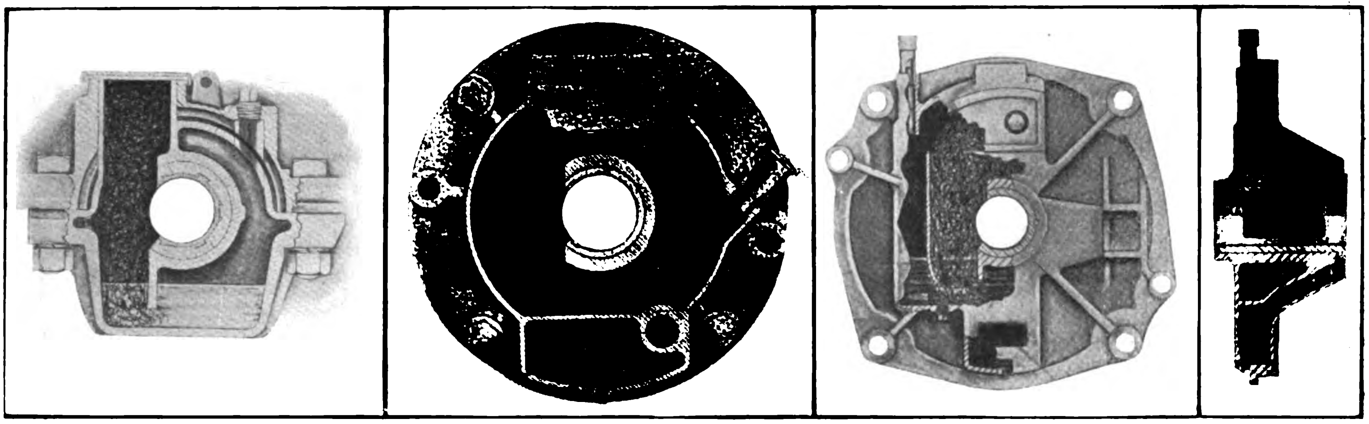
The original double-reduction motors were equipped with compression cups, as grease was considered the most reliable lubricant. The compression cups gave no end of trouble due to loss or breakage, and eventually a grease receptacle was incorporated directly over the bearing lining as part of the frame casting. As grease required the bearing to heat up before it could be melted and lubricate, the results obtained were very unsatisfactory. Motor designers then constructed the lower part of the motor frame under the bearing so that it formed an oil well, in which were placed pieces of felt secured to springs to keep them pressed against the shaft. Oil was supposed to be fed by capillary attraction while the upper grease chamber fed grease. Under such conditions the grease soon clogged the self-feeder and retarded or cut off the flow of oil so that the lubrication was not much improved.

Adaptation of grease-lubricated motors to oil lubrication was first taken up by the electric street railway master mechanics at their convention in 1903, after which a number of roads concluded to adopt oil as the lubricant for their motor equipment. There was no co-operation in the development of an oil cup which would fill all requirements. The result was that a large number of cups were designed and patented, the majority of these being found worthless as far as reliability and economy were concerned.



EXPERIMENTAL ARMATURE HOUSING FOR RE-USE OF OIL

As many old-type motors are still in service, it is a



MODERN PLANS FOR MOTOR LUBRICATION USING CAPILLARY TYPE FEED DESIGNED TO INSURE AN AMPLE SUPPLY OF CLEAN OIL question to some railways whether it is worth while to equip such motors with devices to insure reliable lubrication, because it is possible that the equipment may be discarded within a few years. Some have tried different methods with more or less satisfactory results. Still other roads, realizing that the motors are still good for a few years' service and perhaps more if they can be improved, have decided that it is worth while not only to study conditions and redesign the lubricating facilities, but to provide schedules of lubrication and to put the old motors in a favorable position as compared with more modern equipment.

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*Abstract of a paper presented before the Connecticut Company Section of the American Electric Railway Association on April 4, 1916. See also an article on this subject by Mr. Green in the issue for Feb. 7, 1914. The present paper is to be published complete for general distribution by the Galena Signal Oil Company.

LUBRICATING SCHEDULE FOR ELEVATED EQUIPMENT

January 1, 1915

ARMATURE BEARINGS

WH-50L and WH-300 type motors are to be oiled on regular inspection, i. e., every 1,000 miles.

Pinion end oil level is to be maintained at 2½" in depth on each regular inspection.

Commutator end oil level is to be maintained at 1½" in depth on each regular inspection.

The depth of oil in oil well is to be measured with brass rule, especially furnished for the purpose.

WH-50 B, E and Walker L-15 motors are to have two (2) gills of oil added to the pinion end bearing and one (1) gill to the commutator end bearing on regular inspection.

On regular overhauling add three (3) gills to the pinion end and two (2) gills of oil to the commutator end bearing.

MOTOR AXLE BEARINGS

The WH-50 B, E&L, also Walker L-15 and GE-212 are to have one (1) gill of oil added to each bearing twice a month during the summer Coney Island service. All other months of the year, one gill is to be added to each bearing.

WH-300 type motors to have oil level maintained at 1½" in depth. Oiling dates to be so arranged as to permit oiling while cars are in for inspection.

MOTOR JOURNAL BOXES

Motor truck journals are to be packed with new saturated waste at the time of overhauling of motors and trucks. The journal waste is to be withdrawn every six (6) months, resoaked and put into service for another period of six (6) months.

TRAILER JOURNAL BOXES

Trailer journal boxes are to be packed with waste taken from the armature, axle and motor truck journals. These boxes are to be repacked every six months after date of overhauling. Old waste removed from trailer journal boxes will be pulled apart and resoaked. Any material found unfit for further service must have the oil removed and the waste destroyed.

INSPECTION

Journal boxes are to have covers opened for observation each regular inspection.

LUBRICATION OF GEARS AND PINIONS ON OVERHAULING

The GE-212, WH-300, also WH-50B, E & L and Walkor L-15 gears and pinions are to have from 4 to 6 pounds of gear grease applied on each regular overhauling.

LUBRICATION OF GEARS AND PINIONS ON INSPECTION

On each 4 months' inspection add two pounds of gear grease to the WH-50B, E & L, and Walker L-15 gears and pinions.

The GE-212 and the WH-300 gears and pinions are to have two (2) pounds of gear grease added every two months.

COMPRESSOR

(Oiling on Regular Mileage Inspection)

On Christensen B-2 and C-3 type, oil is to be added until it reaches the bottom of the filling elbow.

National BB-4 type, oil is to be added until it reaches 2" above bottom of filling elbow.

The commutator end armature bearings are to be oiled on inspection.

On the WH-D2 and D-4 type, oil is to be added until filled to ¾" above bottom of filling elbow. Oil must be drained from gear case and returned to crank case and new oil is only to be added when the oil from the gear case does not meet the required level.

AIR BRAKE CYLINDERS

All cylinders are to be lubricated with Marvin's Air Brake Compound when overhauled.

The application of this lubricant should be made after the cylinder, piston and packing leather are thoroughly cleaned, then a thin coat should be applied to the walls of the cylinder with a brush.

EMERY LUBRICATOR

The Emery lubricators are to be inspected on regular inspections and an Emery stick lubricant to be installed when found necessary.

MOTORMAN'S BRAKE VALVE

The motorman's brake valves are to be lubricated with olive oil when found necessary on regular inspection. A few drops to be applied through the stem to lubricate leather and also through plug to lubricate rotary.

CENTER AND SIDE BEARINGS

Ball bearing center plates and roller side bearings are not to be lubricated. Straight surface, cup type center bearings to be lubricated with center plate grease mixed with graphite once every 4 months. Dates to be so arranged that lubrication will fall due on dates that cars are placed for overhauling and inspection. All side bearings with exception of those of the roller type are to be given a brush of grease on each mileage inspection.

TROLLEY EQUIPMENT

All trolley wheels are to have the Emery brake cylinder lubricant forced into the hollow axle with pressure guns on regular inspection. Trolley bases are to be lubricated with car oil through stem of stand when found necessary on inspection.

CONTROL EQUIPMENT

For fingers and plates of the upright controllers, use compressor oil as found necessary on inspection and yearly overhauling. The lubricant to be applied with a piece of felt.

For walls of cylinders on both upright and U S G control use Emery brake cylinder lubricant and apply small quantity with hand at the time of overhauling. New leathers and those removed at the time of overhauling are to be soaked in 20 cold test Neatsfoot oil for 48 hours. These leathers are to be treated with Emery lubricant on each controller overhauling or where found necessary on inspection. The Emery lubricant to be thoroughly rubbed into the pores of the leather. Bearings in the upright control are to have a few drops of the compressor oil added as found necessary on regular inspection.

DRAWBAR FACES, BRAKE RIGGING, ETC.

Lubricant to be a mixture of center plate grease and all refuse oils. The mixture to be applied with a brush on every mileage inspection of motor and trailer cars.

LUBRICATION SCHEDULE FOR LARGE PROPERTY SHOWING FAVORABLE COMPARISON BETWEEN OLD AND NEW EQUIPMENT, THE FORMER HAVING BEEN MODERNIZED BY NEW CAPS OR WELDED CUPS OF THE CAPILLARY TYPE

After grease had been discarded as a lubricant, oil was used at first by means of felt feeders, and then by means of wool waste, the latter being found to be the best material. Oil is carried to the bearings by means of capillary attraction, being added at the bottom of the bearing well, picked up and filtered by the wool waste.

On one large railway property experiments are being made with an improved type of housing in which oil is returned to the oil receptacle for further service. The object of this is to keep the oil out of the insulated parts of the electrical equipment, and to prevent surplus or used oil from flowing into the gear case and causing the lubricant there to become thin enough to flow out of the case into the street, leaving the gears without the necessary lubricant. At the same time the elimination of the loss of oil permits the lengthening of time or increase of mileage between lubrications.

When the first cars were equipped with electric motors the gears were protected by mud pans suspended at the four corners to the body of the car with canvas so arranged around the sides as to protect the motor from the mud and water of the street. The only lubrication provided for the exposed gears was applied by hand. As crude as this method may appear it was in certain respects superior to some of the supposed modern methods. Metal cases which are so arranged that the wheel hub extends into the case make it impossible to provide a watertight joint. This construction allows the water and grit picked up by the wheel and running into the case to stay there as an effective grinding agent.

In order to insure the desired results with gears and pinions, it is essential that they be protected from grit and dirt and that they be properly lubricated. They must also be kept in perfect alignment so that the sides of the gear case will not be worn by the sides of the gear rubbing against them. Such rubbing not only destroys the case, but the cuttings remain in the case, stick in the grease, and are picked up by the gear and ground between the teeth. We cannot expect to overcome these difficulties as long as we allow an iron or steel axle collar, located without protection from grit and street dirt, to wear out the thrust end of the axle bearing, whether it is a steel shell babbitted, or a bronze bearing. The resulting wear causes the gear and pinion to get out of alignment, and is disastrous to both gearing and gear case.

Another questionable feature in the majority of present-day gear cases is the hand hole in the top, which some master mechanics think necessary for inspection and lubrication. This is, in reality, an additional entrance way for grit and dirt. In view of the high prices paid for gears and pinions and the importance of keeping them clean, this opening should be considered more of a curse than a blessing, on surface equipment at least, and it should be permanently eliminated.

AXLE BEARINGS SHOULD BE PROTECTED

For many years street railway motors have been operated with the ends of the axle bearings unprotected from street dirt to the detriment of the bearing and its seat. The dirt forms a grinding compound, wearing out both bearing and axle most expeditiously, producing a noisy equipment with its attendant racking of other parts, and continual extensive renewals.

Some of the older type motors had their axles entirely covered by the frame castings, and the axles were readily kept in condition without expensive or extensive replacements. In the majority of motors this feature was neglected, and it is only within the past few years that the value of protecting the entire axle bearing has been appreciated.

On one large property the motors have been equipped with a sheet steel cover which fits the gap between the two ends of the axle bearings, and is fastened to the frame casting by top bolts, the junction between the cover and the motor being made dust tight and watertight with a felt gasket. This practice has produced gratifying results. On modern motors, however, this feature is cared for by the manufacturer in the design.

On a railway operating between Syracuse and Rochester, N. Y., a test is being made with a cast-iron sleeve containing the bronze axle bearings. This sleeve is placed on the axle before the wheels are pressed on, and extends from the hub of the wheel to the hub of the gear, the wheel being counterbored so as to allow the sleeve to extend somewhat inside, so that the end may be protected from dirt. A fiber ring is placed at each end between the thrust ends of the sleeve and the hubs of wheel and gear, which obviates wear. It is expected that the bearings will wear 100,000 miles, and if this is found to be true the sleeves can be removed without unnecessary expense when this mileage has been made, as the wheels are pressed off and the axles inspected at such times. These sleeves are installed on Westinghouse No. 119, 125-hp. motors, in which type there is sufficient clearance between the axle and the motor frame to accommodate them. Many motors, due to the very scant clearance at this point, could not be supplied with this method of protection. With, perhaps, the use of thin steel tubing or pipe of sufficient diameter and removable bearing fitting it properly, this method could undoubtedly be used with many motors.

Journal bearings, when of proper mechanical design so as to give a bearing pressure of not more than 300 lb. per square inch, and when packed with waste of proper quality which has been thoroughly soaked and drained and which will at all times press against the axle, give very little trouble. On these bearings, the important points are: Proper lining to insure seating to a good, smooth bearing; sufficient side clearance to avoid wiping of the lubricant from the journal, and proper fitting and renewal of the dust guards at the back of the journal boxes.

Lubricating Schedule for Surface Equipment

January 1, 1915

MOTORS	ARMATURE BEARINGS *Lubricant ··· Electric Car Oil*			AXLE BEARINGS *Lubricant ··· Electric Car Oil*		GEAR CASES *Lubricant ··· Gear Grease*	
	FREQUENCY	QUANTITY COM. END BEAR'G	QUANTITY PIN END BEAR'G	FREQUENCY	QUANTITY	FREQUENCY	QUANTITY
WH 49 Handbrake	On Inspection	½ Gill	½ Gill	On Inspection	½ Gill	On Overhauling	2 lbs. per Case
WH 68 Handbrake	" "	½ "	½ "	" "	¼ "	" "	2 " " "
WH 68 Airbrake	" "	1 "	1 "	" "	½ "	" "	2 " " "
WH 81	" "	1 "	1 "	" "	½ "	" "	2 " " "
WH 93	" "	Raise Oil Level to 2 Inches	Raise Oil Level to 2½ Inches	" "	½ "	" "	3 " " "
WH 101	" "	" "	" "	" "	½ "	" "	3 " " "
GE 57	" "	1 Gill	1 Gill	" "	½ "	" "	2 " " "
GE 64	" "	" "	" "	" "	½ "	" "	3 " " "
GE 80	" "	" "	" "	" "	½ "	" "	3 " " "
GE 90	" "	" "	" "	" "	½ "	" "	2 " " "
GE 234	" "	" "	" "	" "	½ "	" "	3 " " "
GE 800	" "	½ "	½ "	" "	¼ "	" "	2 " " "
WP 50	" "	½ "	½ "	" "	¼ "	" "	2 " " "
						When changing wheels double quantity of gear grease.	

TRUCKS	DRIVER JOURNAL		PONY JOURNAL		BRAKE RIGGING	BEARINGS	
						SIDE	CENTRE
SINGLE	On Overhauling	Remove all Old Waste from Journal Boxes Replacing it with Properly Soaked and Drained Waste, Not Necessarily New Waste	On Overhauling	Same as Driver Journal	On Inspection Use Mixture of Old or Used Kerosene Oil and Centre plate Grease Where Required	On Inspection Use Thin Film of Centre plate Grease	On Overhauling Use No Lubricant on Roller or Ball-bearing Centrebearing On All Others Use Graphite
MAXIMUM TRACTION			On Overhauling	" "			
MCB			On Overhauling	" "			
BRILL 62-E			On 18,000 Mile Basis	" "			

GOVERNORS	Governor Piston and Leathers are to be Lubricated with Marvin Air Brake Compound. Place a drop of Air Compressor Oil on Stem.
AIR COMPRESSORS	Lubricate with Air Compressor Oil on Inspection. Fill Elbows to ½ inch from rim.
BRAKE CYLINDERS	And Slack Adjuster Cylinders are to be Lubricated with Marvin Air Brake Compound. The Application of Lubricant should be After the Cylinder, Piston and Packing Leathers have been Thoroughly Cleaned. Then a Thin Coat of Lubricant must be Applied with a Brush.
BRAKE VALVES	On Inspection ·· A Few Drops of Air Compressor Oil.
H & H-1 EMERGECY VALVES	On Overhauling ··· A Few Drops of Air Compressor Oil.
TROLLEYS	On Inspection ··· Apply a Few Drops of Sperm Oil to Shunts. See Book of Rules, Nos. 512-514, 516, 517.
CONTROLLERS	On Inspection ··· Lubricant Vaseline to be Applied to Contact Fingers and Plates with a Piece of Felt. Use Small Quantity Air Compressor Oil for Bearings.
C.E. CAR DOOR ENGINES	As per instructions contained in Instruction Bulletin No. 8.

LUBRICATING SCHEDULE SIMILAR TO THAT ON OPPOSITE PAGE, BUT FOR SURFACE EQUIPMENT

LUBRICATION OF THE AIR-BRAKE EQUIPMENT

Air compressors of modern design are free from many of the difficulties experienced with the original type of machines. The improvements have been made with the idea of reducing oil losses from the crank case past the piston into the air line. Another source of annoyance is the leakage of oil over the compressor, causing dirt to stick and accumulate and making the appearance anything but desirable. This was often caused by the force with which the oil was thrown by the gear against the upper part of the gear case and the under part of the armature bearing, causing it to leak past the bearing to the outside. This was brought about through the large opening in the crank case partition which has been eliminated in modern compressors. This allowed the oil to flow into the gear cases in such quantities that unless a high level of oil was maintained in the crank case, the cylinder farthest from the gear was not properly lubricated. As it requires very little oil in the gear case for the proper lubrication of the gear and the pinion, it has been found that with the partition opening closed the oil splashed over the top by the crankshaft is ample.

For the motorman's valve olive oil has been found to give the best results in service for many types of valves. That carefully made and somewhat intricate piece of apparatus, the triple valve, requires accurate adjustment so that the different air pressures will be properly balanced and controlled to the end that the moving parts may perform their functions properly and without hesitation. Several lubricants are successfully used on the bushings, pistons and slide valves of triples, but the most important thing, after choosing a lubricant that will not become gummy, is to use it as sparingly as possible. With triples on cars having motor-driven compressors there is a danger that they will be flooded with oil discharged into the system from the crank cases, past the pistons, and that erratic action of the slide valves will be caused thereby.

There are many methods in vogue to keep the center plate thoroughly lubricated. On the old type of plate designed for the use of grease, trouble is experienced by the grease being squeezed out, leaving the plate dry and dripping and subject to rust. An ideal lubricant is one that will not squeeze out, will not be affected by wheel wash, and will not gather dust and grit: Dry graphite is good but "don't stay put," so that a mixture of graphite and shellac, using as much graphite as can be mixed into the shellac, has been used with satisfactory results. The mixture, applied to upper and lower plates when the trucks are removed from under a car, becomes dry by the time they are overhauled and keeps the plate in good condition from one overhauling to another without further attention. This mixture has also been found satisfactory for ball-bearing plates.

There are many other parts of a car equipment which require lubrication and which cannot be taken up in detail within the compass of this article. Many parts are pneumatically or electro-pneumatically operated, involving the use of leather valves and pistons. The proper lubrication of these has been troublesome, particularly during cold weather, as the leather gathers moisture from the air and freezes, causing sticking and leaking. This trouble is found in pneumatic door engines, pneumatic-electric control apparatus, air-brake cylinders. On one large system these troubles have been overcome by the use of a compound worked into the leathers and applied to the walls of the cylinders.

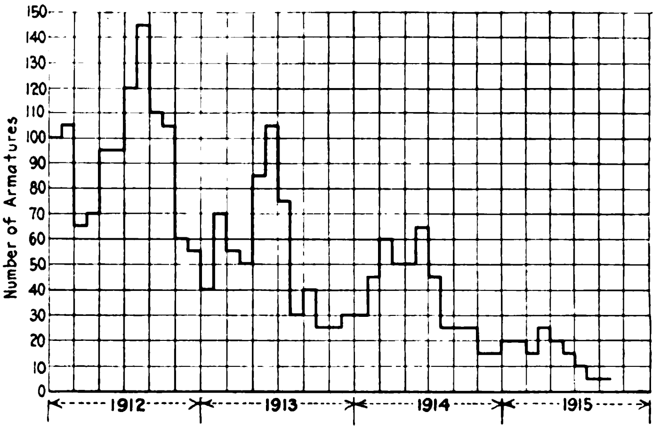


CHART SHOWING PROGRESS IN REDUCTION OF MOTOR ARMATURE DEFECTS CAUSED BY HOT BEARINGS

Lubrication on a Mileage Basis

Where the system of lubrication on a mileage basis has been adopted, the results continue to be very satisfactory. This is proved by the decrease in equipment troubles and the economics made possible which were never dreamed of when the equipment was lubricated on a time basis. There is nothing that shows the condition of the electrical and mechanical details of the equipment, more than the defects developed in service and the cost of lubrication per thousand car-miles. There is no greater folly than to attempt to save lubricants at the expense of the moving parts or other parts affected thereby, but it is the height of folly to attempt to overcome mechanical difficulties by flooding oil onto bearings that are absolutely unfit for the purpose for which they are being used, or that are in such a condition as to warrant their removal. High maintenance cost and high lubrication costs go hand in hand. The results obtained on one system are shown below.

Passenger Equipment Defects and Lubrication Costs on Large Electric Railway System

	Surface Equipment		Elevated Equipment	
	1909	1915	1909	1915
Total miles operated....	46,026,625	58,582,114	33,494,885	39,945,475
Total number of surface trouble in operation reported	33,386	39,704	21,116	5,311
Average cost of lubrication per 1000 miles, cents	19.2	12.57	19.9	12.66

Water Power and Transportation

Recent Progress in Steam Engineering Has Affected Water-Power Values.

At a meeting of the American Institute of Electrical Engineers, held in Washington, D. C., on April 26, L. B. Stillwell presented a paper discussing the effect upon water-power values of recent progress in the art of producing electric power by steam as well as the proportion which the cost of fuel for steam locomotives bears to the total cost of operation in steam railroad service.

The following table, taken from the Interstate Commerce Commission report for the year ended June 30, 1914, gives the cost of fuel for locomotives and total operating expenses for all railroads of the United States having operating revenues greater than $100,000 in a year:

Table I—Statistics by Divisions of All Railroads in the United States Having Operating Revenues Greater Than $100,000 in the Year

	Miles of Line Operated	Cost of Fuel for Locomotives	Total Operating Expenses	Ratio of Fuel Cost to Total Operating Expenses, Per Cent
Eastern District....	62,780	$104,461,133	$1,004,620,282	10.45
Southern District...	46,587	33,052,970	348,295,136	9.50
Western District....	136,257	105,286,696	847,397,741	12.40
All Railroads......	245,624	242,800,799	2,200,313,159	11.05

Table II gives the accounts in steam railroad operating expenses which would be affected by a change from steam to electricity, with the figures for steam and the estimated figures for electricity. These figures are from a table presented by the author and H. S. Putnam in 1907 before the Institute, and the figures for steam operation are the average for five years, from 1901 to 1905, as reported by the Interstate Commerce Commission. The author added that while these are now nearly ten years old, additional operating data of electrified railroads now available are corroborative of their general correctness.

These figures, which are in percentages of the total operating cost, show that the total estimated saving in cost of operation is approximately 18 per cent of the whole, and a saving of one-half in fuel represents about half of this total saving. Reduction in fuel expense secured by utilizing water power would, therefore, under average conditions, affect practically but one-third of the total savings due to electrification.

Table II—Possible Savings From Electrification, Based on Percentages of Total Operating Expenses

	Average Five Years	Estimated Cost of Operation by Electricity
54, Maintenance of way and structures...	21.003	22.354
55, Maintenance of equipment............	19.524	12.587
21, Engine and roundhouse men..........	9.451	4.710
22, Fuel for locomotives...............	11.292	5.702
23, Water supply for locomotives........	0.634	0.000
24, Oil, tallow and waste for locomotives..	0.381	0.250
27, Train supplies and expenses..........	1.537	1.000
29, Telegraph expenses................	1.780	2.000
35, Loss and damage..................	1.112	0.750
36, Injuries to persons................	1.086	1.000
37, Clearing wrecks..................	0.246	0.200
	68.046	50.553

(The above items are numbered as in the report of the Interstate Commerce Commission, and only items the amount of which is changed by electrification are included.)

Mr. Stillwell then pointed out that, broadly speaking, the commercial value of the development of stretches of navigable water by hydroelectric developments, as parts of waterways had less value than formerly to the public as an economic force to compel reasonable railway rates, because railway rates are now subject to regulation.

He then compared the cost of operation of a steam plant, including interest with that of a water-power plant, assuming in each case the continuous output of 50,000 kw. The steam station was considered as comprising five 12,500-kw. units, one as a reserve. The cost of such a plant at $63.70 per kilowatt would amount to $3,185,000, exclusive of the reserve unit. Assuming an annual load factor of 50 per cent, the output of the plant, when fully loaded, would be 219,000 kw.-hr., and its coal consumption, assuming coal to have 14,000 B.t.u. per pound, will require approximately 200,000 tons per annum. The cost of operation would then be as shown in Table III.

TABLE III—COST OF OPERATION OF 50,000-KW. STEAM STATION AT 50 PER CENT LOAD FACTOR AND COAL AT DIFFERENT PRICES

Price of coal per ton	$1.00	$2.00	$3.00	$4.00	$5.00
Interest depreciation and taxes at 12 per cent.	$482,200	$482,200	$482,200	$482,200	$482,200
Operating labor and material..	175,000	175,000	175,000	175,000	175,000
Annual costs, excluding coal...	$657,200	$657,200	$657,200	$657,200	$657,200
200,000 tons coal	200,000	400,000	600,000	800,000	1,000,000
Total annual costs	$857,200	$1,057,200	$1,257,200	$1,457,200	$1,657,200
Cost per kilowatt-hour, .50 per cent load factor, cents.....	.039	0.48	0.57	0.66	0.75

For a water-power plant of the same size, assuming an annual operation and maintenance of cost of $1 per kilowatt, the limit of investment theoretically permissible, with capital charges taken at 9 per cent, 12 per cent and 15 per cent, would be as shown in Table IV. This table is based on the assumption that the flow of water is practically continuous. If an auxiliary steam plant must be constructed to make up for a deficit of hydraulic power in dry seasons, the real value of the water power must be estimated upon a totally different basis. With the exception of the Niagara and St. Lawrence Rivers, there is perhaps no river in the country which is not affected by an occasional period of very low water.

TABLE IV—WARRANTED INVESTMENT PER KILOWATT IN WATER PLANT WITH VARIOUS RATES FOR CAPITAL CHARGES AND FUEL

Coal at..................	$1.00	$2.00	$3.00	$4.00	$5.00
(a) Cost per kw., 9 per cent cap. charges	$179	$223	$267	$311	$355
(b) Cost per kw., 12 per cent cap. charges	134	167	200	233	266
(c) Cost per kw., 15 per cent cap. charges	108	134	160	186	212

According to Mr. Stillwell, the reduction in cost of steam power, which in recent years has resulted from decreased cost and increased fuel economy of steam plants, has reduced very considerably the limits of investments in water powers which, theoretically at least, were permissible, say fifteen years ago. Within that period the cost of high-grade steam plants of large size has been reduced about $25 per kilowatt. The amount of coal required to produce a kilowatt-hour has been decreased approximately one-third, and the capitalized value of this saving is a further amount which must be deducted from the investment permissible in developing a water power.

According to the annual report of the Allgemeine Elektricitäts Gesellschaft, Berlin, Germany, for the year ending June 30, 1915, the shops of the railway department of this company were engaged on comprehensive work on the A. E. G. high-speed railway of Berlin and the completion of the State railway sections between Lauban and Königszelt and Halle and Merseburg. Three locomotives out of twenty-seven on order for the Halle line have been delivered. The Hamburg Elevated Railway would be completed in the current year, but owing to the war it was not possible to put in hand the extensions which were subsequently contracted for.

COMMUNICATION

Co-operation Between Railways and Schools in Educational Work

NEW YORK STATE RAILWAYS
ROCHESTER, N. Y., April 24, 1916.

To the Editors:

I was very much interested in the description of the co-operative engineering courses of the University of Cincinnati by Prof. A. M. Wilson. It is pleasing to note that some progress has been made toward specialized education of electric railway employees. During the past five or six years a great deal of attention has been given to commercial and industrial education and to vocational guidance. The desire for greater efficiency has led manufacturers and business men to devote much thought toward the development of proper means for educating or training employees.

It is to be regretted that electric railway men have not taken a more active part in this work, for there is no industry more in need of specially trained employees than theirs. The schools cannot give any great part of the special training required, but they can furnish the foundation or groundwork. The railway companies must do the practical training work. Heretofore, such work has been done in an unsystematic way, in many cases, and one can readily see that the schools or colleges, through co-operative courses, will encourage and stimulate the railway companies to plan their part of the training work in such a way as to obtain more satisfactory and efficient results. Undoubtedly, a railway organization would be more efficient if the head of each department had some practical experience in the other co-ordinate departments. In order to secure this, an apprentice system becomes necessary. To the persons taking up apprentice work in the various departments, a properly planned, co-operative college course would be an invaluable aid.

I believe that the co-operative college work for training railway employees has for its field the fitting or preparing of persons for the higher, administrative positions, and for this reason should not consist entirely of engineering studies. There should be some instruction in economics, psychology, administration and commercial law as well.

For the training of employees for the minor positions within each department, the so-called "continuation school" method seems admirably adapted. I have tried this out in the mechanical department for several years with very satisfactory results. Our method is to choose boys who have not had the advantage of much schooling but are, nevertheless, ambitious. We shift them around from one class of work to another, giving them a general practical training. During this training period each boy is required to attend the city shop school a certain number of hours per week and to take up a specially arranged course, the nature of which depends somewhat upon his previous education. By some this work has been done entirely at night. Others have arranged for time off during certain days of the week.

This work is not as comprehensive as that outlined in Professor Wilson's co-operative courses but it has a field of its own, in that it aids boys who could not consider the taking up of a complete college course. It has an advantage for the railway company also, as the persons who complete it usually remain with the company as satisfied, efficient employees.

G. M. CAMERON, Master Mechanic.

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

ASSOCIATION NEWS

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

Arrangements to Handle Exhibits at the Convention Are Well Under Way—Semaphore Clearance Signals Were Considered at a Committee Meeting on April 24—Chicago Elevated Company Section Holds First Anniversary Meeting—Denver Tramway Section Meets

General Association Activities

CONVENTION EXHIBITS

A meeting of the convention sub-committee on exhibits was held in Cleveland, Ohio, on April 20. Those of the committee present were: D. W. Smith, Detroit, Mich., chairman; J. J. Stanley, Cleveland; M. B. Lambert, Pittsburgh, Pa.; J. G. Barry, Schenectady, N. Y., and J. J. Dempsey, Brooklyn, N. Y. In addition there were present S. D. Hutchins, Columbus, Ohio, chairman membership committee; E. F. Wickwire, Mansfield, Ohio, chairman entertainment committee; J. C. McQuiston and H. W. Beaumont, Pittsburgh; F. H. Gale, Schenectady, and E. B. Burritt, New York. A general study of the situation was made and sub-committees were appointed to arrange with contractors for the usual equipment, and to prepare plans for decorations.

SEMAPHORE SIGNAL CLEARANCES

A meeting of the joint sub-committee appointed to consider the design of a standard semaphore signal diagram was held in New York on April 24, there being present G. N. Brown, Syracuse, representing the standing committee on block signals, and C. R. Harte, New Haven, representing the standing committee on power distribution. There had been prepared by the sub-committee a diagram in which a location for semaphore blades and masts had been provided, with special consideration to the standard clearance lines for rolling stock and structures, and this was discussed in detail at the sub-committee meeting, recommendations for presentation to the various standing committees that were interested being formulated with the new diagram as a basis.

FIRST GRADUATES OF CORRESPONDENCE COURSES

The International Correspondence Schools have notified the educational committee of the American Association that Andre Harduck, who is in the employ of the Interborough Rapid Transit Company, New York, recently completed the combined power-house and substation course. John E. Waller, Grand Junction & Grand River Valley Railway, Grand Junction, Col., finished the same course a few days later.

Activities of the Company Sections

CHICAGO ELEVATED SECTION

The first anniversary meeting of this section was held on April 18, in the Edison Building, Chicago, with an attendance of 100. The secretary reported a total of 222 applications received to date, with 185 paid up. At the organization meeting one year previous there were 138 applicants. The increase, therefore, is 61 per cent.

The president announced the appointment of P. V. Lyon, secretary to the general manager, as librarian of the section. He will keep copies of all of the proceedings, copies of committee reports, etc. A scrap book has been started in which are kept clippings of all accounts of the meetings and of section affairs.

Taliafero Milton, district engineer Electric Storage Battery Company, then spoke on the general subject of "Storage Batteries." He explained the theory and chemical action of the storage battery and went briefly into its history. The different types of plates were described and the particular field for which each type of plate was fitted was illustrated by means of slides. Mr. Milton showed some of the multitudinous uses to which storage batteries are put, from the extremely large batteries used for central station and railway purposes down to the small batteries used for ignition and telephone work.

The method by which discharge and terminal voltage of storage batteries is controlled was of much interest to the members of this section, as the Chicago Elevated Railroads have on their lines nine storage batteries of large capacity in which the discharge is controlled by booster sets. The end-cell method of voltage control for lighting work was interesting because of its contrast to the booster control method.

In conclusion Mr. Milton showed a number of slides of the installation of storage batteries for all types of service and spoke particularly of the development of the field of the storage battery for the operation of electric vehicles. As a proof of the severe usage the battery could stand without injury a six-volt, 120 amp.-hr. battery was short-circuited through steel terminals without any external resistance in the circuit. The terminals rapidly came to a white heat and were melted off, but even with this current many times in excess of the rated output of the battery no injury resulted.

Mr. Milton's talk was of particular value because a great majority of men on these properties come in contact with storage batteries used in power work, control apparatus, telephone or interlocking in their daily duties.

By way of entertainment Frank Devlin, motorman on the Chicago Elevated Railroads, with his two sons seven and nine years old, performed on banjos to the great delight of their audience. The evening was made lively by songs in which the entire gathering joined and the meeting was adjourned by the singing of "America."

DENVER TRAMWAY SECTION

The regular meeting of company section No. 3 was held in Denver on April 20 with an attendance of seventy-five. W. G. Matthews, president of the section, gave a brief introduction to a motion picture trip through the State of Colorado, the films for this trip having been loaned by a local firm. The presentation of the pictures was followed by musical selections, after which an instructive paper on "Bonds and Bonding Practice on the Denver Tramway System" was read by George H. Eveland of the power department. In this paper the writer covered both past and present local bonding practices.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices
in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Portable Testing Apparatus Arranged for One-Man Operation

BY E. D. RANSOM, B.E.

The photographs reproduced herewith show how an inspection shop, maintaining approximately 450 multiple-unit elevated cars, had all of the necessary apparatus for car testing grouped on a small wagon or cart and arranged for operation by one man. By means of batteries, master switch, telegraph keys and jumper connections the operation was made so simple that seven cars could be tested and inspected in four hours, where previously three men had taken the better part of a day.

In addition to the saving in time and labor a complete record was kept, the results of the tests being tabulated on the top of the wagon. On a table located here standard readings were displayed for comparison with the results of each test, any variation from the standards indicating the presence of trouble. Where previously one man was needed to operate the master controller, another at the limit switch to give the required position of the controller and a third to do the actual testing and inspecting required, now one man can place this wagon alongside the car to be tested, and he has all of the apparatus necessary to operate the controller and make the desired tests right under his hand. By manipulating the several switches and keys he can place the controller on any position required, drop it off and run it up again more readily than if he were in the cab of the car, and he is always where he can see the results of the test being registered on the test apparatus. In addition to all this he can place the wagon directly beside the controller and watch the operation of each switch as he manipulates the controlling keys.

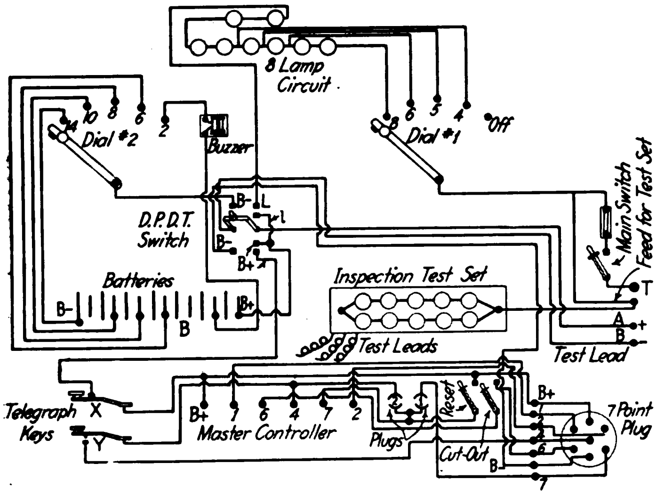


FIG. 1—CIRCUIT DIAGRAM OF TEST SET

On the system where this wagon is in use the equipment consists of Westinghouse A B unit-switch groups, 251-1-3 switch groups and Westinghouse 131 and 160 upright controllers operated by 14-volt battery control circuits with limit control and line switch protection. The above information is necessary to fully understand the uses made of, and the advantages gained by, the use of such an outfit.

The test wagon has the following apparatus, which is wired up as shown in Fig. 1 and described later: Set of batteries similar to that used in car; dial for use in regulating battery pressure from 2 to 14 volts; series circuit of eight lamps; dial for varying circuit from four to eight lamps; car inspection test set; master controller similar to that used on cars; buzzer for ringing out circuits; telegraph keys to operate limit switch and controller point by point; seven-point jumper for connection of test batteries to car control circuit under test, for operation from master controller on test panel; necessary switch and plug connections.

Fig. 1 shows the test circuits which are as follows:

The batteries *B* are connected with plus and minus to bottom posts of the double-pole switch through the contact arm on dial No. 2, by means of which the pressure can be adjusted to 2, 6, 8, 10 or 14 volts. The last position of this arm gives 2 volts through a buzzer to the negative test lead, which is used with the positive test lead whenever a bell circuit is needed.

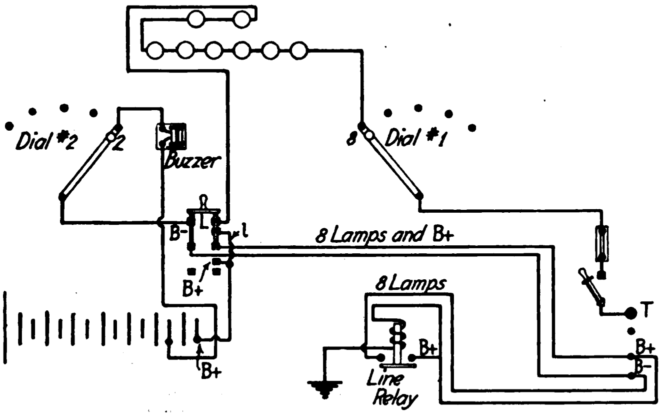


FIG. 2—DIAGRAM OF LINE RELAY CONNECTIONS

The eight-lamp circuit is connected to the top right-hand post of the double-pole switch through dial No. 1, by means of which 4, 5, 6 or 8 lamps can be connected in circuit for use in locating grounds and testing line relays, the positive test lead being used.

The blade posts of the double-pole switch are connected to two plugs on the side of the wagon, which are used for lead connections to the equipment as shown at *AB* in Fig. 1.

From the preceding three descriptions and a study of Fig. 1 it can be seen that when the double-pole switch is thrown to the "up" position it is possible to obtain a circuit of from four to eight lamps on the positive test lead. This position is also used in testing line relays, giving a battery circuit at the same time as lamp circuit, as described later. By having this switch thrown to the "down" position it is possible to obtain from 2 to 14 volts at the seven-point plug on the side of the wagon, first passing through the master, reset and cutout switches, as on a car, and also through controlling telegraph keys. From this seven-point plug a jumper connection is made to a seven-point receptacle on the car, the car batteries being made inactive so that control operation is then possible solely from the test panel.

The plug shown as "Feed for Test Set" is for a 550-volt trolley connection to this apparatus, the voltage being reduced by two series circuits of five lamps each in parallel, which is a part of the set.

The plugs *P*1 and *P*2 were inserted, as it was found that, due to the difference in operation of the 131 and 160 control circuits and the *AB* and 251-1-3 switch group control circuits, it was impossible to get beyond the full series position. This was overcome by the plug *P*2 which short-circuits the No. 4 and No. 7 wires at the telegraph key *Y* giving the desired result, *P*1 being used for all other tests.

From the above it can be seen that on this test wagon are the means to make any test necessary to determine the condition of an equipment under inspection in addition to the visual inspection which is often too much depended upon.

Tests. The test cart is pulled up beside the car to be tested, beside the controller when possible, and a trolley connection is obtained from the car for the main switch *T* which feeds the 550-volt side of the test panel. The seven-point jumper connection is then made to the car receptacle, the car batteries made inactive and the following tests are made:

Test No. 1—*General Inspection.*—The inspection test set is applied to the car and a general reading is taken of the resistance of each control circuit from line switch to ground through motors and resistance on each position of the controller. The tests made by this will not be described, as they were previously given in an article in the issue of the JOURNAL for June 3, 1914. Although partly a repetition of the statements made in that article it may, for completeness, be well to state here that the car inspection test set is built on the principle of the Wheatstone bridge, namely, the balancing of a known resistance against the car circuit to be measured. Each type of equipment has its standard of resistance readings for each point of the controller, which are displayed on the table for the guidance of the operator. By operation of the controller the resistance from line switch through all control, motor and resistance circuits to ground, the actual path of the operating current, is measured. The lead from the test set is attached to the positive side of the line switch and the controller is then operated by means of the apparatus on the test panel. The master controller is advanced to the full series position, after which the points are obtained one at a time by means of the telegraph key which operates the limit switch. The reading taken on each point is entered on a tabular form and by comparison with standard readings any open or short circuit or poor connections can be located. To obtain the full value from this test the writer would suggest that it would be worth the time of the reader, if he is sufficiently interested, to refer to this previous article as the methods used and results obtained are described, especially with regard to the manner of tracing the trouble through each part of the equipment until it is located at the exact point.

Test No. 2—*Insulation Leakage.*—The inspection test set is also equipped so that any leakage, to the nearest megohm, can be measured and test No. 2 locates any such leakage up to a dead ground. The test lead remains on the line switch, and by advancing the con-

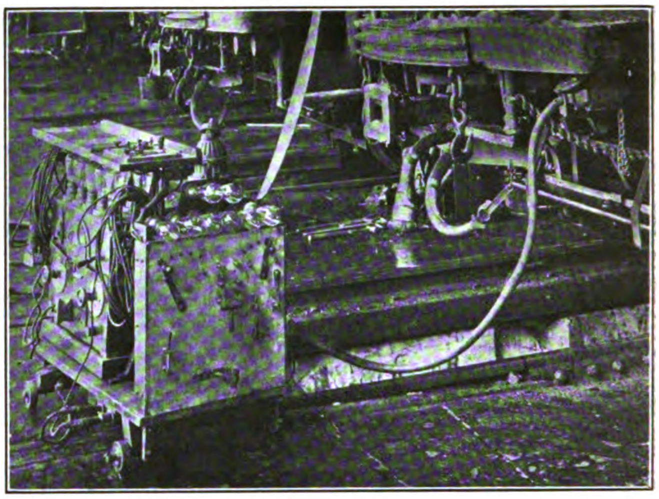


FIG. 5—TEST SET CONNECTED TO CAR

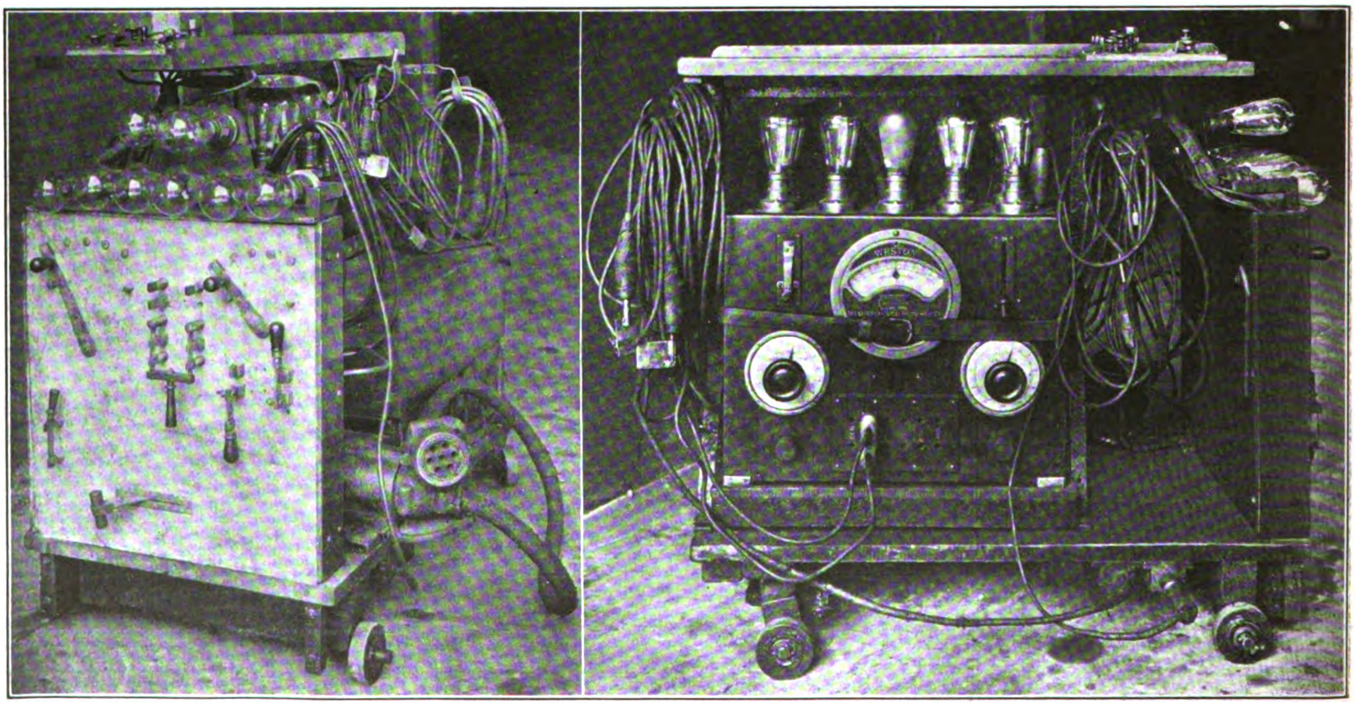


FIG. 3—VIEW OF SWITCHBOARD AND JUMPER. FIG. 4—VIEW OF INSTRUMENT BOARD AND TEST LEADS

troller point by point, the reverse being blocked, any leakage on any point of the control equipment is located.

Test No. 3—Control Operation on Reduced Voltage.—By moving the arm of dial No. 2 to the second position the control voltage is reduced from 14 to 10. The controller is again operated point by point to make sure that at this reduced voltage, which is the minimum allowable operating condition, the control magnets are still active.

Test No. 4—Equipment Leakage.—Controller and resistance frames are tested for grounds by means of a four-lamp circuit. The arm on dial No. 1 is placed on the position next to the last and by use of the positive test lead a four-lamp test circuit is available for use. In fact, by moving this arm to various positions a lamp circuit of any desired practical capacity can be obtained.

Test No. 5—Line Relays.—In accordance with outstanding instructions all line relays are tested on inspection to determine that they will operate in series with eight lamps, this circuit giving approximately the minimum current on which the relay will have to operate in service. The arm on dial No. 1 is placed on the first position, giving eight lamps to the positive test lead which is applied to the line relay coil, the other side of the coil being grounded. Referring again to Fig. 1, it will be noted that the jumper *l* also throws "B plus" on this positive test lead. By placing the arm of dial No. 2 on the last position it throws the buzzer with 2 volts and "battery minus" on the negative test lead. Connections to line relay are then made as shown in Fig. 2, and when the line relay operates, the test operator is notified by the buzzer, thus doing away with the necessity of opening up the relay to make sure of its operation. In addition to this the test affords a check on the secondary contacts.

From the above description it is apparent that the use of this test wagon results in the following advantage: It gives various combinations of lamp tests, buzzer for ringing out circuits, variable battery voltage for testing the controller under operating conditions and, of greater importance, all of the apparatus is grouped on a small portable cart. This cart is also equipped with all the necessary apparatus to operate the multiple-unit equipment from one point, directly at the controller, by one man in the shortest time and with the least confusion, doing away with the previous drawbacks of carrying around the pieces of testing apparatus separately and cluttering up passage ways.

Ladder Track Design

BY N. L. SANOW

New York State Railways, Rochester Lines

In the past very little attention has been paid to the question of the most economical form of construction for ladder tracks, and although it is recognized that a straight ladder having no subdivisions of the diverging tracks is less desirable than a branch-off arrangement, no definite study of the reasons for the difference between the two general schemes seems ever to have been made. The writer has been much interested in ladder track construction on both steam and electric railways and, taking advantage of an opportunity recently offered, made an investigation along this line with the view of obtaining, if possible, tangible data for the most economical design.

The investigation was along one general line, the object of which was to find the method of grouping branch-off tracks from the principal ladder that would call for the least number of total movements of cars over switch, mate and frog in electric railway work (or switch points and frog in steam railway work), when one car was passed to each of the ladder tracks. On an electric railway such a series of car movements is comparable to the situation existing at a carhouse in which each one of the various tracks contains the same number of cars. When these cars are run out of the house, each one will have to pass over a definite number of frogs, depending upon the position, in the carhouse, of the track upon which the car stood; and as the life of a piece of special work is practically dependent upon the number of movements made across it, any arrangement of the ladder which will reduce the number of movements across the frogs and switches will result in reduced maintenance.

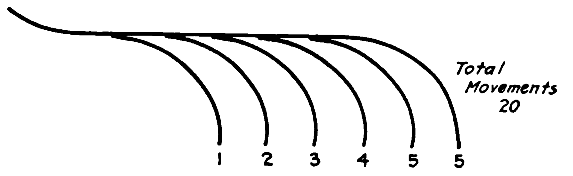


Fig. 1

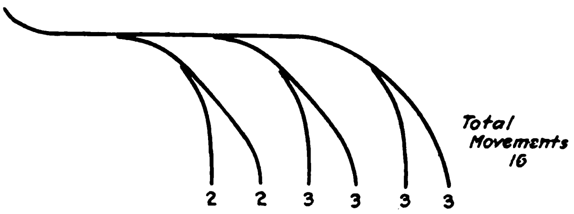


Fig. 2

FIGS. 1 AND 2—DIAGRAMS SHOWING NUMBER OF MOVEMENTS MADE OVER FROGS WITH PLAIN LADDER TRACK AND WITH BRANCH-OFF ARRANGEMENT

The simplest arrangement, and the one that has been taken as a basis for this investigation, consists in a plain ladder, from which each diverging track turns off individually and runs into a separate yard track or carhouse track in the series served by the latter. However, by arranging the yard tracks in groups of two, or three, or more, with each group connected by a single branch-off to the principal ladder track, a great saving in movements may be made. This saving increases rapidly with the total number of tracks in the complete arrangement, even exceeding 50 per cent for installations of moderate size. The extent of the savings are shown in Table I. This indicates the total number of movements that have to be made over frogs in a plain ladder when one car is passed to each of the ladder tracks, and also the saving in the number of movements that may be effected by various groupings

TABLE I—SAVINGS EFFECTED IN CAR MOVEMENTS OVER FROGS BY VARIOUS GROUPINGS OF TRACKS AS COMPARED TO PLAIN LADDER ARRANGEMENT

Number of Tracks in Complete Layout	Total Number of Movements With Plain Ladder	NUMBER OF MOVEMENTS SAVED — Number of Tracks in Each Branch-Off: 2	3	4	5	6	7
6	20	**4**	**4**	3	...	...	...
7	27	**6**	**6**	6	4	...	...
8	35	9	**10**	9	8	5	...
9	44	12	**14**	12	12	10	6
10	54	16	**18**	**18**	16	15	12
11	65	20	**24**	**24**	21	20	18
12	77	25	**30**	**30**	28	25	24
13	90	30	**36**	**36**	36	31	30
14	104	34	44	**45**	44	40	36
15	119	...	52	**54**	52	50	42
16	135	...	60	**63**	62	60	54
17	152	...	70	**77**	**77**	70	66
18	170	...	80	**84**	**84**	80	78
19	189	...	90	**96**	**96**	92	90
20	209	...	102	**108**	**108**	105	102
21	230	...	114	120	**123**	120	114
22	252	...	...	135	**136**	135	126
23	275	...	...	150	**152**	150	144
24	299	...	...	165	**168**	165	162
25	324	...	...	180	**184**	180	180
26	350	...	...	198	**204**	200	198
27	377	...	...	216	**220**	**220**	216

Note.—Boldface figures indicate preferred arrangement.

of the tracks, ranging from two tracks to seven tracks per branch-off. From this table may be noted the peculiarity that the saving in movements increases very sharply with groupings of from three tracks to five tracks, and then drops sharply as the number of tracks in each branch-off increases beyond five. This indicates that the most economical layouts are obtained when the groupings range between three and five tracks, the former figure covering installations having a total of thirteen tracks or less, and the latter being the most economical for layouts having seventeen tracks or more. Between these limits the most economical number of tracks for the branch-offs is four.

This table has been made up by a formula which need not be developed here, as the figures may be checked for any particular case by counting the movements. For example, in Fig. 1, which represents a plain ladder with six tracks, the movement of a car to the track farthest to the left involves the passage over one frog. The movement of a car over the track next to this involves the movement over the frog serving the first track and also the frog that leads to the second track. For the third, fourth and fifth tracks the number of movements over frogs are, respectively, three, four and five, while for the sixth track the number of movements is five, because the last track in the yard does not need to have a separate switch from the main ladder track unless the latter is carried beyond the yard or carhouse, a condition that has not been considered in this study. The sum of these movements over the various tracks comes to twenty.

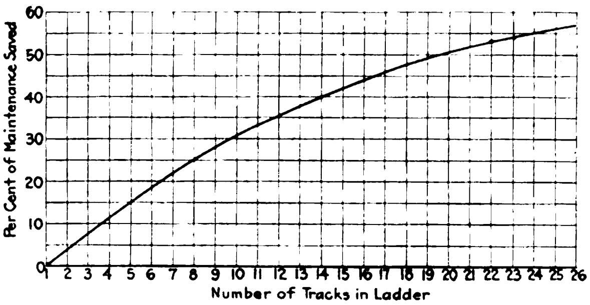


FIG. 3—DIAGRAM SHOWING RELATIVE SAVING IN MAINTENANCE EFFECTED BY BEST LADDER TRACK ARRANGEMENT

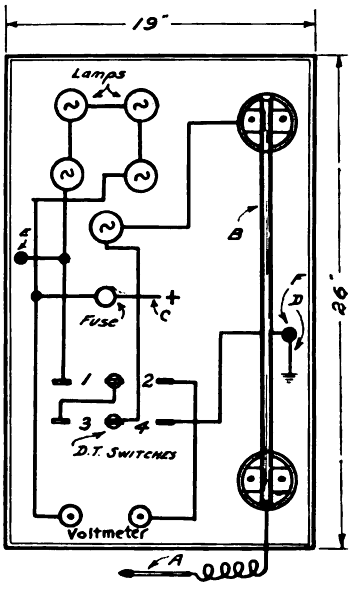
Now, in the case of a branch-off arrangement, such as that shown in Fig. 2, where six tracks are arranged in three groups of two tracks each, the movement of a car over the first track at the left involves the passage of the frog serving the first branch-off, and also the frog located at the separation of the two tracks making up the group. Thus, the number of movements over the first track is two, and the number over the second track is also two. For the next group of two tracks, including the third and fourth tracks from the left, the movements over frogs are three for each track, as is also the case in the last group making up the arrangement. The total of all these movements comes to sixteen, so that the branch-off arrangement shown in Fig. 2 saves four movements over the plain ladder arrangement shown in Fig. 1. It may be necessary for the total number of tracks in the complete arrangement to be such that it cannot be divided exactly by the number of tracks in each branch-off, and when this is the case the odd tracks should be placed last in the ladder, as a larger number of cars would have to pass the extra frog for this branch-off if it was placed in any other position.

The greatest direct saving to be effected by arranging a ladder track in the most economical manner is that of maintenance, the extent of this being indicated in the accompanying curve. This shows that the maintenance on a twenty-track ladder would be cut in half if the number of movements over switch, mate and frog was the only consideration. However, there are other circumstances which must be accounted for, but which are not as tangible nor as easily derivable as the foregoing one. Foremost among these is the additional land necessary to construct branch-offs as compared with that involved for a plain ladder, and there may even be cases where the interest on the investment thus involved would exceed the saving in maintenance brought about by the more efficient design, and thus would become the limiting factor. However, this condition will be found to be the exception rather than the rule in view of the fact that the average carhouse is constructed on land which has but a small first cost.

Insulation and Phasing Test Panel

BY G. B. TANIS

Many valuable minutes can be saved during substation trouble by the use of a test panel such as is shown in the accompanying illustration. Such panels have been built and installed in the stations of the Brooklyn Rapid Transit System for testing high-tension cables and have given entire satisfaction. Discharging, phasing, and insulation resistance can be measured without making several connections, by merely closing the proper switches.



WIRING DIAGRAM FOR INSULATION AND PHASING TEST PANEL

A wood stick, with the lead attached to it for making contact with the cable to be tested, is shown at *A*, while *B* is a high-tension fuse used to protect the operator and apparatus in case of accidental contact with a live feeder. The insulators upon which this fuse is mounted should be capable of standing the line voltage, but the balance of the insulators and wiring of the panel need only be for 550-volt service, if used in connection with railway work. A voltmeter can be connected to the designated terminals when testing for insulation resistance. The wires marked *C* and *D* should be permanently connected to the 550-volt bus and the ground bus respectively. The buttons *E* and *F* are connected to the wires as shown, these forming convenient contact points for determining when the lamps are in working order.

A sign containing the following instructions should be placed near the panel:

To discharge or ground cable close switch to position 4.

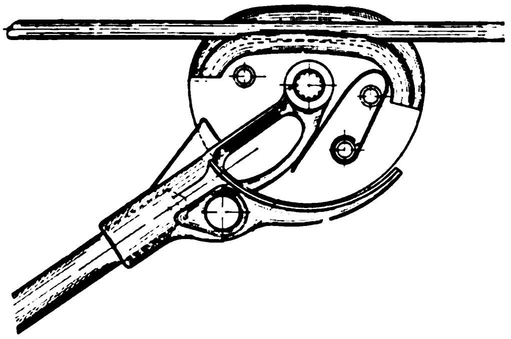
To measure insulation resistance close switches to positions 2 and 3.

For phasing close switches to positions 1 and 3.

It is understood there are two double-throw switches and these should be closed according to the above instructions. For phasing, the proper phase relation between power and substations can be determined by a prearranged number of lamp flickers.

Trollev Shoe Substitute for Trolley Wheel

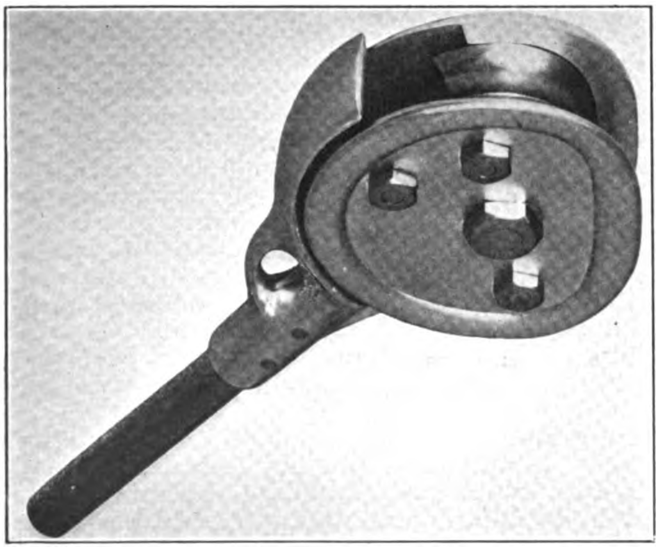
A trolley shoe with a renewable steel contactor, which it is claimed will run from 7000 to 10,000 miles, has just been put on the market by the Utility Specialties Company, Ltd., Boston, Mass., with Holden & White as sales agents for the Chicago district. This invention is known as the Miller trolley shoe, and it is shown in the accompanying illustrations. It consists essentially of a standard trolley harp in which an oval-shaped rocker or shoe is mounted. The shoe is pivoted and fitted with a strong spring so that the contactor automatically assumes full contact with the wire, regardless of the angle between the wire and the trolley pole. The increased area thus obtained, combined with the sliding contact, eliminates arcing.



CROSS-SECTION OF TROLLEY SHOE

It is claimed that the secret of this shoe's practicability and efficiency is largely due to the especially constructed renewable contact, which is made of a very close-grained metal, hardened to a specific standard to reduce friction to a minimum. So well has this end been obtained that inspections made immediately after a long, fast run show that the shoe is quite cold. The renewable contact strip is grooved and fits between the sides of the shoe, so that it will not leave the wire except under most extraordinary conditions. This shoe has been found particularly adapted for delivering energy to large-capacity electric locomotives and high-speed passenger motor cars. Incidentally it is claimed that the sliding contact makes sleet shoes unnecessary; in fact, actual service tests during the past winter in New England demonstrated this fact.

Since there are no rotating parts, except the slight rocking movement necessary to adjust the contactor to variable heights of trolley wire, no lubricants are necessary. Experience has demonstrated that about 18-lb. tension at the end of trolley pole is sufficient for this shoe to meet all conditions. A number of tests made in different parts of the country also demonstrate that this trolley shoe will follow the wire at crossing frogs, and move forward and backward just as readily as a trolley wheel. Moreover, the quality of steel used in the contactor is claimed to eliminate practically all wear on a copper trolley wire.

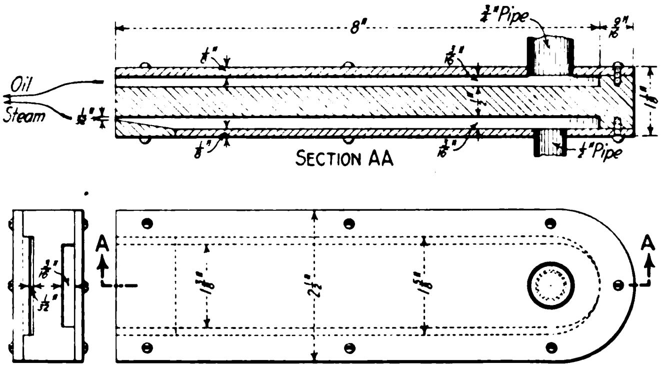


THE TROLLEY SHOE

New Fuel Oil Burner Used on C., M. & St. P. Locomotives

After the new electric locomotives had been in service some time on the electrified portion of the Chicago, Milwaukee & St. Paul Railway it was determined to experiment with oil burners in an endeavor to develop a device which would improve combustion under the boilers used for generating steam to heat the passenger coaches.

The burner now in use, designed by Frank Sowerby, general foreman at the company's Deer Lodge shops, works satisfactorily with Western oil, it is stated, and burns a smaller quantity of this oil at 1½ cents per gallon than the standard type burner required of Eastern oil at 7 cents per gallon. The time required to heat the boiler to blow-off temperature has also been cut down from thirteen to seven minutes.



SECTION AND PLAN OF C., M. & ST. P. FUEL OIL BURNER

The accompanying sketch shows the shape and general dimensions of the new burner, which is made of a solid piece of brass, grooved on both faces and fitted with ⅛-in. sheet-copper cover plates. The upper groove or chamber has a uniform cross-section 1⅜ x 3/16 in. in size, while the steam chamber is 1⅝ x 3/16 in. in cross-section and reduces to 1⅝ x 1/32 in. at the outlet. This outlet, however, is adjustable, the lower lip being a separate piece of solid copper fitted into the burner and held in place by screws under which shims can be placed to widen the opening. Both steam and oil chambers are 8 in. long, and the oil and steam feed pipes are ¾ in. and ½ in. in diameter respectively.

During the year 1915 the New York, New Haven & Hartford Railroad sold a total of $931,861 worth of old scrap. Among the items listed in the sales for 1915 are scrap from old locomotives which brought $29,779; miscellaneous iron and steel from burned cars, $13,228; brass and copper $267,784; waste paper and old records, $2,601; cement bags, $13,162, and rope, $3,133. The weight of all material sold amounted to a total of 133,414,630 lb., or 59,454.7 gross tons.

New Turbo-Generator Unit for Boston Elevated

As announced in the issue of the ELECTRIC RAILWAY JOURNAL for March 25, the Boston Elevated Railway, through its engineers, the Stone & Webster Engineering Corporation of Boston, Mass., has awarded a contract to the General Electric Company for a 35,000-kw. turbo-generator to be installed in its South Boston power station by Dec. 1, 1916. The addition of this unit will increase the capacity of the station to 80,000 kw. Provision has been made in the contract for the temporary installation of a 10,000-kw. turbine to facilitate handling next winter's load, in case the manufacturer is unable to complete the specified delivery. The general relation of the new unit to the company's power requirements was reviewed in the issue for March 4, 1916, page 463.

The new generating set will consist of a horizontal single unit, about 45 ft. 6 in. long, 20 ft. wide and 12 ft. 3 in. high, thus occupying about 1/40 sq. ft. per kilowatt of capacity, including both turbine and generator. The machine will operate at 1500 r.p.m. and initially it will be supplied with steam at 200 lb. per square inch and 200 deg. Fahr. superheat, the steam temperature being 588 deg. Fahr. at the throttle. The speed regulation will not exceed 2 per cent above or below normal at any load under 35,000 kw., and the machine will have a capacity of 42,500 kw. for two hours. It will, of course, be operated condensing, but when run non-condensing and exhausting against an absolute back pressure of 18 lb. per square inch, it will deliver 15,000 kw. A Schutte & Koerting throttle valve, actuated at a speed of 10 per cent above normal by a safety governor, will be provided.

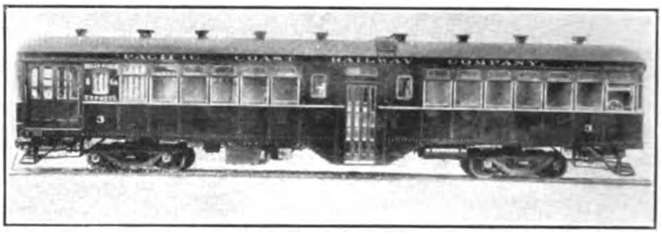
The steam guarantee for the turbine at 200 lb., 1500 r.p.m. and 1 in. back pressure, is as follows: 10,000 kw., 12.10 lb. per kilowatt-hour; 15,000 kw., 11.30 lb.; 20,000 kw., 10.85 lb.; 25,000 kw., 10.65 lb.; 35,000 kw., 10.95 lb. For each 10 lb. per square inch increase or decrease in steam pressure the steam consumption is to decrease or increase by 1 per cent from 185 lb. to 210 lb. per square inch, and for each 10.5 deg. increase or decrease in steam temperature between 175 and 225 deg. Fahr. superheat, the steam consumption will vary 0.5 per cent. At 2 in. absolute back pressure the guaranteed steam consumption per kilowatt-hour is as follows: 10,000 kw., 13.20 lb.; 15,000 kw., 12.30 lb.; 20,000 kw. 11.80 lb.; 25,000 kw., 11.60 lb.; 35,000 kw., 11.90 lb. An 18-in. steam pipe will be required for the unit, with a 10-ft. x 16-ft. exhaust.

The generator will be of the two-pole type, delivering 25-cycle power at 13,200 volts, three-phase. It will have a continuous capacity of 35,000 kva. and a two-hour capacity of 42,500 kva. The regulation of the generator when operated at full load and 100 per cent power factor will not exceed 32 per cent, and when operated at 70 per cent load and at 100 per cent power factor, 24 per cent. Not less than 55 sq. ft. of air-inlet opening will be required with an equal area of discharge opening. The commercial efficiency guarantee of the generator is 97 per cent at one-quarter load; 98.25 per cent at one-half load; 98.75 per cent at three-quarter load, and 99 per cent at full load, not including friction and windage, which approximate 250 kw. The exciting current required is 675 amp. at 125 volts, at full load and 100 per cent power factor, the exciting current at 90 per cent power factor and full load being 710 amp.

With the air at 40 deg. C., the maximum temperature of the armature is not to exceed 100 deg. C., at 35,000 kw. continuously, or 125 deg. C. at 42,500 kw. for two hours. The field temperature by resistance measurement is not to exceed 125 deg. C. for either load; the collector ring and brush temperature, by thermometer, will not exceed 60 to 70 deg. C., or that of the bearings, 70 to 80 deg. C. At full load and 40 deg. C. 70,000 cu. ft. of air per minute will be required for ventilation. The generator reactance is to be about 8 per cent of the rated voltage at rated continuous output. The shipping weight of the unit will be 946,000 lb., the completed weight, 860,000 lb., and the weight of the heaviest piece (armature) 190,000 lb. To remove the field 24 ft. of straight pull will be required.

Steel Passenger Car for Pacific Coast Railway

The Pacific Coast Railway, San Luis Obispo, Cal., has recently purchased the steel passenger car shown herewith for its short line between Santa Maria and Guadaloupe, Cal., some 13 miles in length. Energy is purchased from the Midland Counties Public Service Corporation. The chief business on the line is that of handling sugar beets for the Union Sugar Company during the fall of the year. The most interesting feature of the car is that it is of the standard Southern Pacific type but adapted to a 3-ft. gage. It is equipped with Westinghouse narrow-gage commutating-pole motors and H L control.



STEEL PASSENGER CAR FOR PACIFIC COAST RAILWAY

Air-Operated and Electric Mechanisms for Railway Structures

The National Pneumatic Company, Chicago and New York, which is well known to the electric railway field because of its pneumatic and manual door and step control, announces that it is also prepared to design and build pneumatically-controlled mechanisms for any purpose where such mechanism would give better results than hand or electric operation. It has already done considerable work in the installation of pneumatic devices for opening and closing the windows of power stations and shops from a distance. One notable installation of this kind is to be found in the power house of the Commonwealth Edison Company, Chicago, where sectional pivoted windows in three vertical groups are operated by means of pneumatic cylinders. In general, each window of such installations can be operated from individual cylinders, or whole groups can be manipulated from a master cylinder. The control is from a small valve which can be placed at any point most convenient for operation. Almost any variety of combinations can be arranged.

This company, through its associate, the Burdett-Rowntree Manufacturing Company, has also available much experience in the construction of electric dumbwaiters. Such dumbwaiters are well worth a place in electric railway structures, especially in the storerooms department.

NEWS OF ELECTRIC RAILWAYS

500 BILLS BEFORE NEW YORK GOVERNOR

Brief Review of Some of the Important Measures Affecting the Railways

Some of the important measures passed by the Legislature of New York at the session concluded recently were referred to in the ELECTRIC RAILWAY JOURNAL of April 22, page 792. Again the spectacle was witnessed of jamming bills through at the last moment. The legislators, however, were no respecters of persons. The Governor's legislative program as set forth in his message to the Legislature was killed practically in toto. As for the program of Mayor Mitchel of New York, there were saved from that only a few stray measures. Most of the legislation passed was not peculiarly the Mayor's own, but proposals of other interests in the city to which he gave his support. In all more than 500 bills await action by the Governor.

In the action taken at Albany in the full-car bill matter in particular, a rebuke is regarded as having been administered to Mayor Mitchel. The anti full-car bill, known as the Simpson act, although it is peculiarly a New York City measure, will go to Governor Whitman instead of to the Mayor for final executive action. The Simpson bill was designed to nullify the order issued by former Health Commissioner Goldwater prescribing the number of passengers that may be carried on surface cars. Commissioner Goldwater, whose order has been retained in force by his successor, was supported in his action by Mayor Mitchel. It is generally accepted that the Goldwater order was merely an effort on the part of the local city administration to secure over the heads of a recalcitrant Public Service Commission relief which the local administration, of different political faith from the majority of the members of the commission, regarded as essential to its best political interests. In commenting on the passage of the Simpson bill Public Service Commissioner Whitney said: "Our observation has been that the full-car order has only resulted in crowding parallel lines. When the Simpson bill becomes a law we will try to see that enough cars are operated to carry the passengers."

So far as public service legislation was concerned, practically all the measures advocated by New York City taxpayers and the Thompson committee were killed and a few measures, disapproved by the Public Service Commission and the city of New York, were passed. The legislation championed by Public Service Commissioner Whitney to hasten rate decisions was killed. There were two important bills in this program. One took away from the public service corporations the right of review by certiorari and the other provided that a rate reduction decision must be effective as of the date the complaint was filed instead of as of the date of final decision, after the courts had settled all appeals. The bill to give the Board of Estimate of New York City power to separate the construction and regulatory work of the Public Service Commission and throw the construction work into the hands of a commission appointed by the Mayor, was passed. The measure was disapproved by the Public Service Commission. The Thompson bill, making the Mayor and Comptroller members ex-officio of the boards of directors of the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company was defeated, as was the Maerkle bill to give the Public Service Commission supervision over companies acting as holding companies for public service corporations.

The workmen's compensation bill was amended. Chief of the changes were the provision permitting longer working hours for women in cannery factories, and a clause giving the State insurance department certain limited supervision of the moneys in the State insurance fund. The attempt to make that fund a separate and independent State department was defeated.

The safety first movement received a great boost in the passage of the Cromwell-Kelly bill. The measure relates only to New York City, but its advocates hope for its extension to include other cities. The police were keen for this measure, but the automobile interests are deadly opposed to it. Under it all operators of motor vehicles in New York City will pass under a license system, rendering them liable to the revocation of their licenses for cause. Automatically, as it were, all operators will receive licenses. Control is lodged wholly in the power of police magistrates to revoke a license for cause.

The Legislature has passed and Governor Whitman has signed a bill which will prohibit an inspection of a corporation's stock book by any holder of less than 5 per cent of outstanding stock whose possession of shares has not been of record for at least six months.

The State constabulary bill passed the Senate on April 17. It provided for two troops, 116 men in all, and carried an appropriation of $250,000, half the force and half the appropriation asked for in the original bill introduced by Senator Clinton T. Horton of Buffalo for Governor Whitman. The committee on rules of the assembly decided, however, not to report the measure out.

The effort to repeal the full-crew train law failed.

At the eleventh hour of the session the Legislature put through the Thompson and Ellenbogen bills, which in different ways affect the operation of the west side lines of the New York Central Railroad. The Thompson bill prohibits the use of steam locomotives on Manhattan Island after Jan. 1, 1919. This would compel the New York Central to have its west side lines electrified by that time or run the risk of having this done by the city authorities at the expense of the company. The Ellenbogen bill makes the operation of trains at grade on the west side of Manhattan a public nuisance and authorizes the removal of the tracks if the company fails to file plans for their removal from the surface within seventeen months. Plans looking toward the electrification of these lines are reviewed at length elsewhere in this issue.

PUBLIC MAY PASS ON CLEVELAND WAGES

Fielder Sanders, Street Railway Commissioner of Cleveland, Ohio, on April 21 suggested a novel method of determining whether the demand of the motormen and conductors of the Cleveland Railway for increased wages and better working conditions shall be granted. He said that as the public must pay the bill, the car riders should decide whether the rate of fare be increased to cover the additional expense. Mr. Sanders said that a fare of 4 cents, or three tickets for 10 cents, with a 1-cent charge for transfers, would be necessary to cover the expense, if the men were granted the wages and conditions they demand. He said that under the Tayler franchise the employees of the railway were as much public employees as the firemen and policemen. Mr. Sanders said he had not considered methods of securing an expression from the patrons.

J. J. Stanley, president of the Cleveland Railway, has refused to make a counter proposal to the demand of the men for an increase of wages to 40 cents an hour and a revision of the schedules which would give 90 per cent of the men a work day of eight hours or more. He did, however, offer to consider a new agreement or such a revision of the schedules as would not greatly increase the operating expenses. He said that any increase in wages that would necessitate an advance in the fare was a matter to be considered by the city. The company's shop men have also made a demand for an increase in wages of 5 cents an hour.

Mr. Sanders said on April 18 that a partial review of the check of East Cleveland car riders made recently would indicate that the average ride is much longer than the average ride inside the city of Cleveland, and that the people of the suburban city may be asked to pay an increased fare. East Cleveland has a contract with the company for the same fare paid in the city until the franchise expires.

THOMPSON COMMITTEE APPROPRIATION REFUSED

The application made to the Legislature of New York for the expense of the Public Service Commission investigation by the Thompson committee was denied as the result of a deadlock between the Senate and Assembly. The committee has no money, but it has unlimited power of investigation until July 1. The Senate on April 21 refused to accept the Assembly amendment to the Senate resolution passed some days previously appropriating $50,000 to pay the obligations already incurred and to provide for the expense of the investigation to July 1. The Assembly rules committee had previously amended the Senate resolution reducing the appropriation to $25,000 and providing that it should be used to pay outstanding obligations, and that the investigation should terminate at once. When this resolution was handed down in the Senate on April 21 with the Assembly amendment Senator Thompson moved that the Senate refuse to concur, and asked for the appointment of a conference committee. The Assembly appointed a conference committee. These two committees met but could find no ground of compromise. The representatives of each house stood firm in support of the action previously taken. Speaker Sweet said that it was the purpose in reducing the appropriation and amending the resolution to stop the work of the Thompson committee. He said:

"When Senator Thompson came to the Legislature early in February and asked for an extension of time he told us that his committee was on the verge of making sensational exposures. He has failed to fulfill that promise. He has exposed nothing that will aid the Legislature in determining legislative action. That is the purpose of appointing an investigating committee."

Senator Thompson, chairman of the investigating committee, promptly denounced the Speaker and announced that the committee would resume its investigation on May 1. There have been no sessions of the committee now for more than two weeks.

250 STATE DIRECTORS NAMED TO MOBILIZE NATION'S WAR RESOURCES

The committee on industrial preparedness of the Naval Consulting Board of the United States, through the engineers of the country, is preparing an inventory of the country's manufacturing and producing resources as a first step in industrial preparedness. Two hundred and fifty state directors have been appointed from the American Society of Civil Engineers, the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Chemical Society. Of the directors appointed the following are well known in the electric railway field:

Wynn Meredith, Sanderson & Porter, and A. H. Babcock, Southern Pacific Company, California; W. C. Spruance, Jr., and Charles L. Reese, E. I. du Pont de Nemours & Company, Delaware; John H. Finney, Aluminum Company of America, District of Columbia; R. W. Hunt, consulting engineer, Chicago; Dr. W. F. M. Goss, University of Illinois, Urbana, and P. Junkersfeld, Commonwealth Edison Company, Illinois; F. S. Hunting, Fort Wayne Works of the General Electric Company, Indiana; Carl P. Nachod, Nachod Signal Company, Kentucky; M. S. Sloan, New Orleans Railway & Light Company, Louisiana; H. D. Bush, Carnegie Steel Company, Maryland; A. D. Little, A. D. Little, Inc., Massachusetts; H. H. Crowell, Michigan Railway, Michigan; W. R. McKeen, McKeen Motor Car Company, Nebraska; W. K. Freudenberger, Railroad Commission of Nevada, Nevada; J. Brodie Smith, Manchester Traction, Light & Power Company, and Hugh K. Moore, Berlin Mills Company, New Hampshire; Farley Osgood, Public Service Electric Company, New Jersey; James G. White, J. G. White & Company, and William McClellan, New York; William S. Lee and Charles I. Burkholder, Southern Power Company, North Carolina; Samuel G. McMeen, Columbus Railway, Power & Light Company, Ohio; O. B. Coldwell, Portland Railway, Light & Power Company, Oregon; Paul Spencer, United Gas & Improvement Company, Pennsylvania; L. W. Downes, D. & W. Fuse Company, Rhode Island; W. B. Tuttle, San Antonio Traction Company, Texas; B. T. Burt, Rutland Railway, Light & Power Company, Vermont; John Harisberger, Puget Sound Traction, Light & Power Company, Washington; L. E. Strothman, Allis-Chalmers Manufacturing Company, and A. W. Berresford, Cutler-Hammer Manufacturing Company, Wisconsin.

P. R. T. ADVANCES WAGES.

The co-operative committee at a meeting held on April 20 determined in company with the management of the Philadelphia (Pa.) Rapid Transit Company that the condition of the 22 per cent fund is now such as to make possible an advance of 1 cent an hour to all of the conductors and motormen so that effective on May 1, 1916, the new scale will read as follows: New men, 26 cents; after one year's service, 27 cents; after two years' service, 28 cents; after three years' service, 29 cents; after four years' service, 30 cents; after five years' service, 31 cents.

When the Stotesbury management took charge of the property in April, 1911, the motormen and conductors were receiving a maximum wage of 23 cents an hour, making the total increase in the maximum wage since then 8 cents. All of this has been accomplished by the use of the 22 per cent funds and through the work of the co-operative committeemen and the superintendent of time-tables by keeping closely in touch with the requirements of increased service to the public as determined by the traffic checks and by following closely the desires of the motormen and conductors in the make-up of runs.

During the five years immediately preceding the incoming of the Stotesbury management an average of 369 men a month were discharged or left the service for other causes. During the past five years under the co-operative plan an average of only 82 men a month were discharged or left the service for other causes. About 75 per cent of the total number of trainmen are now drawing the maximum of 30 cents an hour and will be immediately eligible to the maximum rate of 31 cents an hour under the new scale. Within the next few months an additional 5 per cent of the men will enter the maximum rate class, so that approximately 80 per cent of the men will then be drawing the maximum rate of 31 cents an hour.

Announcement is also made of increases in wages among the mechanical and electrical employees. These men do not receive their pay from the proceeds of the 22 per cent fund.

MR. ANDERSON ATTACKS REDUCTION IN PUBLIC SERVICE COMMISSION

George W. Anderson, United States District Attorney at Boston, Mass., and a former member of the Massachusetts Public Service Commission, appeared before the ways and means committee of the Massachusetts Legislature during the week ended April 29 in opposition to the proposed reduction of the board from five to three members. Mr. Anderson pointed out that the law organizing the commission in 1913 was designed to place the members of the board on the same plane of power and importance as that occupied by a judge of the Superior Court. He said that the board in the Bay State Street Railway fare case was engaged in one of the most important rate cases ever tried in New England and one of the greatest rate cases ever tried in this country outside the Interstate Commerce Commission. On this account the nominal saving of about $18,000 a year in salaries resulting from a reduction of the commission's membership would be false economy. Moreover, any such change would interfere with the efficiency of the board. In closing, Mr. Anderson said:

"The work of the commission can be done only by men who are giving their entire time and attention, or substantially that, to it and are left with a feeling of security provided they perform their duty. The minute you put that commission or any other commission engaged in the performance of these difficult duties into the field of partisan politics, you destroy utterly the whole system of public regulation of privately owned public utilities. No one will be able to rely on anything permanent or stable if legislation of this kind is to be passed."

Much other opposition to the bill developed at the hearing, which was continued to April 27, at which time Chairman McLeod of the commission was expected to address the committee.

ELECTRIFICATION OF IOWA ROAD PROPOSED

The Muscatine, North & South Railway, a steam road between Muscatine and Burlington, Iowa, will be reorganized and may be converted into an interurban electric railway. Officials and stockholders of the company will meet in Davenport about May 1 to effect the reorganization. E. H. Ryan, Davenport, the president, has just returned from a Western trip and is preparing the plans for reorganization. The road is now in the hands of Maurice Dailey, Muscatine, as receiver.

Officials of the Tri-City Railway & Light Company, which is controlled by the United Light & Railways Company, have been approached by officials of the Muscatine, North & South Railway relative to the question of power. B. J. Denman, vice-president of the Tri-City Railway & Light Company, and assistant general manager of the United Light & Railways Company, says it is possible a traffic arrangement will be made to establish through service from Clinton to Burlington, Iowa. He admits having looked over the Muscatine, North & South Railway, but says there is not the slightest possibility of the United Light & Railways Company taking the line over. He has expressed the opinion that with economies in operation through electrification and with more frequent service the road can be made to pay.

SUSPENDED MONORAIL LINE PROPOSED IN NORTHERN CALIFORNIA

The Clear Lake Suspended Monorail Company has applied to the Railroad Commission of California for authority to build and operate a monorail transportation system starting from the line of the California Northwestern Railway at Hopland and extending to Lakeport, 24 miles distant, via Kelseyville. The construction proposed is the Shoemaker high-speed flexible monorail type. The company is incorporated for $50,000, of which $26,400 has been subscribed and paid in. It is planned to take over from the Clear Lake Railroad right-of-way property and franchises. Construction will be carried out with the proceeds of an issue of first mortgage 6 per cent gold bonds, to an amount sufficient for that purpose. The Clear Lake Railroad expended more than $50,000 in construction work. The directors of the new company are L. H. Boggs, Kelseyville; Andrew Smith, Finley; S. E. Brookes, Hopland; F. D. Flint, San Francisco, and M. S. Sayre, Lakeport.

SEATTLE COUNCIL OPPOSES RAILWAY PURCHASE

William Hickman Moore, chairman of the judiciary committee of the City Council of Seattle, Wash., R. H. Thomson, chairman of the city utilities committee of the Council, and C. B. Fitzgerald, chairman of the finance committee, who were appointed by the Council to report on the advisability of the city becoming a bidder for the property of the Seattle, Renton & Southern Railway, which is to be sold at receivers' sale on May 1, have recommended to the Council that the city enter no bid for the property. According to the city officials serious obstacles lie in the way of the city acquiring the railway. The court order provided that the successful bidder must abide by a contract entered into by the receivers with the Puget Sound Traction, Light & Power Company to purchase power for the operation of the line from that company until April, 1926. Sec. 2 of the bond ordinance provides that in the event the Seattle, Renton & Southern Railway is purchased by the city of Seattle, it will be on an appraisal made by the Board of Public Works. In the same section it is provided that power for the operation of the railway by the city shall be obtained from the municipal light and power plant, on terms to be fixed by ordinance. Under the order of sale approved by Judge A. W. Frater no bid for less than $1,200,000 is to be considered by the court. The city has a bond issue of $375,000 available at this time for the purchase of the line. The fact that it is proposed to sell the line in its entirety brings up the question of the right of the city to acquire or operate a street railway outside the city. Hugh M. Caldwell, corporation counsel of the city, will be directed by the Council to attend the proposed sale on May 1, and notify all bidders that the city has certain claims against the company.

REASONS FOR COURT DECISION ON TOLEDO FARES

In the account of the settlement of the strike of the employees of the Toledo Railways & Light Company, Toledo, Ohio, which appeared in the ELECTRIC RAILWAY JOURNAL of April 15, page 745, brief mention was made of the order by Judge Killits in the District Court of the United States for the Northern District of Ohio, Western Division, allowing the company to increase its fares to meet the increase in wages of the men and set up with the added revenue a special fund for improvements.

The conditions in Toledo are peculiar. The franchises there have expired and the company is operating under sufferance, pending a settlement of the franchise controversy. The company, previous to the strike, which was declared on March 28 and settled on April 9, without any attempt being made to operate cars, was charging 3 cents during the rush hours morning and evening and selling six tickets for a quarter with a cash fare of 5 cents. It appeared to the court that if the cash fare was fixed at 5 cents, the ticket fares at six for a quarter, the fare for children under eight years of age 1 cent and the 3-cent rush-hour fare eliminated, the increase in the gross revenue of the company would be 12 per cent and that approximately one-half of the increase would be required to meet the advance in wages granted to the men. The court accordingly ordered such rates to be put into effect, and directed that the remainder of the increase not needed to meet the added wage charge be placed with John Craig, Toledo, as custodian at weekly intervals until further order of the court and be disbursed by him in acquiring new cars and equipment. A bond of $25,000 was required from Mr. Craig. It was, of course, provided that the 3-cent fare tickets outstanding at the time of the strike and purchased in good faith by patrons of the company should be accepted by the company for transportation under the terms of the temporary permit under which the company operates.

As the company was without franchise rights appeal for redress was made to the federal court, which assumed authority although the company was not insolvent or in the hands of receivers. Judge Killits said that it was only within narrow limits that the court could have anything to say about fixing fares; that this was a legislative function of the city, and that, ordinarily, the only question for the courts to pass upon would be reasonableness of fares fixed by the City Council. On the other hand, if the city refused to accept the terms fixed by the court, the only recourse for the city was to order the company to cease operation and remove its rails from the streets. It was made clear that the federal court order was only for a working agreement, pending some settlement of the franchise issue.

The patrons of the company accepted the increase in fare as a reasonable and necessary contribution toward better service and higher wages for the men. There were no demonstrations in opposition to the change. A remarkable feature of the whole controversy was the unanimously cordial recognition by the local press of the spirit of frankness manifested by the company throughout the negotiations leading to the settlement.

CINCINNATI BELT LINE AUTHORIZED

The proposal to issue bonds to the amount of $6,000,000 for the construction of a rapid transit belt line in Cincinnati was approved by the voters of that city by about eight to one on April 25. This belt line, when completed, will open the way for all the interurban railways to reach the business section of the city. Heretofore they have been compelled to stop at the city limits and transfer their passengers to the local street cars. In addition the belt line will bring in two other roads. Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, has assured the Rapid Transit Commission that his company will arrange to extend its line to Cincinnati. A new company has been incorporated to build a line between Dayton and Cincinnati through an undeveloped territory, but this hinged on the approval of the rapid transit bond issue also.

The action at the election indorses the previous action of the local rapid transit commission in adopting what is known as modified plan No. 4. The route of the proposed line under this plan was referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1915, page 1271.

Municipal Ownership Proposal in Sherbrooke.—The Sherbrooke Railway & Power Company, Sherbrooke, Quebec, is reported to have made an offer to the City Council to sell the road for $250,000 or lease it to the city for twenty-five years at a semi-annual rental of $9,000. At the end of this period the system would become the absolute property of the city.

Revision of Cincinnati Franchise Proposed.—On April 22 the first of a series of public meetings was held in the Council chamber at Cincinnati, Ohio, for the discussion of the proposed revision of the terms of the franchise of the Cincinnati Traction Company, including the rate of fare. The Rogers law, under which the franchise was granted, provides for a revision this year.

Norumbega Park Extension.—The Norumbega Park Company, which operates the well-known pleasure resort of the Middlesex & Boston Street Railway at Auburndale, Mass., has purchased 12 acres of land adjoining the park and plans to erect an administration building with pavilion for meetings, dancing, etc. A baseball diamond will probably be laid out on the new property. Carl Alberte is manager.

National Civic Federation Issues Profit-Sharing Report.—Ralph M. Easley, chairman executive counsel of the National Civic Federation, has announced that the report on "Profit-Sharing by American Employers," which has been in preparation during the last twelve months, is now ready for distribution. This report can be secured at the main office of the federation, 1 Madison Avenue, New York City, for $2.

Suggestion That Cleveland Railway Build Its Own Cars.—At a meeting of the street railway committee of the Cleveland (Ohio) City Council last week, the proposition of authorizing the Cleveland Railway to build 100 cars in its new shops on Harvard Avenue was discussed. Fielder Sanders, Street Railway Commissioner, said that 100 cars would be needed soon and it was at this point that the plan was proposed of authorizing Terrance Scullin, master mechanic of the company, to bid on the cars with the manufacturers.

Payment on Over-Expenditures Prevents Decrease in Cleveland Fare.—The operating report of the Cleveland (Ohio) Railway for March shows an ordinance surplus of $85,016, which would have brought the interest fund up to $738,512, or above the point at which the 1-cent charge for transfers would have been dropped. Under the agreement made with the city some time ago, $300,000 is to be withdrawn from the fund and applied to the payment of over-expenditures in the maintenance and renewal fund, which will prevent the reduction of fare. Periodical payments on this deferred debt will prevent a change in the fare for some time to come.

Public Service Girls' Basketball Team Wins Championship.—Among the athletic teams under the direction of W. H. Shepherd, athletic manager of the Public Service Railway, Newark, N. J., is a basketball team comprised of stenographers and mileage clerks from the accounting department. William McWalters, who like Mr. Shepherd is in the time-table department, was coach. The team has just won the championship among the girls' team of Central New Jersey, including those from churches of various denominations, the General Electric Works at Harrison, and the Overbrook Insane Asylum (nurses). The Public Service team won eleven out of fourteen games played.

Toledo Conscience Fund Enriched.—The conscience fund of the Toledo Railways & Light Company, Toledo, Ohio, was swelled recently by the largest sum ever turned in. A Toledoan appeared at the cashier's window and handed in $6. When questioned he stated that it was car fare, and said that his conscience had been bothering him since he learned, through the court's statement, that the company could not operate for 3 cents per passenger. The man is quoted as follows: "I was in the franchise fight two years ago because I really thought the company could do business for 3 cents, and I refused to pay any more. Of course, I rode free like all the rest. As near as I could figure it up, I owed the company about $6 for free rides." The largest sum turned in heretofore was 25 cents.

Buffalo Suburban Line Negotiating With Employees.—Demands for a substantial increase in wages and changes in working conditions were made recently upon officials of the Buffalo & Lake Erie Traction Company, operating between Buffalo, N. Y., and Erie, Pa., by platform men, members of the Amalgamated Association of Street & Electric Railway Employees. The company offered an increase of 1 cent an hour, but this was rejected. Several conferences were then held between representatives of the employees and officers of the company, but no agreement was reached and negotiations have been temporarily broken off. The agreement under which the men are now working expires on May 1. The union was organized three years ago at the time of the strike of platform men on the city and interurban lines of the International Railway, Buffalo. The present scale of wages is 23 cents an hour for the first year; 25 cents for the second; 26½ cents for the third; 28 cents for the fourth; 29 cents for the fifth, and 30 cents an hour thereafter. The men are now asking for 25 cents an hour for the first year; 28 cents for the second; 32 for the third, and 35 cents an hour thereafter.

PROGRAM OF ASSOCIATION MEETING

Central Electric Railway Association

A. Benham, president of the Central Electric Railway Association, has announced the midsummer meeting and excursion of that association in a bulletin just distributed from the office of the secretary, A. L. Neereamer, Indianapolis, Ind. A steamer trip is to be made in connection with the June meeting of the association. The meeting will be held on the steamer. The committee in charge has arranged the following itinerary:

The Chicago, Duluth & Georgian Bay Transit Company's steamship South American, one of the finest passenger cruising steamers on the Great Lakes, has been chartered for a three days' cruise for the exclusive use of the association and its invited guests. The South American is scheduled to leave Toledo, Ohio, at 11 o'clock a. m., on June 27. It will proceed from Toledo through Lake Erie and the Detroit River to Detroit, reaching Detroit about 3.30 the same afternoon, and will leave Detroit at 4.30 p. m. It will then proceed through Lake St. Clair, the River St. Clair and Lake Huron, and it is expected to reach the "Soo" at about 12.30 o'clock of June 28. The steamer will proceed through the locks into Whitefish Bay and return and will leave the "Soo" about 4 o'clock in the afternoon. It is expected to arrive at Mackinac Island not later than 5 a. m. on June 29, and to leave there at 10 o'clock the same morning. A stop at Harbor Springs, one of northern Michigan's noted health resorts, will be made from 2 o'clock to 4 o'clock, June 29. The South American will be due at Holland at 7.30 a. m. on June 30. At this point those who desire to do so may take the cars of the Michigan Railway. The steamer will then proceed to Benton Harbor, at which point it will be due at 11.30 a. m. on June 30. This will be the end of the regular cruise, but the steamer will proceed from Benton Harbor to Chicago, where it is due about 4.30 p. m. on June 30.

Tickets for the trip on the steamship, including meals and berth for the three days, from Toledo or Detroit, to Benton Harbor, will cost $18 each. Those desiring to proceed from Benton Harbor to Chicago may do so upon the payment of 75 cents additional. Children under twelve years will be charged half the full fare. Tickets may be secured from John Benham, vice-president of the International Register Company, 15 South Throop Street, Chicago. The rule of first come first served will be made in making the assignment to rooms. All the rooms on this ship are outside rooms. Checks for the value of tickets should accompany all requests for stateroom reservations and must reach Mr. Benham on or before June 23. The name and address must be given in the application for each person who is to use a ticket. Nearly all the rooms have two berths and applicants for accommodations should indicate with whom they desire to share a stateroom.

The executive committee of the association has directed that any member of the association may invite for the trip any friend he desires. Officers and employees of all electric railway lines within the territory of the association are invited by the association to participate in the trip, whether or not they are members of the association.

Financial and Corporate

ELECTRIC RAILWAY FINANCING

New Issues Decreased $56,658,600 in 1915, but Gained $13,115,400 in First Quarter of 1916—Bankers Say They Are Not So Popular as Other Utility Issues

How electric railways share in the new financing in this country is always an important question, but it is even more so now after a year of besetting ills like 1915 and after three months in 1916 with reports of general improvement. To show how these conditions have been reflected in electric railway financing, this journal has made a review of financial statistics contained in the New York *Journal of Commerce*, *The Commercial and Financial Chronicle* and general banking reports, and arranged the data shown in the accompanying tables. In general the results indicate that electric railway financing showed a decrease of $56,658,600 or almost 30 per cent in 1915 as compared to 1914, but that for the first quarter of the present year the new issues rose $13,115,400 or about 49 per cent above those of the same period last year. This gain, besides being helped by the general improvement in market conditions, was no doubt primarily caused by the facts that development activity, greatly suspended in 1915, became quickened with the first reports of bettered utility earnings in the last part of 1915, and that to some degree electric railways endeavored to take advantage of the reinvestment market existing at the first of this year on account of the very fat industrial disbursements then made.

It might not be very wise to expect, however, that electric railway new financing will maintain this percentage of increase throughout 1916. Such financing has by no means been completed, of course, as an examination of merely the probable refunding issues for this year will show. In 1916 there are $80,575,100 of electric railway bond and note maturities, almost all of which will probably be refunded and only a small part of which has been thus cared for during the first quarter. Besides the refunding issues therefore still to come, there will undoubtedly be some actual new financing for additional equipment, improvements and even extensions, as the companies give up their retrenchment policy of the last year. In general, however, conditions in the electric railway field are such that one should expect only a fair improvement at most in an investment market where the prosperous industrials are making themselves felt so strongly.

Before pointing out some of the detailed features of the accompanying tables, it may be said that the figures cover only securities which have been actually issued and were listed by the financial papers mentioned. No foreign loans are included, although these have reached enormous totals and greatly lessened the supply of investment money. Moreover, in separating electric railways from other public utilities an effort has been made to retain in the former group only those companies doing a purely transportation service. On this basis it will be seen from Table I that the steam railroads, the electric railways and the other public utilities all suffered decreases in 1915 as compared to 1914, but the losses were felt more by the last two classes on account of the smaller totals involved, the percentage losses being approximately 12 per cent for steam lines, 30 per cent for electric railways and 32 per cent for other utilities. The net result for the year would have displayed marked corporate economy along development lines if it had not been for the large industrial increase of 193 per cent. This, combined with a slight increase of 2 per cent in municipal issues, gave a small net gain amounting to a little more than 0.4 per cent for the year.

For the first three months of 1916, however, a gain in other-than-industrial lines became evident. Most of the 49 per cent increase for electric railways came in January. Electric railways and other utilities picked up more rapidly than did the steam lines, which continued their losses through January and February, only to have them more than counterbalanced by the extensive new financing in March. Industrials continued their large increases, so that the complete results for the quarter showed gains in all corporate lines approximately as follows: Steam railroads, 6 per cent; electric railways, 49 per cent; other public utilities, 32 per cent; manufacturing companies, 480 per cent, and miscellaneous, 220 per cent. New municipal issues increased about 3.5 per cent, the net gain for all issues for the quarter being about 57 per cent.

In addition to examining the amounts of new securities recently issued, it may be well to note the various classes of securities utilized by the various groups during the first quarter of 1916, as shown in Table II. With the reports spread broadcast of a favorable bond market, it is not surprising to find that the bond issues at $340,827,400 led the

TABLE I—NEW CORPORATE AND MUNICIPAL ISSUES*

Calendar Year

Class	1915	1914	Change
Steam railroads	$644,793,900	$738,575,300	—$93,781,400
Electric railways	135,423,000	192,081,600	—56,658,600
Other public utilities	188,457,100	277,158,000	—88,700,900
Manufacturing companies	309,186,300	105,545,000	+203,641,300
Miscellaneous	157,491,100	123,158,000	+34,333,100
Total corporate issues	$1,435,351,400	$1,436,517,900	—$1,166,500
States, counties and municipalities	475,745,258	466,375,261	+9,369,997
Total issues	$1,911,096,658	$1,902,893,161	+$8,203,497

Month of January

Class	1916	1915	Change
Steam railroads	$39,621,000	$66,360,000	—$26,739,000
Electric railways	22,662,500	12,050,000	+10,612,500
Other public utilities	66,075,400	37,453,500	+28,621,900
Manufacturing companies	37,111,200	8,042,900	+29,068,300
Miscellaneous	27,306,100	3,700,000	+23,606,100
Total corporate issues	$192,776,200	$127,606,400	+$65,169,800
States, counties and municipalities	53,034,700	31,088,964	+21,945,736
Total issues	$245,810,900	$158,695,364	+$87,115,536

Month of February

Class	1916	1915	Change
Steam railroads	$73,823,000	$163,652,100	—$89,829,100
Electric railways	12,479,000	11,307,000	+1,172,000
Other public utilities	17,875,000	28,525,000	—10,650,000
Manufacturing companies	110,027,300	22,342,000	+87,685,300
Miscellaneous	89,350,000	38,420,000	+50,930,000
Total corporate issues	$303,554,300	$264,246,100	+$39,308,200
States, counties and municipalities	28,871,951	38,127,500	—9,255,549
Total issues	$332,426,251	$302,373,600	+$30,052,651

Month of March

Class	1916	1915	Change
Steam railroads	$147,758,100	$16,000,000	+$131,758,100
Electric railways	5,480,900	4,150,000	+1,330,900
Other public utilities	42,150,300	29,065,000	+13,085,300
Manufacturing companies	35,690,000	1,200,000	+34,490,000
Miscellaneous	41,312,500	6,912,000	+34,400,500
Total corporate issues	$272,391,800	$57,327,000	+$215,064,800
States, counties and municipalities	38,331,274	50,881,600	—12,550,326
Total issues	$310,723,074	$108,208,600	+$202,514,474

Quarter, January-March

Class	1916	1915	Change
Steam railroads	$261,202,100	$246,012,100	+$15,190,000
Electric railways	40,622,400	27,507,000	+13,115,400
Other public utilities	126,100,700	95,043,500	+31,057,200
Manufacturing companies	182,828,500	31,584,900	+151,243,600
Miscellaneous	157,968,600	49,032,000	+108,936,600
Total corporate issues	$768,722,300	$449,179,500	+$319,542,800
States, counties and municipalities	119,697,925	115,683,900	+4,014,025
Total issues	$888,420,225	$564,863,400	+$323,556,825

*This table shows in a combined but slightly rearranged form the statistics originally appearing in the *Journal of Commerce* and *The Commercial and Financial Chronicle*.

list of new issues, while notes at $206,916,100 and stocks at $220,978,800 ranked about even. The most encouraging feature from the electric railway point of view is the fact that out of the total of $40,622,400 of new electric railway issues for the quarter, $30,859,000 represented bonds. In view of the world-wide unsettled financial state investors are still looking for short-term notes at high interest rates, and some of the electric railways had to meet this demand, although not to the extent of a large total. A few electric railways and other utilities were able to sell some stocks, although naturally the largest portion of the new stock issues is found in connection with the industrials. In general bond issues predominated for the transportation lines, both steam railroads and electric railways, while the industrials favored stocks.

Complete statistics are not available to show the exact average yield for which the various electric railway securities have been put out, but some readers may be interested in a brief mention of certain specific issues. The Chicago City Railway recently sold $1,000,000 of 5 per cent first mortgage bonds at 99¾ and interest; the Chicago Railways, $1,500,000 of 5 per cent first mortgage bonds at 97½ and interest; the Manhattan Railway, $4,523,000 of 4 per cent second mortgage bonds at 89 and interest to yield 4.5 per cent; the Schenectady Railway, $2,256,000 of 5 per cent first mortgage bonds at 101 and interest to yield 4.94 per cent; the Des Moines City Railway, $2,280,000 of 5 per cent general and refunding bonds at 97½ and interest to yield 5.2 per cent, and the Monongahela Valley Traction Company, $1,000,000 of 5 per cent first and refunding bonds at 94 and interest to yield 5.45 per cent. The yields on these electric railway bonds, it will be observed, run from 4.5 per cent to 5.45 per cent. The short-term note issues have generally been put out at higher rates, such as the $750,000 of Winnipeg Electric Railway 6 per cent two-year notes at par and interest; the $750,000 of Dallas Electric Company 6 per cent five-year terminal notes at 99.5 and interest to yield 6.12 per cent; the $2,300,000 of American Railways 5 per cent three-year notes at 100.5 and interest, and the $2,750,000 of United Railways & Electric Company 5 per cent five-year notes at 99 and interest to yield 5.25 per cent.

TABLE II—CLASSES OF NEW CORPORATE SECURITIES IN 1916

	Bonds	Notes	Stock
January:			
Steam railroads........	$33,000,000	$6,621,000	....
Electric railways.......	21,350,000	1,100,000	$212,500
Other public utilities....	9,946,000	52,050,000	4,079,400
Manufacturing companies	550,000	4,750,000	31,811,200
Miscellaneous	2,000,000	15,256,100	10,050,000
Total	$66,846,000	$79,777,100	$46,153,100
February:			
Steam railroads........	$42,538,000	$15,285,000	$16,000,000
Electric railways	7,229,000	5,250,000	....
Other public utilities....	17,875,000	....	....
Manufacturing companies	50,300,000	20,000,000	39,727,300
Miscellaneous	15,200,000	12,000,000	62,150,000
Total	$133,142,000	$52,535,000	$117,877,300
March:			
Steam railroads........	$82,494,100	$63,814,000	$1,450,000
Electric railways	2,280,000	....	3,200,900
Other public utilities...	27,690,300	7,800,000	6,660,000
Manufacturing companies	6,100,000	2,240,000	27,350,000
Miscellaneous	22,275,000	750,000	18,287,500
Total	$140,839,400	$74,604,000	$56,948,400
Quarter:			
Steam railroads	$158,032,100	$85,720,000	$17,450,000
Electric railways	30,859,000	6,350,000	3,413,400
Other public utilities...	55,511,300	59,850,000	10,739,400
Manufacturing companies	56,950,000	26,990,000	98,888,500
Miscellaneous	39,475,000	28,006,100	90,487,500
Total	$340,827,400	$206,916,100	$220,978,800

In connection with all the foregoing data, the ELECTRIC RAILWAY JOURNAL has endeavored to ascertain what is the real position of electric railway securities in the present investment market. Interviews with many representative bankers dealing in public utility securities have elicited the general conclusion that electric railway security issues, while not at all discredited in the ordinary sense of the word, are nevertheless not at the present day as attractive as they formerly were. Investors have in recent years become more discriminating, and bankers now dealing with them have found that this discrimination takes the form of a preference for lighting or other public utility securities or for the securities of companies whose service is of a combined lighting and transportation character.

Many individual electric railway issues, however, still carry their appeal to the investing public and no difficulty seems to have been experienced in placing the purely railway issues recently brought out by the large investment houses. It was remarked, however, that these houses examine carefully all security proposals coming to them, and their very purchase of a particular issue indicates that it possesses certain talking points which will probably enable it to be placed in the competitive market, in spite of the general leaning toward utility issues other than those of electric railways. In other words, the investment banker is said to be confronted with a slight prejudice on the part of his client against electric railway securities, and the ease with which this feeling can be overcome, if at all, depends entirely upon the margin of safety and general prospects that the banker can show for each particular railway property. For this reason the known conservatism exercised by a banker in making his financial investigations will probably find direct reflection in the rapidity of sale for an issue. Investment bankers endeavor to be conservative about all their offerings, but it is felt that this attribute becomes of greater importance when used in connection with issues belonging to a class that has been touched by suspicion in the investor's mind.

The investment bankers with whom a representative of this paper talked generally believed that the comparative unpopularity of electric railway securities is due to fundamental conditions existing in the industry. Electric railways are more in the hands of labor than are other utilities; they are more intimately connected with the public and are therefore held to more drastic rules of operation, and they furnish a commodity which is dispensed with more easily in times of industrial depression than is the commodity supplied, for example, by lighting and water companies. Furthermore, they deal with a business that is restricted, *i. e.*, they are not able, except within very narrow limits, to expand their traffic and increase their receipts through business campaigns and similar efforts, while unprofitable extensions of service may be continually forced upon them. Besides this limitation of paying business, there is the handicap of the fixed fare, combined with increasing burdens of operating cost over which the railways have no control. The combination of all these fundamental factors makes the margin of profit upon which an electric railway operates very small, and causes the carrier to be very susceptible to any influence even temporarily cutting into its earnings. Thus, it is asserted, the competition of the jitneys clearly demonstrated the vulnerability of electric railways, and as a result the investor of to-day feels a lessened inclination to buy electric railway securities unless he is convinced by expert advice that a particular issue is an exception to what he imagines is the rule. This is in quite a contrast, it is said, to the eagerness with which the investor takes up electric lighting, gas and other utility issues about which he has fewer, if any, preconceived derogatory notions.

Of course, there is a more cheerful aspect of the question, for electric railway issues during the first quarter of 1916 have been selling better than last year at the same time, but this may be, it is said, largely only a natural consequence of the general investment improvement in the later period. According to the investment bankers, the feature of the market to-day is a steadily increasing demand for public-utility securities, but more especially those of the electric light and power and gas companies. Electric railway securities have fallen behind in popularity, and if the future holds advanced prices for such issues, the gains, as one banker tersely says, will probably come after other utility gains. Jitney competition has gone, but this is not sufficient. The public must be educated to a realization of what electric railway service really costs, to a willingness to pay adequately for such service and to a knowledge of the need for new railway capital and the attractions that must be offered to the investor in the competitive market. If this can be done, it is thought that the investor may be easier to convince.

ANNUAL REPORTS

Commonwealth Power, Railway & Light Company

The combined results of operation of the properties of the Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., for the years 1914 and 1915 follow:

	1915	1914	Per Cent Inc.
Gross receipts	$14,590,123	$14,006,484	4.17
Operating expenses	6,964,679	6,761,891	3.00
Gross income	$7,625,444	$7,244,593	5.26
Fixed charges, including taxes and dividends on outstanding preferred stocks of subsidiary companies	5,329,857	5,000,859	6.58
Net income, available for dividends, replacements and depreciation	$2,295,587	$2,243,734	2.31
Dividends on preferred stock	960,000	960,000	...
Balance	$1,335,587	$1,283,734	4.04

The new electric railway between Grand Rapids and Kalamazoo was completed early in the year, and passenger service was established between the two cities on May 17, 1915, and also on the line between Allegan and Battle Creek, the electrification of which is fully completed. Freight service was established on Aug. 16, 1915. The passenger terminals are located in the business centers of the respective cities, trains entering Grand Rapids over the company's own right-of-way into its own terminal, located within 600 ft. of Campau Square, the business and hotel center of the city. It is expected that during 1916 a substantial amount of business will be done in the way of handling heavy freight, which would result in a material addition to the company's earnings.

The foregoing statement includes the complete earnings for the calendar year of all properties with the exception of the new railway lines, earnings of which are included from July 1, 1915. The receipts of all the subsidiaries showed a gratifying increase of $583,639 or 4.17 per cent, while the gross income, owing to a smaller increase in operating expenses, rose $380,851 or 5.26 per cent. On the other hand, the fixed charges, including taxes, increased $328,998 or 6.58 per cent, so that the net income gained only $51,853 or 2.31 per cent. The taxes paid by the company and its subsidiaries during 1915 alone amounted to $823,776 as compared to $788,008 in 1914, an increase of 4.54 per cent. This increase would, however, have been materially greater were it not for the fact that during the year several subsidiary companies were combined, greatly simplifying the corporate relations between the holding company and its operating subsidiaries, reducing the number of such subsidiary companies by eighteen and eliminating duplicate payments under the federal law upon income passing from one company to another, thereby effecting a material saving in such taxes.

It is interesting to note that of the increase of $583,639 in gross receipts the largest amount, or $519,918, came from electric, heating and water companies. This represented an increase of 10.13 per cent over the preceding year. Gas companies showed increased receipts of $65,566 or 2.52 per cent, while the old interurban lines had the smallest increase in both amount and percentage, *i. e.*, $20,123 or 1.16 per cent. The street railway lines lost $169,171 or 4.30 per cent and miscellaneous railway revenues dropped off $55,439 or 9.31 per cent. The new interurban lines for their first period of operation showed total receipts of $202,641. The detailed comparative receipts for the various operating divisions are given in the following table:

	1915	Per Cent of Total	1914	Per Cent of Total	Increase	Per Cent Inc.
Gas	$2,670,456	18.30	$2,604,889	18.60	$65,567	2.52
Electric, heating and water (a)	5,650,816	38.73	5,130,897	36.63	519,919	10.13
Railway—						
Street	3,764,070	25.80	3,933,242	28.08	*169,171	*4.30
Interurban—						
(old)	1,762,226	12.08	1,742,103	12.44	20,123	1.16
(new)	202,641	1.39	......	....	202,640	...
Miscellaneous	539,914	3.70	595,353	4.25	*55,439	*9.31
Total	$14,590,123	100.00	$14,006,484	100.00	$583,639	4.17

*Decrease. (a) Electric sales to subsidiary distribution and railway companies are eliminated.

The year's street railway earnings were adversely affected by operation during the spring and summer months of jitneys in a number of cities. Their operation has, however, fallen off very materially, as reflected in the fact that the earnings for November and December showed increases over the same months of 1914 of 3.99 per cent and 8.27 per cent, respectively, although a portion of this increase should be attributed to generally improved business conditions. The decrease in miscellaneous railway earnings was largely due to the falling off in park and resort business during the summer, owing to the excessive cold and rainy weather during July and August. During 1915 the street railway subsidiaries carried 81,464,051 revenue passengers, a decrease of 4,429,285 or 5.16 per cent, while the old interurban traffic of 8,769,915 revenue passengers represented a loss of 419,186 or 4.56 per cent. The new interurban lines carried 418,047 revenue passengers after their opening.

General Electric Company

The condensed profit and loss statement of the General Electric Company, Schenectady, N. Y., for the twelve months ended Dec. 31, 1915, follows:

Sales billed	$85,522,070
Cost of sales, including all operating, maintenance and depreciation charges	76,898,183
Profit from sales billed	$8,623,887
Interest and discount	$1,434,269
Income from securities owned	1,554,843
Sundry revenues	694,996
Total	$3,684,108
Interest on debenture bonds	570,086
	$3,114,022
Net income	$11,737,909
Dividends paid	8,129,918
Net surplus for the year	$3,607,991
Surplus at Jan. 1, 1915	20,084,879
Surplus at Dec. 31, 1915	$23,692,871

The value of orders received by the company for electrical apparatus and devices in 1915 was $98,385,891, an increase of $14,637,370 or 17 per cent over that of 1914. This increase was largely due, it is said, to the general revival of business in the latter part of the year. These figures are exclusive of orders for special war munitions, which in 1915 amounted to $33,980,000. These orders were so restricted as to interfere as little as possible with the regular product of the company. The percentage of profit from these orders will probably be less than that of the average of the company's output.

The total sales billed for 1915 were $85,522,070 as compared to $90,467,691 in 1914. The sales billed are not a good basis of comparison, however, on account of unfilled orders that are carried over into another year. For example, if a large volume of unfilled orders had not been carried over into 1914 from 1913, the effect of the general depression of 1914 on the company's business would have been more evident. The real condition of the industry was shown by the fact that in 1914 the value of orders received decreased 25 per cent below the 1913 figure, and in just the same way the improvement in the last year is evidenced by the increase of 17 per cent in the value of the orders in 1915 as compared to those in 1914.

The company followed its customary practice in writing off against income account its total expenditures in 1915 for patents, applications for and licenses under patents and other outlays relating thereto, amounting to $838,455. The patent account is carried at $1, as in previous years. Stocks, bonds and other securities are carried at a valuation of $32,916,593, of which $19,687,965 represents securities of subsidiary companies, and $13,228,628 those of public utility and other companies. The current accounts and notes receivable are carried at $19,619,216.

The sale of several small factories substantially offset the manufacturing floor space added in 1915, and plant expenditures, amounting to $4,485,068.81, were chiefly for improvements in existing construction and equipment and the purchase of special tools and machinery which are subject to a high rate of depreciation. Because of the nature of these expenditures and on account of the liquidation of the book value of the factories sold the reduction in the plant account for the year was $5,985,069.

BOSTON ELEVATED REDUCES DIVIDEND

At a meeting on April 24 the directors of the Boston (Mass.) Elevated Railway declared a dividend of one-half of 1 per cent for the quarter ended June 30, making the dividend rate for the fiscal year 5 per cent. The dividend is payable on May 15 to stockholders of record of May 5. The stock fell 68 as a result of the action of the directors. This is a drop of nine points below the April 22 closing quotation. In a statement to stockholders, W. A. Bancroft, president, said:

"On July 26, 1915, near the beginning of the currrent fiscal year, the directors wrote you as follows: 'The net income of the company has been seriously affected by the large increase in the cost of labor and materials and by the large burdens which have been constantly imposed upon the company, and in the judgment of the directors it is not likely to be sufficient to provide for continuous 6 per cent dividends, unless some relief is afforded either by an increase in the unit of fare or otherwise.'

"The experience of the year has proved this statement to be only too true. We wrote you that the rate of 6 per cent per annum is the rate to which, at least, we believe you are entitled, and we have accordingly paid during the last three years at that rate up to the final dividend for each year, paying in all 5 per cent during the year ending June 30, 1914, and 5.5 per cent during the year ending June 30. 1915. As the last dividend of the year is payable on May 15 to stockholders of record May 5, we are obliged to estimate the earnings of the last three months of the fiscal year to end June 30, 1916, and base the final dividend upon that estimate, having in mind, of course, provision for maintenance, depreciation and other possible increases in operation, calculating, also, as closely as we can, our probable gross income.

"We have concluded that the highest rate we can pay this fiscal year is that of 5 per cent per annum, and have declared accordingly a dividend of one-half of 1 per cent (50 cents) for the quarter ending June 30, 1916, making, with the 4.5 per cent heretofore paid, 5 per cent for the year. We have retrenched in our operating as far as is consistent with safety and the accommodation of our patrons. The constant increase in the cost of labor, of material, of rental and interest is felt, of course, in the net which we are able to show. We repeat that in order to provide sufficient net earnings the company must have some relief, 'either by an increase in the unit of fare or otherwise.'"

ELECTRIC RAILWAY EARNINGS IN 1915

In its annual review of the electric railway industry *The Commercial & Financial Chronicle* of April 22 reports that the influence of jitney competition for 1915 seems to have been comparatively slight for the industry as a whole. Moreover, the losses to the electric lines from this source are said to have occurred almost entirely in the first six or seven months of the year, the situation in the closing months being radically changed for the better. For the railways as a whole it seems that the gross earnings for 1915 were only a trifle lower than in 1914, and the falling off in net earnings was also relatively small.

From the annual reports of 272 companies it has been calculated that the gross earnings in 1915 were $513,967,674 as compared to $514,028,402 in 1914, a decrease of $60,728 or 0.01 per cent. Of the 272 lines 148 showed decreases in gross aggregating $10,726,907. The net earnings for the entire group were $194,893,975 in 1915 and $196,921,712 in 1914, a decrease in this case of $2,027,737 or 1.03 per cent. In all 131 companies reported decreases in net to an extent of $10,937,946. In 1914 the gross earnings were able to show a slight increase of 0.87 per cent, with a decrease of 0.53 per cent in net. The poorer showing of the electric railways in the last calendar year is thus evident.

Besides the railways previously mentioned eighteen companies reported on gross earnings alone. Thus for 290 lines the gross earnings totaled $530,682,406 in 1915 as compared to $531,077,160 in 1914, a decrease of $394,754 or 0.07 per cent. By using for these eighteen companies the average operating ratios of the 272 lines, it is calculated that the aggregate net earnings of the 290 companies reached $201,232,201 in 1915 as compared to $203,453,091 in 1914, this being a decrease of $2,220,890 or a little more than 1 per cent. If there are included also the companies reporting for the year ended June 30, the decrease for 344 lines becomes 0.28 per cent for gross earnings (total in 1915, $567,901,652), and 1.43 per cent for net earnings (total in 1915, $214,319,303). These showings are poorer than those of 1908, which was by far the worst year between 1905 and 1913, inclusive. The year 1915 is the first one showing decreases in both gross and net, and the only other decrease at all was in net in 1914.

Cities Service Company, New York, N. Y.—A syndicate consisting of Montgomery, Clothier & Tyler; Kissel, Kinnicutt & Company; J. & W. Seligman & Company, and White, Weld & Company, is offering at par and interest, yielding 6 per cent, a new issue of $14,000,000 of first mortgage and collateral trust sinking fund 6 per cent gold bonds of the Empire Gas & Fuel Company dated May 1, 1916, due on May 1, 1926. The payment of principal, interest and sinking fund installments is unconditionally guaranteed by the Cities Service Company.

Detroit (Mich.) United Railway.—The Detroit United Railway has declared a quarterly dividend of 1¾ per cent, payable on June 1 to stock of record May 16. This places the stock on a 7 per cent basis, being an increase of one-quarter of 1 per cent over previous quarterly declarations.

Northern Electric Railway, Chico, Cal.—The reorganization committee of the Northern Electric Railway on April 13 adopted a resolution to file an application with the California Railroad Commission requesting a hearing on the readjustment plan. This is taken to amount in effect to a declaration of the plan as being operative. The time for making deposits has been extended one month to May 15.

Public Service Corporation of New Jersey, Newark, N. J.—The financial statement for March issued by Public Service Corporation of New Jersey shows a gross increase in business amounting to $491,610, over March of the previous year. This represents a gain of 17 per cent. The balance available for amortization, dividends and surplus, after payment of operating expenses, fixed charges, sinking fund requirements, etc., was $380,205. The increase in surplus available for dividends over the corresponding month of 1915 was $167,802. For the three months ended March 31, 1916, the gross increase in total business was $1,229,242. The balance available for amortization, after payment of operating expenses, fixed charges, sinking fund requirements, etc., was $1,212,927. The increase in surplus available for dividends over the corresponding period of 1915 was $303,557.

Scioto Valley Traction Company, Columbus, Ohio.—The Ohio Public Utilities Commission has approved the request of the Scioto Valley Traction Company to issue $200,000 of preferred stock, the proceeds to be used to purchase a similar amount of stock of the Columbus Depot Company, which will erect a depot in Columbus. The stock must be sold at not less than 97 and the proceeds must be invested in the depot stock at not less than 97. The stock of the depot company is to be held in the treasury of the traction company and not sold, except by authority of the commission.

Southern Traction Company, Inc., Bowling Green, Ky.—Application has been made for the appointment of a receiver for the Southern Traction Company, Inc., which recently succeeded the Bowling Green Railway.

United Railways, St. Louis, Mo.—Application has been made by the United Railways to the Missouri Public Service Commission for authority to issue $1,000,000 in bonds, each upon the Merrimac River Railroad and St. Louis & Suburban Railroad, owned and operated by the United Railways. The bonds are to be issued under a general mortgage upon the properties of the companies with the Mississippi Valley Trust Company as trustee. The mortgages were executed in 1903. The quarterly report of the company for the three months ending March 31, as filed with the city register, shows an increase of approximately 3,500,000 in the number of passengers carried, as compared with a similar period last year. The company carried a total of 56,951,611 passengers in the three months, of whom 1,040,879 were half-fare passengers. A total of 1,579,256 trips was made, for a total of 9,663,352 car-miles. In the same three months last year 53,475,810 passengers were carried, of whom 948,993 were half-fare. A total of 1,505,934 trips was made for 9,500,037 car-miles.

DIVIDENDS DECLARED

Bangor Railway & Electric Company, Bangor, Me., quarterly, one-half of 1 per cent, common.

Brazilian Traction, Light & Power Company, Ltd., Toronto, Out., quarterly, 1 per cent, common.

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent, preferred.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., quarterly, 1½ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., quarterly, 1¼ per cent, preferred.

Montreal (Que.) Tramways, quarterly, 2½ per cent.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., 3 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
BATON ROUGE (LA.) ELECTRIC COMPANY						
1m., Feb.,	'16	$17,150	*$8,524	$8,626	$3,436	$5,190
1 " "	'15	13,906	*8,770	5,136	2,082	3,054
12 " "	'16	196,290	*106,964	89,326	29,616	59,710
12 " "	'15	179,596	*113,502	66,094	25,034	41,060
CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.						
1m., Feb.,	'16	$28,638	*$18,579	$10,059	$6,424	$3,635
1 " "	'15	23,439	*15,069	8,379	6,558	1,821
12 " "	'16	367,479	*211,355	156,124	78,872	77,253
12 " "	'15	347,303	*209,700	137,603	78,020	59,583
COLUMBUS (GA.) ELECTRIC COMPANY						
1m., Feb.,	'16	$64,622	*$27,428	$37,194	$28,679	$8,515
1 " "	'15	55,777	*26,970	28,807	28,791	16
12 " "	'16	741,241	*326,371	414,870	344,329	70,541
12 " "	'15	688,655	*305,684	382,971	332,102	50,869
DALLAS (TEX.) ELECTRIC COMPANY						
1m., Feb.,	'16	$163,758	*$95,660	$68,098	$36,573	‡$33,525
1 " "	'15	149,396	*82,309	67,087	33,426	33,661
12 " "	'16	1,836,629	*1,130,126	706,503	411,104	‡300,599
12 " "	'15	2,153,492	*1,232,770	920,722	384,373	536,349
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.						
1m., Feb.,	'16	$64,175	*$34,344	$29,831	$8,939	$20,892
1 " "	'15	48,408	*30,316	18,092	8,908	9,184
12 " "	'16	751,425	*395,327	356,098	105,535	250,563
12 " "	'15	669,977	*392,529	277,448	102,830	174,618
EL PASO (TEX.) ELECTRIC COMPANY						
1m., Feb.,	'16	$91,146	*$45,584	$45,562	$4,722	$40,840
1 " "	'15	79,240	*42,265	36,975	4,198	32,777
12 " "	'16	1,006,674	*528,951	477,723	51,379	426,344
12 " "	'15	1,031,457	*564,455	466,602	51,112	415,490
JACKSONVILLE (FLA.) TRACTION COMPANY.						
1m., Feb.,	'16	$50,136	*$33,549	$16,587	$14,716	$1,871
1 " "	'15	48,520	*34,532	13,988	13,516	472
12 " "	'16	611,470	*426,708	184,762	180,385	4,377
12 " "	'15	699,212	*465,260	233,952	153,878	80,074
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
1m., Feb.,	'16	$25,618	*$14,829	$10,789	$7,378	$3,411
1 " "	'15	23,985	*15,868	8,117	7,658	459
12 " "	'16	292,168	*177,877	114,291	90,666	23,625
12 " "	'15	301,658	*193,016	108,642	91,566	17,076
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Feb.,	'16	$21,832	*$11,686	$10,146	$8,066	$2,080
1 " "	'15	19,988	*11,612	8,376	7,248	1,128
12 " "	'16	263,590	*147,430	116,160	86,891	29,269
12 " "	'15	259,073	*165,402	93,671	86,922	6,749
SAVANNAH (GA.) ELECTRIC COMPANY						
1m., Feb.,	'16	$60,396	*$44,169	$16,229	$23,021	†$6,792
1 " "	'15	64,995	*41,827	23,168	22,956	212
12 " "	'16	785,159	*518,011	267,149	278,466	11,317
12 " "	'15	839,109	*548,681	290,428	276,071	14,357
TAMPA (FLA.) ELECTRIC COMPANY						
1m., Feb.,	'16	$90,543	*$44,456	$46,087	$4,394	$41,694
1 " "	'15	82,890	*39,521	43,369	4,427	38,942
12 " "	'16	990,048	*510,705	479,343	52,184	427,159
12 " "	'15	988,735	*514,698	474,037	53,205	420,833
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Mar.,	'16	$850,282	$542,924	$307,358	$14,586	$161,772
1 " "	'15	788,122	529,703	258,419	144,648	113,771
3 " "	'16	2,490,985	1,609,174	881,811	427,882	453,929
3 " "	'15	2,277,917	1,555,125	722,792	418,496	304,296

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

ROCHESTER JITNEY HEARING CONCLUDED

Summary of Testimony in Most Important Case Before the New York Commission

Brief reference was made in the ELECTRIC RAILWAY JOURNAL of April 15, page 755, to the final argument on April 12 at Albany on the application for certificates of convenience and necessity for jitney buses in Rochester. This is considered the most important case of this character so far heard before the Public Service Commission of the Second District.

D. M. Beach for the New York State Railways, Rochester lines, declared that the record in the case showed that the criticism of the electric railway service was unfounded. He said that more witnesses had testified more strongly to the service being satisfactory than had testified as to its inadequacy. He declared that the track layout and equipment of the electric railways was fully adapted to take care of Rochester's traffic requirements; that rush-hour crowding was unavoidable, but that it was less in Rochester than in any other place in the country as testified to in this case; that the street railway was the only medium that could supply adequate transit facilities for Rochester or any other city of its size and character; that the jitneys could not replace the street cars; that if both were permitted to operate neither would be able to furnish satisfactory service; that the jitneys would so injure the electric railways that the latter would be unable to finance new extensions and improvements; that the service furnished by the electric railways, if inadequate, could be regulated by the Public Service Commission, and that the jitneys and their proposed operators were irresponsible and unreliable.

Mr. Beach also laid great stress on the recent decision of the commission in the New Rochelle jitney case where certificates were refused to lines on the same streets with the electric railways. He said that in the present instance every one of the routes asked for in Rochester paralleled a trolley on the same street with two exceptions. Mr. Beach maintained that the jitneys would be subject to the same causes of delay as now affected the electric railways, such as the canal bridges and congested traffic downtown. The down curve of the company's business last spring exactly coincided with the flourishing of the jitneys.

In response to a suggestion by Chairman Van Santvoord that jitneys would certainly help to relieve conditions in his home city of Troy, R. M. Searle made this statement for the company:

"We have now ordered fifty new cars of a new type which will furnish sixty seats as against the forty in the present cars. We plan to operate them in two-car trains during the rush hour. This will give 120 seats as against forty furnished now, and is a larger improvement than jitneys could possibly make under any conditions."

Mr. Beach and Mr. Searle both declared that the last winter's experience proved the jitneys would not be able to operate continuously. They said that horses had to be substituted for commercial motors, and that the autos could not operate until the railway had cleared the streets.

Richard D. B. Powell, for the sixty individual jitney applicants pointed out to the commission that the jitney ordinance was passed by the Common Council of Rochester without a dissenting vote, and said that the ordinance provided for a substantial bond, a tax to be paid the city and regulation of the operation of the cars. Jitneys, operating through the rush hours, would take from the street cars the surplus load which the railways could not provide with seats. He declared that the jitneys would provide a new form of social benefit to the people of Rochester in affording them an opportunity for a ride in the fresh air for 10 cents. He also reviewed the evidence by D. M. Suter, a real estate man, tending to show that the jitney lines would greatly aid in the developing of new territory by enabling working people to live at a distance from their places of employment not now possible. Mr. Powell concluded his argument with figures tending to show that the jitneys would not seriously injure the business of the railway. He read from the company's testimony to show that the net reduction in revenue during the last year was only $200,000 and that the company had still been able to show a profit of $900,000 on its operations.

All of the commissioners present took an active part in the arguments. At the close of the hearing Commissioner Emmet, who presided, announced that Charles R. Barnes, the electric railway expert of the commission, had made the most elaborate and extensive survey of transit conditions in Rochester that had ever been made in New York. Mr. Emmet said that though not a matter of testimony the commission would, of course, be guided in its decision largely by these figures and other data gathered by its own expert.

LOW FARE ORDER RESCINDED

Railroad Commission of Wisconsin Restores Superior Fares, Which Were Reduced in 1912.

The Railroad Commission of Wisconsin issued an order on April 20 rescinding the order of the commission made on Nov. 13, 1912, under which the Duluth-Superior Traction Company was required to reduce fares in Superior. In its rescinding order the commission says:

"The respondent, it appears, has reached the stage when improvements in the service, especially extensions, are required. There has been relatively only a small increase in the track mileage for the last twelve years, or since 1904, while the population, it is estimated, has increased 30 per cent and passenger traffic in the neighborhood of 80 per cent during that time. These increases compared with the increase in track mileage of from 21.55 miles in 1904 to 23.54 at present, an increase of a little more than 9 per cent, indicate the situation to a certain extent. The most urgent extension at present which the public demands and the company is desirous of making is the one to the dock front involving an estimated cost in excess of $90,000.

"It is fair to estimate that when all the needed improvements in the service have been made and the paving obligation fulfilled, from $125,000 to $175,000 will have been added to the plant value within the next few years. Upon the basis of the net earnings for the period 1910-1915 inclusive the rate of return upon the increased plant value will slightly exceed 6 per cent."

The commission points out that prudence would indicate that the public desired these improvements rather than a decrease of railroad fare. Extensions would be impossible unless the reduced-fare order were rescinded. The order is rescinded on the understanding that the improvements mentioned are to be made.

The original order of the commission, issued on Nov. 13, 1912, fixed the rate of fare in Superior at six tickets for 25 cents. No reduction was ordered in the cash fares. The original order and the decision were reviewed in a six-page article which appeared in the ELECTRIC RAILWAY JOURNAL of Nov. 23, 1912, page 1067.

JITNEY LICENSING BILL FOR MASSACHUSETTS

After extended deliberation the committee on mercantile affairs has introduced a bill into the Massachusetts Legislature providing for the licensing and regulation of motor vehicles carrying passengers for hire and not running on tracks or rails. Under the terms of the bill municipalities may impose reasonable license fees, make regulations for the operation of such vehicles within their own limits, and impose suitable penalties for the violation of such regulations, provided, however, that no such motor vehicle shall thus be operated until the proprietor of the business in which it is to be operated shall have executed and filed with the treasurer of such city or town, and renewed or increased from time to time as may be required, a bond running to such treasurer and approved by him, in such sum as the municipality may reasonably require, conditioned to pay any final judgment against the principal named in the bond for any injury to person or property, or damage causing the death of any person by reason of any negligent or unlawful act on the part of the principal, his or its agents, employees or drivers in the use or operation of such vehicle. Any person injured or damaged may sue on this bond in the name of such city or town treasurer, and damages so recovered shall go to the person injured or damaged. The bill is to take effect in cities upon its acceptance by the city council and in towns upon its acceptance by the voters. The bill was passed by the House on April 20.

M'KINLEY LINES ASK INCREASE IN FARES

H. I. Green, general solicitor of the Illinois Traction System, appeared at a public hearing before the Aldermen of St. Louis, Mo., on the night of April 18 on the proposed ordinance to permit the company to increase the fare between St. Louis and the tri-cities and also to grant it certain track rights. Mr. Green said that since the completion, five years ago, of the McKinley Bridge, over which the lines operate into St. Louis, they have been run into that city at a loss. Mr. Green expressed confidence in the willingness of the Aldermen of St. Louis to deal fairly with the company, and said that the company would "throw all of its cards on the table." Additional freight facilities were needed by the lines. The rates asked and on file with the Interstate Commerce Commission were not remunerative at present, but could probably be made so if the facilities in St. Louis were increased. An agreement was finally reached with the Aldermen by which the company will not oppose a delay of a month, if necessary, to give the city and the members of the board time to reach a decision as to whether the rate question can be solved by a new ordinance or the presentation of evidence before the Interstate Commission.

The hearing before Examiner Wilbur La Roe, Jr., of the Interstate Commerce Commission in regard to the increase in fares proposed by the Illinois Traction System over the St. Louis bridge was commenced at the Planters' Hotel, St. Louis, on April 22. B. E. Bramble, general auditor of the Illinois Traction Company, testified in regard to the losses sustained by the company since 1910 in the operation of the bridge. He said that in 1915 the Illinois Traction Company advanced to the bridge and terminal company $153,000. Mr. Bramble estimated that even if the advances as now on file with the commission were allowed, there would still be a deficit in the operation of the line into St. Louis.

Mr. Green for the company said that it was hoped through the increase in fares asked of the commission and by the intensive development of both the passenger and freight business to overcome the deficit at which the company was now operating. He said that when the present rate was established the fare in Illinois was 3 cents a mile, but that it had since been reduced to 2 cents. This had materially affected the earnings.

E. D. Bell, superintendent of the local lines of the company, said that the proposed increase would affect 82 per cent of the patrons of the entire system, but that 59 per cent of these would be furnished with commuters' books containing tickets good for fifty-two rides for $3. This would make the increase of fare for all workers on the East Side less than 1 cent. The tickets contained in these books would be good between 5 a. m. and 8 a. m. and between 4 p. m. and 6.30 p. m. Others who crossed the bridge at times not specified in the tariff schedule proposed by the company would be furnished with six rides for 50 cents. The occasional passenger would be the only one to pay an additional fare of 5 cents to go beyond Venice.

At the continuation of the hearing on April 24 both Mr. Green and L. E. Fischer, a consulting engineer of St. Louis and former general manager of the Illinois Traction System, testified. Mr. Fischer said that it was extremely unlikely that any extension of the present facilities could be made unless fares were increased so as to provide additional revenue. He also said that the bridge had been built with the expectation that it would develop business between central Illinois points and St. Louis. This had proved not to be the case. He said that the Illinois Traction System by city ordinance was limited for freight service to the use of a parcel of land belonging to it near the bridge; that its freight trains were limited to two cars each, and that the company was prohibited from bringing a car of a steam road west of Ninth Street. He reviewed the efforts made to obtain the passage of an ordinance to authorize the company to occupy half of Hall Street near the bridge so that physical connection could be made with the line of the Terminal Railroad Association. Only 150 ft. of track was needed to make this connection.

BAY STATE FARE HEARINGS CONTINUING

Cross-examination of R. M. Feustel, valuation expert of the Bay State Street Railway, Boston, Mass., was the outstanding feature of the fare hearings before the Public Service Commission during the week ended April 29. The time was largely occupied by counsel for the remonstrants to the proposed fare increase in endeavoring to secure the assent of the witness to various theories bearing upon the treatment of depreciation. At a recent session Chairman McLeod stated that B. J. Arnold, who has been employed by the commission to make an independent investigation of the Bay State property, will shortly complete his report and that he will probably be present for examination as a witness in the future. Counsel James F. Jackson, for the petitioners, stated that President P. F. Sullivan and other officials of the company will testify in the case if needed.

In the course of the hearings Mr. Feustel stated that no definite standards of overhead charges during construction can be cited as accepted by all electric railways. In a study of rolling stock depreciation on the Bay State system it was found that the average age of single-truck open cars was 14.9 years. Attempts on the part of the remonstrants to make the witness commit himself relative to the feasibility of using one-man cars on the Bay State system were generally unsuccessful. The witness maintained that he had not conducted an investigation of the road from the traffic point of view, but that he and his staff had confined their work almost entirely to the valuation of the Bay State property. In the course of the hearings the point was brought out that the open type of car has not entirely gone out of fashion and that the Public Service Railway of Newark, N. J., will shortly complete a number of such cars.

Freight Service Proposed for Cleveland Suburban Line.—A daily freight service will be inaugurated by the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, early this summer.

Massachusetts Commission Supends Fare Increases.—The Public Service Commission of Massachusetts has suspended the proposed fare increases on the Bristol & Norfolk Street Railway and the Massachusetts Northeastern Street Railway from May 1 to July 1, and has suspended the proposed increase on the Bay State Street Railway from May 1 to Sept. 1.

Hoboken Fare Hearing Continued.—At the sessions on April 19 and 20 before the Board of Public Utility Commissioners of New Jersey in Jersey City on the application before the commission to require the Public Service Railway to operate at a 3-cent fare in Hoboken counsel for the company cross-examined witnesses for the city as to the methods which were pursued in reaching their conclusions with respect to property values and the number of passengers carried. The case will be continued on May 24 and 25.

Detroit Experimenting With Transfer Printing Machine.—The Detroit (Mich.) United Railway is experimenting with a new transfer printing machine on one of the Hamilton line cars. The machine prints from a roll of white paper, does away with all punching and is expected to enable the conductors to issue transfers more expeditiously than under the old way. Where double transfers are requested, under the rules the transfer issued will be stamped "transfer," and on its surrender to the conductor of the second car a transfer to the final line will be issued.

Bus Rights Granted in Watertown.—The Public Service Commission for the First District of New York has granted a certificate of public convenience and necessity to the Watertown Transportation Company for the line of buses which it has been operating for a number of years through the residential section of Watertown, and for which certificate it applied after gaining the consent of the municipal authorities under the jitney law passed last year. As the Black River Traction Company does not operate in the district served by the buses it made no objection to the granting of the certificate.

Arranging Through Rates Out of Louisville.—The Board of Trade of Louisville, Ky., has issued a statement as follows: "All of the eight or ten electric railways in interest, with one exception, have practically agreed on rates out of Louisville to northern Indiana and southern Michigan and on the division of these rates among themselves. The only exception is our Louisville end of the line and the companies there have submitted a different proposition to the lines for discussion. As soon as the difference shall have been adjusted we will have through traffic arrangements with every electric railway running out of Indianapolis."

Seattle Heating Case Concluded.—At the hearing before the State Public Service Commission in Seattle, Wash., on April 17, G. A. Richardson, superintendent of railways of the Puget Sound Traction, Light & Power Company, stated that the company planned to expend $7,500 in putting sashes and windows on the rear ends of open cars. He expressed the opinion that this would give better results than the same amount expended in heaters. It was conceded by the proponents of heating in cars that heaters were unnecessary in cars running on short-haul lines. J. B. Howe, attorney for the company, offered to show that the earnings of the company were only a little more than 3 per cent on the investment. He was overruled by the commission. Chairman C. S. Reynolds stated that the question before the commission was one of service and not of rates. The case was then concluded.

One-Man Cars Approved for Lockport.—Opposition to the operation of one-man cars in Lockport on the International Railway has been withdrawn by the City Council, and plans and specifications for the construction of a new passenger terminal in Lockport for the Buffalo & Lockport; Lockport & Olcott and Buffalo, Lockport & Rochester interurban lines are now being made. This settlement brings to an end a four-year controversy between the city and the railway company. After the adoption of the ordinance the International Railway obtained an injunction, and the matter is still pending in the courts. The action on the part of the City Council rescinding the ordinance ends the litigation in the courts. A referendum vote of members of the Lockport Board of Trade made recently showed almost unanimous sentiment in favor of one-man cars because of the frequency of the service over all lines.

Janitors Become Traffic Guardians.—Louisville papers have been printing the recent news article carried by the ELECTRIC RAILWAY JOURNAL on the proposal that janitors of public schools be authorized to serve as traffic officers while school children are going to and coming from schools. It was used as favorable expert comment on the idea and has been credited with helping the decision of the Board of Education and the Board of Public Safety to give the plan a trial at four of the schools of the city where conditions are typical. These are yet to be selected. The plan will be tried out during the remainder of the present school year and if it proves practicable it is said that the system will likely be extended next year to all schools where passing vehicles constitute a menace. In this connection the Board Commissioner of Public Safety at Lexington, Ky., has provided traffic policemen who will take their stands near the Johnson and the Maxwell public schools during the noon recesses and at the hours of closing in the afternoons. This precaution is, however, principally to protect the children from the danger of passing automobiles.

Jitney Victim Fails to Recover from Railway.—In Judge Kavanaugh's court at Portland, Ore., on April 14, a jury brought in a verdict entirely exonerating the Portland Railway, Light & Power Company from responsibility for injuries to a woman incurred in a collision between a street car and a jitney. The woman who sued was one of five jitney passengers more or less badly injured. A sixth passenger was killed. The jitney driver, prior to engaging in that business, had never operated an automobile in his life. He had been running his car six weeks when the accident happened. It had been raining the morning of the accident. The jitney was not equipped with chains. The pavement was slippery and the driver had to seek the cobblestones between the tracks for traction. He turned into the tracks ahead of a car moving south and lost control of his automobile a few feet in front of another car moving north. The inevitable collision carried the automobile backward 40 ft. against the car coming from the opposite direction. The case was the first in Portland in which a jitney victim sought to recover from the street railway. The suit was for $25,000.

Personal Mention

Mr. Joseph R. Sterling, for the last eight years chief engineer of the Inter-Urban Railway and the Des Moines City Railway, Des Moines, Iowa, has resigned to become associated with the Des Moines Asphalt Paving Company.

Mr. Bion J. Arnold, chairman of the Board of Supervising Engineers, Chicago Traction, has been appointed a member of the Federal Naval Consulting Board to succeed Mr. Henry A. Wise Wood, resigned. Mr. Arnold received this appointment as a member of the American Society of Aeronautical Engineers. He is also a member of the National Reserve Corps of Engineers, organized by the American Society of Civil Engineers.

Mr. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., has been elected president of the Universal Concrete Products Company, Chicago, Ill., formed to manufacture concrete poles for railway and lighting companies. Mr. Blackhall will not resign as general manager of the Chicago & Joliet Electric Railway, but will devote most of his time to organizing and putting the new company in operation.

Mr. W. H. Wood has been appointed superintendent of power plants of the Baltimore & Ohio Railroad, with headquarters at Baltimore, succeeding Mr. T. F. Foltz, resigned. Mr. Wood was formerly with the American Writing Paper Company, Holyoke, Mass., where he had charge of the steam boiler plants. He was born in October, 1875, and was graduated from the University of Arts and Sciences in 1898, following which he was connected with the Standard Steel Company, at Burnham, Pa. From July 1, 1899, to May 1, 1914, he was associated with Mr. A. C. Wood, a consulting engineer.

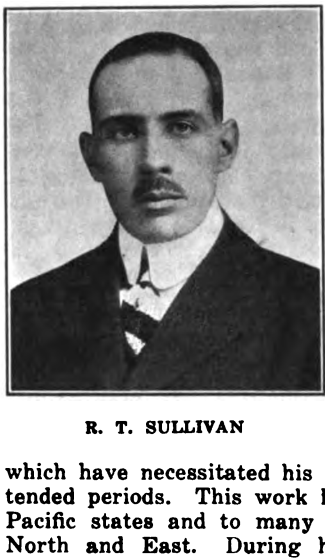
Mr. W. H. Heun, superintendent of transportation of the Chicago & Joliet Electric Railway, Joliet, Ill., has been appointed general superintendent of the company and will take over some of the duties formerly handled by Mr. J. R. Blackhall, general manager. He will have complete charge of the property in Mr. Blackhall's absence. Mr. Heun has been with the Chicago & Joliet Electric Railway more than tweny-one years. He started with the company as a conductor. Later he accepted a clerical position in the receivers' office, was advanced to receiving clerk, then to cashier, and was appointed superintendent of transportation in 1903.

Mr. John H. Lucas, who has been connected for many years with street railway and electric lignt companies in Kansas City, Mo., has been elected president of the Kansas City Light & Power Company. Mr. Lucas established a law office in Kansas City in 1879, the firm name being Johnson & Lucas. He early became identified with the legal department of the street railway, becoming general counsel for the cable railway and later for the other street railway organizations as consolidation was effected, being counsel for the Metropolitan Street Railway since 1902. When the Kansas City Electric Light Company was organized in 1884, he became counsel for that company. He continued as legal adviser for both companies through the recent receivership, handling the usual detail of legal work and assisting in the reorganization plans.

Mr. E. Fears has just been placed in charge of the maintenance of electric equipment on the Chicago, Milwaukee & St. Paul Railway, with headquarters at Deer Lodge, Mont. Mr. Fears is a graduate of Purdue University and subsequent to graduation he served as a machinist's apprentice on the Denver & Rio Grande Railroad, later becoming roundhouse foreman on the New York Central Railroad. When the latter railroad commenced operation of its electric zone in 1905, he was made general foreman of electric equipment, in which position he remained until two years ago, when he went with the Portland, Eugene & Eastern Railway to take charge of rolling stock maintenance. Recently the scope of his duties was extended to include the rolling stock of 200 miles of steam operated track of the Southern Pacific Railroad. On the Chicago Milwaukee & St. Paul Railway he will be responsible for the electric locomotives operated over 440 miles of route, constituting the most extensive electrification in the world at the present time.

Photo by Kirkland Studio
C. B. WELLS

Mr. C. B. Wells has resigned as assistant to the manager of the Denver (Col.) Tramway, and has accepted the position of publicity manager with the Knight-Campbell Music Company, Denver, one of the largest and best-known music concerns in the West. Mr. Wells was in the employ of the Denver Tramway and its predecessors for more than twenty years. He held the positions of general office man, chief clerk, superintendent of transportation and assistant to the general manager. As assistant to the general manager, to which position he was promoted on June 1, 1914, he assumed charge of the editorial work and management of the *Tramway Bulletin*. This line of activity fell naturally within his ken, for he had always taken the greatest interest in the trainmen, their clubs and their general welfare. Mr. Wells has been deluged with expressions of kindly feeling from the trainmen, and it has been a pleasure to him to know that he had the loyalty of the men and that their relations with the operating department were so cordial. His numerous private interests in Denver and his ranch rendered it impossible for him to consider railway employment elsewhere.


R. T. SULLIVAN

Mr. Richard T. Sullivan, whose appointment as manager of railways of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, was noted in the ELECTRIC RAILWAY JOURNAL of April 15, was born in Newton, Mass., and was educated in the public schools there, the Massachusetts Institute of Technology and Harvard University, taking the degree of electrical engineer at Harvard in 1906. He has since been identified with Stone & Webster and for the last eight years has been general superintendent of the city and interurban railways of the Houston (Tex.) Electric Company. In addition to his duties in that position he has been engaged in various investigations and reorganizations which have necessitated his absence from Houston for extended periods. This work has taken him throughout the Pacific states and to many of the principal cities of the North and East. During his residence in Houston Mr. Sullivan made a host of friends. He took an active part in civic affairs and was prominent in the club and social life of the city. The properties at Youngstown with which Mr. Sullivan has become connected comprise about 200 miles of interurban and street railway lines extending in two states and serving principal centers. The city railways are located in Warren, Niles and Youngstown, Ohio; and New Castle and the Sharon district in Pennsylvania. In addition to these centers the suburban and interurban lines serve Lowellville, Leavittsburg, Girard, Struthers, Mineral Ridge and Poland in Ohio; and Farrell, Wheatland, West Middlesex and Sharpsville in Pennsylvania, including intervening territory in the Mahoning and Shenango valleys in Ohio and Pennsylvania. This territory is the center of an important iron and steel district extending up the valleys of the two rivers and is about 300 miles in extent.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Choctaw Power & Light Company, Portland, Me.**—Incorporated to construct and operate railways. This company will presumably succeed to the property of the Choctaw Railway & Lighting Company, sold under foreclosure on April 8. Capital stock, $1,250,000. Incorporators: S. I. Gould, C. H. Tolman, J. T. Fagin and S. D. Rumery, Portland, and E. L. Jones, Gorham.

***Dayton, Middletown & Cincinnati Traction Company, Dayton, Ohio.**—Incorporated to construct an electric line between Cincinnati and Dayton via Sharonville, Westchester, Germantown, Reading and Bond Hill. Among those interested in the proposed line are J. G. Miller, Westchester; Ben Horwitz, Middletown; L. T. Palmer, Middletown; G. A. Anderson, Monroe, and R. H. Billingslea, Bethany.

FRANCHISES

Hartford, Conn.—The Connecticut Company has asked the Council for a franchise to double track Park Street between John and Laurel Streets and Capitol Avenue between Park Terrace and Sigourney Street.

Atlanta, Ga.—The Georgia Railway & Power Company has asked the Council for a franchise to construct an extension from its line on North Boulevard, near Tenth Street, along the Boulevard to Orme Circle.

Columbus, Kan.—The Oklahoma & Interstate Railway has received a franchise from the Council to construct a line in Columbus. John R. Rose, Oklahoma City, president. [Nov. 27, '15.]

Detroit, Mich.—The Highland Park & Royal Oak Railroad has been granted a franchise by the taxpayers to construct a line from Highland Park to Royal Oak. Robert E. Barber, Highland Park, is interested. [April 1, '16.]

Cincinnati, Ohio.—The West End Rapid Transit Company has received a franchise from the Council to construct and operate a line between Anderson's Ferry and the west line of Race Street at the intersection of Third Street, in the heart of the business district. This line will give the Cincinnati, Lawrenceburg & Aurora Electric Street Railway an entrance to the city. [April 1, '16.]

Green Bay, Wis.—The Green Bay & Eastern Railway has asked the Wisconsin Railroad Commission for a certificate of necessity and convenience for the construction of its proposed line from Green Bay to Manitowoc, with extensions eventually north to Sturgeon Bay and south to Sheboygan. William M. Willinger, Manitowoc, president. [Feb. 12, '16.]

TRACK AND ROADWAY

Birmingham Interurban Development Company, Birmingham, Ala.—Surveys have been begun of this company's proposed line from Birmingham to the Warrior River and Jasper. The first survey work is being done from Nichols' Fish Trap to Jasper under the supervision of C. J. Rogers, engineer. The company, it is reported, will probably accept the survey made by City Engineer Julian Kendrick and County Engineer George H. Clark for the route from Birmingham to Nichols' Fish Trap. [April 15, '16.]

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala.—This company reports that it expects to purchase slides, swings and amusement outfits at once.

Calgary (Alta.) Municipal Railway.—Commissioner Graves has estimated that the cost of constructing an extension to the Sarcee Military Camp will be $6,000.

Martinez & Concord Interurban Railway, Martinez, Cal.—The Martinez & Concord Interurban Railway has filed with the Railroad Commission of California an application for authority to issue 1050 shares of its common stock at not less than $45 a share; $125,000 face value of its first mortgage bonds at not less than $90, and $125,000 of its cumulative participating stock at not less than par. The stock is to be issued only as an equivalent amount of first mortgage bonds is paid and cancelled. The company also asks to issue to Clifford McClellan for promotion services 201 shares of its common stock. The company proposes to locate its main line along Escobar Street and Peyton Road, to the easterly limits of Martinez at Fairview; thence over private rights-of-way to the Associated Oil Company's plant near Avon, thence to a connection with the Oakland, Antioch & Eastern Railway and Bay Point & Clayton Railway at Government Ranch, 2 miles south of Bay Point, and 3 miles north of Concord. The total length of the proposed line is 6½ miles. It is for construction of this railroad that authority is asked for the securities mentioned above, and the bonds are proposed to be issued under a deed of trust to the Merchants Trust Company of San Francisco.

Atlanta & Anderson Electric Railway, Atlanta, Ga.—Surveys have been begun of this company's proposed line from Atlanta to Anderson, S. C. J. L. Murphy, Atlanta, is interested. [March 25, '16.]

***Blue Ridge, Ga.**—Plans are being considered to construct an electric railway from Blue Ridge to Copper Hill. H. P. Mulkey, Blue Ridge, is interested.

Chicago, Peoria & Quincy Traction Company, Peoria, Ill.—At a recent meeting held in Quincy directors of the Chicago, Peoria & Quincy Traction Company authorized the president and secretary of the company to enter into a contract with A. C. Black and E. S. Woolner of Peoria to finance and build the road. The proposed electric line has been surveyed and the right-of-way secured. John L. Soebbing, Quincy, president. [Aug. 14, '15.]

***Tampico, Ill.**—Plans are being made to construct an electric railway from Tampico to Geneseo. W. T. McCaskey and E. L. Tobie, Chicago, are the promoters.

***Valley Traction Company, Elkhart, Ind.**—It is reported that this company will construct a 9-mile interurban line. H. E. Bucklin, Elkhart, president.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company will extend its line west on Main Street to Berry Street instead of Barr Street, as was orginally planned.

Hutchinson (Kan.) Interurban Railway.—In order to maintain street car traffic on Fourth Avenue East while the street is being paved, the Hutchinson Interurban Railway will construct about 1 mile of track on that street. It is intended to pave one-half of the street at a time, and the temporary track will be laid on one side while the portion of the paving, including the regular car track, is being laid.

McComb & Magnolia Light & Railway Company, McComb, Miss.—A report from this company states that it is now building 11 miles of track on its proposed line to connect Summit, McComb, Fernwood and Magnolia. S. M. Jones, Laurel, president. [March 25, '16.]

Kansas City (Mo.) Railways.—This company is reconstructing its Brooklyn Avenue line. Temporary tracks have been laid between the permanent track and the curb, and street railway traffic has not been interfered with.

Mexico Investment & Construction Company, Mexico, Mo.—At a recent meeting of the Commercial Club of Mexico a resolution was made to offer the Mexico Investment & Construction Company $7,500 to place in operation its 4½ miles of line south of Mexico and to extend the line as far as Brown's Corner, 12 miles.

St. Louis & Jennings Railway, St. Louis, Mo.—This company, organized about four years ago with a capital of $15,000, operating an electric line between Jennings and Pine Lawn, St. Louis County, recently increased its capital to $300,000, with a view to extending its lines to the business district of St. Louis. The road will soon ask the city for a franchise to enter the city near Wellston. The road is 2½ miles long and is operated by electric power from the Mississippi River dam at Keokuk, Iowa. The extension would cost $125,000 and add 5 miles to the line. Pine Lawn is 1½ miles north of Wellston. The road holds a franchise for 1½ miles of line in north St. Louis. The company is also considering an extension to Ferguson, 2¾ miles north of Jennings.

United Traction Company, Albany, N. Y.—This company has completed plans for improvements in Albany this summer to cost about $60,000. The plans include the reconstruction of track and repaving in Washington Avenue between Eagle and Lark Streets and in Lark Street between Washington Avenue and Madison Avenue. The company will spend about $35,000 upon similar work in Troy within the next few months.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York on April 20 adopted the plans and forms of contract for the construction of three lines of the five sections of the Fourteenth Street-Eastern District transit line for operation by the New York Municipal Railway Corporation under the dual system contracts. Bids for Section No. 4 will be opened on May 16, for Section No. 1 on May 18 and for Section No. 5 on May 22. Each section must be completed sufficient for operation within twenty-two months from the delivery of the contracts, although twenty-six months will be allowed for the completion of all other work. The contract on the tunnel section was let two months ago and work was begun on the Brooklyn side two weeks ago.

Columbus Railway, Power & Light Company, Columbus, Ohio.—This company has asked permission of the State Board of Agriculture to lay double tracks on East Eleventh Avenue for a distance of about 900 ft. for the purpose of improving the transportation service to State fair patrons. It also asks that a loop be built on the fair grounds. This will probably be necessary because of the fact that the Big Four Railroad at that point expects to eliminate the grade crossing on Eleventh Avenue.

Dayton, Ohio.—Plans are being considered by the Cincinnati, Hamilton & Dayton Railway to operate electric motor trains on its branch between Dayton and Mandale, extending through Delphos and Spencerville.

Hillsboro, Cynthiana, Bainbridge & Chillicothe Traction Company, Hillsboro, Ohio.—A meeting has been called for May 15 for the purpose of electing a new board of directors and increasing the capital stock of the company to $500,000. Work on the construction of the proposed line from Hillsboro to Chillicothe will be begun within a few months. [March 25, '16.]

Sand Springs Railway, Tulsa, Okla.—This company has awarded a contract to J. S. Greer, Sand Springs, for the construction of 4 miles of second track from Crib Siding to Tulsa, including a steel span bridge 50 ft. long near Tulsa.

Southern Oregon Traction Company, Medford, Ore.—The city of Medford has proposed a substitute plan for the construction of an electric railroad from Medford to the Blue Ledge mine and this proposal, it is reported, has been accepted by the Bullis interests, which have agreed to take over the line upon its completion. According to the new plan, the city will bond itself for $300,000, but the proceeds will be devoted to the construction of the line instead of partly going to purchase the railway now operating between Medford and Jacksonville. The Southern Oregon Traction Company agrees to pay the interest on the city bonds thus issued, and to purchase the bonds from the city at the end of five years.

Philadelphia, Pa.—The work of placing the steel columns for the Frankford Avenue elevated line has been begun at Front and Callowhill Streets. Work on the superstructure from Callowhill Street to Girard Avenue must be completed by May 13. The contract for the entire line is divided into sections and must be completed by Oct. 31. The cost of the first section, on which work is now in progress, is $261,400. The remainder is to cost $1,488,600.

Temple & Marlin Interurban Railway, Temple, Tex.—The Marlin-Temple Interurban Promotion Company has been chartered to construct this company's line between Marlin and Temple. S. D. Hanna, Temple, engineer. [Jan. 29, '16.]

Appalachian Power Company, Bluefield, W. Va.—Work has been begun by this company on the construction of an extension of its line on East Princeton Avenue from Lee Street to the county road bridge, where it will connect with the Princeton-Bluefield Electric Railway. The Appalachian Power Company has closed a contract with the Princeton-Bluefield Electric Railway to furnish energy to operate the railway to the county seat.

SHOPS AND BUILDINGS

Cairo Railway & Light System, Cairo, Ill.—This company is remodeling its interurban station at Ninth Street and Commercial Avenue, Cairo.

Union Traction Company of Indiana, Anderson, Ind.—The building occupied as an interurban station by this company in Anderson has been sold and the company will either lease the Van Petten room at the northeast corner of Thirteenth and Meridian Streets or it will proceed with the erection of a temporary station on its building site at the corner of Twelfth and Meridian Streets.

Louisville (Ky.) Railway—A small cyclone visited the western half of Louisville on April 20 and besides doing damage of considerable general extent, blew the roof off the carhouse at Twenty-seventh and Chestnut Streets, depositing it on the trolley wire in front. This broke the wire and put the system out of commission for a time.

Kansas City, Mo.—The Interurban Central Station Company of Kansas City has been incorporated in Missouri to construct a union terminal for interurban electric railways entering Kansas City. The capital stock of the company is $2,000, to be increased later as the plans of the company develop. It is reported that an option has been obtained on the block bounded by Ninth and Tenth and McGee and Oak Streets, and the plans call for a six-story station and office building. The incorporators of the company are W. C. Scarritt, R. A. Long and C. C. Peters, vice-president of the Emery-Bird, Thayer Dry Goods Corporation.

Buffalo, Lockport & Rochester Railway, Buffalo, N. Y.—Plans and specifications are now being made for the construction of a new passenger terminal in Lockport for the Buffalo & Lockport, Lockport & Olcott and the Buffalo, Lockport & Rochester interurban lines.

Cleveland & Youngstown Railway, Cleveland, Ohio.—The Terminal Company has been incorporated to construct a union depot, office building and hotel at Cleveland, in connection with the Cleveland & Youngstown Railway, which also holds a franchise for a freight terminal in the Cuyhoga River Valley. Capital stock, $10,000, to be increased to $50,000,000 later.

Scioto Valley Traction Company, Columbus, Ohio.—The Public Utilities Commission of Ohio has approved the request of the Scioto Valley Traction Company for the issue of $200,000 preferred stock, the proceeds of which are to be used to purchase a similar amount of stock of the Columbus Depot Company. This will enable the latter to begin the construction of an interurban station at Columbus within a few months. It is stated that between $800,000 and $1,000,000 will be expended on the new station.

POWER HOUSES AND SUBSTATIONS

Orleans-Kenner Electric Railway, New Orleans, La.—This company will construct a substation at Kenner. The electrical machinery for the substation and material for a distribution system in Kenner has been ordered. The cost is estimated at $10,000.

Morris County Traction Company, Morristown, N. J.—This company will install new rotary transformer equipment in its substation near Dover.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—A new substation to take care of all electrical requirements of the New Castle district will be erected in New Castle by the Mahoning & Shenango Railway & Light Company. The substation will be 100 ft. long by 70 ft. deep, two stories high, and will be of steel, concrete and brick construction. It will be used to transform the electrical current from the Lowellville plant of the company. The contract for the erection of the substation has been let to the Stone & Webster Engineering Corporation. The cost is estimated at $150,000.

Oklahoma (Okla.) Railway.—This company reports that it has purchased one 3700-kva. Westinghouse turbine and will purchase 1000-kw., 60-cycle rotaries in various sized units. The company will construct two substations.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company reports that it will install one 1150-kw. generator, driven by gas engine, in its central power plant.

Manufactures and Supplies

INSULATOR MARKET REFLECTS DEARTH OF NEW RAILWAY CONSTRUCTION

Although the insulator manufacturer reports large aggregates of orders for insulators, the present electric railway demand includes only a small proportion of the total business, owing to the small amount of new construction. Renewal orders for broken or defective insulators are being received from time to time at about the usual rate, but no great general increase of demand for new extensions is anticipated while the present prices of copper, steel and labor continue so exorbitant as to repel investment of new capital. The prices of insulators are stated to have risen during the last few months from 20 to 40 per cent, varying greatly according to the amount of malleable-iron castings and galvanized-iron materials used in connection with the insulators. The excessive cost of labor and raw materials have been chiefly responsible for the high quotations on the finished product. In addition to the well-known increase in the price of cast iron, the price of the insulating material proper has also increased, the pottery business of one large plant being said to be greater than at any other previous time.

Deliveries of insulators are extending over a greatly varied period of time, depending on the quantity ordered or already on order for any one particular pattern for which the number of pattern molds is limited, and also on the delay through railway congestion in shipments of hardware material to the manufacturer. Good deliveries on low-tension material are reported. An order for, say, 100 units of certain patterns for which the demand is not already too great may take only about ten days; while on the other hand a large order for high-tension insulators may take from five to six months to complete. In one case orders for high-tension suspension insulators for various electrical purposes, some of which are holding over from last year and amounting to about 500,000 units, are expected to complete delivery some time before next September. Strenuous efforts are being exerted by the insulator manufacturer to assure good deliveries by accelerating the shipment of patterns from the foundries, although much avoidable delay in obtaining raw materials is being occasioned by railway congestion, shortage of labor and other labor troubles.

ROLLING STOCK

Connecticut Company, New Haven, Conn., expects to place an order for sixty-two cars within the next ten days.

Muskegon Traction & Light Company, Muskegon, Mich., has ordered five cars from the Cincinnati Car Company.

Rutland Railway, Light & Power Company, Rutland, Vt., has ordered one double-truck car from The J. G. Brill Company.

Louisville (Ky.) Railway has ordered eighty-six 203-A motors from the General Electric Company to replace old equipment.

Great Falls (Mont.) Street Railway is expecting to purchase seven new steel cars. The electrical equipment has been ordered.

Indianapolis Traction & Terminal Company, Indianapolis, Ind., is reported as having ordered twenty-five interurban cars from the Standard Steel Car Company.

Moncton Railway, Light & Gas Company, Moncton, N. B., expects to purchase two single-truck, pay-as-you-enter one-man cars from the Preston Car & Coach Company.

New York State Railways, Utica, Lines, have ordered sixteen 49-ft. 6-in. car bodies from the Cincinnati Car Company, through the W. R. Kerschner Company, Eastern agent.

Monongahela Valley Traction Company, Fairmont, W. Va., noted in the ELECTRIC RAILWAY JOURNAL of April 22 as having ordered eight new cars, has placed this order with The J. G. Brill Company.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has purchased ten all-steel, double-end, center-entrance cars, duplicates of their 1915 order, from the Niles Car Manufacturing Company.

Hutchinson (Kan.) Interurban Railway will purchase two new sets of motors which will be placed on the cars now in use. The smaller motors now on those cars will be removed and assembled on new one-man type cars.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., noted in the ELECTRIC RAILWAY JOURNAL of April 8 as having ordered four single-truck, center-entrance, arch roof, steel car-bodies from the Southern Car Company, has specified the following details for this equipment:

Seating capacity	40
Seats,	Heywood Bros. & W., reversible, rattan covered
Motors	Two G. E. 247A.
Control,	K-10 N, with auxiliary contactors
Air brakes,	Nat'l Brake Co., Bungalow type
Hand brakes	Peacock
Door-operating mechanism,	Southern
Push buttons	Consol.
Hand straps	Rico
Fare registers	Ohmer
Life guards	H. B.
Trolley catchers	O. B.
Sanders	O. B., air operated
Signs	Keystone, illuminated
Heaters	Consol.
Headlights	"Golden Glow"
Trucks,	Phila. Holding Co., 15-ft., radial

City Light & Traction Company, Sedalia, Mo., has specified the following details of equipment for the eight double-end closed motor cars recently ordered from the American Car Company:

Seating capacity	32
Length of body	18 ft. 3½ in.
Length over vestibule	29 ft. 1 in.
Width over sills	7 ft. 10 in.
Width over all	8 ft. 1 in.
Height, rail to sills	21 13/16 in.
Sills to trolley base	8 ft. 6 in.
Body	Semi-steel
Interior trim	Polished bronze
Headlining	Carline finish
Roof	Plain arch
Underframe	Metal
Air brakes	West.
Cables	G. E.
Curtain material,	Pantasote, motorman's curtain only
Destination signs	Hunter
Life guards	H. B.
Gears and pinions	G. E.
Gongs	Brill Dedenda
Hand brakes,	Amer. Car Co.'s, with Giant drum
Heaters	Consol.
Headlights	"Golden Glow"
Motors	2 G. E. 258, inside hung
Sanders	Elec. Ser. Sup. Co.
Sash Fixtures	O. M. Edwards
Seats	Brill Winner, reversible
Seating material,	Pressed steel type, with cherry wood cushions and backs
Step treads	Feralun
Trolley catchers,	Elec. Ser. Sup. Co.
Trolley base	G. E.
Trucks	Brill 21-E., single
Ventilators	Brill exhaust

TRADE NOTES

Edward B. Smith & Company, Philadelphia, Pa., have removed their offices to 1411 Chestnut Street.

Union Switch & Signal Company, Swissvale, Pa., announces that its Montreal office is now located in Rooms 510 and 510A, Canadian Express Building, Montreal, Quebec.

U. S. Metal & Manufacturing Company, New York, N. Y., has been appointed general Eastern agent for the Johnson fare box manufactured by the Johnson Fare Box Company of Chicago.

B. A. Clements, formerly Western railroad representative of Worth Brothers, Chicago, has been elected vice-president of the Rome Merchant Iron Mills, with headquarters at 30 Church Street, New York.

E. R. Mason, formerly in the railway-supply business, Grand Central Terminal, New York, has disposed of his business and has been appointed assistant sales agent for the Ohio Brass Company, Mansfield, Ohio.

Brown Hoisting Machinery Company, Cleveland, Ohio, has appointed its vice-president, Alexander C. Brown, to the position of general manager, succeeding Richard B. Sheridan, who has resigned to accept another position.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has sold to the Leckie Fire Creek Coal Company of Bluefield, W. Va., sixteen 5-ton Baldwin-Westinghouse gathering locomotives. The locomotives are equipped with special ball-bearing motors and motor-driven reels.

Davis-Bournonville Company, Jersey City, N. J., has appointed Henry Cave to take active charge of its research department. Mr. Cave will retain his interest in and act in an advisory capacity to the Cave Welding & Manufacturing Company, of which he is president. The Davis-Bournonville Company will sell directly to its customers in the New England States. Sales offices will shortly be established in Boston and other New England cities.

Peter Witt, formerly street railway commissioner, Cleveland, Ohio, has been allowed twelve claims covering the front-entrance center-exit type of car, which he introduced on the lines of the Cleveland Railway in January, 1915.

Royalties are being claimed for the use of this car, and Mr. Witt announces that 150 of this type are now in operation in Cleveland and that the New York State Railways have just ordered eighty-five cars of this type.

United States Department of Commerce, Customs House, New York, N. Y., has opened a visitors' book containing the names of all traders from foreign countries who register there and do not for some special reason desire their business to remain private. The book is intended to assist manufacturers in this country and their agents and to give an idea of the manner in which buyers in all parts of the world are turning to the United States. The book is open to inspection at the office of the bureau.

International Register Company, Chicago, Ill., has received from the Boston (Mass.) Elevated Railway an order for 128 motor-driven coin registers, including 118 Type C-25 and ten Type C-26, making the total number of motor-driven coin registers in use or ordered by this company 658, of which eighty-seven are used at the subway and elevated stations and 571 on the surface cars of the company. These motor-driven coin registers were fully described in the ELECTRIC RAILWAY JOURNAL for Jan. 8, 1916.

Worthington Pump & Machinery Corporation, New York, N. Y., recently organized under the laws of Virginia, on April 25, was declared the successor in ownership of the properties of the defunct International Steam Pump Company, the joint reorganization committee plan having become effective. Securities of the new company will be exchanged for certificates of deposit of securities in the old company. All of the new company's stock has been placed under a voting trust to continue for five years. The voting trustees are L. L. Clarke, G. G. Henry, P. Jackson, R. W. Leigh and C. H. Sabin.

L. B. Morris, who has been district sales manager at New York of the Cambria Steel Company, has been made manager of sales of the New York district for the Cambria Steel Company, the Midvale Steel Company and the Worth Brothers Company, with headquarters at 165 Broadway. H. W. Hayes has been made manager of sales for the three companies in the Boston district, with headquarters in the Massachusetts Building. Mr. Hayes has been district sales manager at Boston for the Cambria Steel Company. Edson S. Harrin, who has been in charge of the export department of the Midvale Steel Company, has been made manager of sales of the three companies in Philadelphia territory, with headquarters in the Widener Building. L. E. McLain, who has been district sales manager for the Cambria Steel Company at Pittsburgh, becomes manager of sales of the three companies in that district, with offices in the Oliver Building.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been experiencing a strike at its shops, which has grown until at the time of going to press the plants of the company were shut down with something like 15,000 men out of work. No formal demands, Chairman Guy E. Tripp said in a statement on Saturday last, were made on the company by the striking employees, although it is understood that the men desired an eight-hour day with an increase in wages. Only last December the company made an advance in wages of 10 per cent. The men now working on a fifty-six-hours-a-week schedule, it is said, want the forty-eight-hour schedule at the same wages as for fifty-six hours. The Westinghouse works of the Pittsburgh district are known to be committed as opposed to the reduction of working hours at the present time. Following rioting early in the week, the managers of the Westinghouse Air Brake Company and of the Union Switch & Signal Company closed down their plants on Wednesday, owing to their inability to protect their employees from violence.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued a bulletin containing illustrations and descriptions of its series brackets and fixtures for incandescent street lighting. A type of side-light bracket, adapted especially for use for 600-volt railway circuits, is illustrated. This manufacturing company has also issued a bulletin describing the Novalux street lighting units for Mazda series lamps.

Shaw Lightning Arrester & Insulator Works, Newark. N. J., have issued a folder presenting a few illustrations and data on Shaw third-rail and line suspension composition insulators which have been designed and manufactured for a number of traction and power companies in this and foreign countries. This company has also issued Bulletin A16, which describes and illustrates their molded insulation and lightning protective equipment.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a sheet which reproduces the profile of a tool steel pinion used in city service which was finally worn out only after 248,804 miles of service, or ten times as much life as the untreated pinion, which averaged 24,740 miles in the same service. The tool steel pinion was guaranteed for 100,000 miles. The company has also issued another sheet which indicates graphically the great increase of orders which it has received yearly since beginning business in 1907.

Stone & Webster Engineering Corporation, Boston, Mass., has issued a booklet entitled "Work Done and Work Doing" which lists construction contracts of this company completed or in progress, February, 1916. This work includes steam power stations amounting to 424,670-kw. capacity; water-power developments amounting to 292,450-kw. capacity; 1194 miles of transmission lines; sub-stations amounting to 304,885-kva. capacity, 697 miles of railway construction and a large amount of building and gas plant construction.

Spray Engineering Company, Boston, Mass., has distributed a booklet entitled "What Spray Engineering Company Has Done and Is Doing," covering work completed or in progress up to March, 1916. The booklet shows geographically the number, character and size of installations in the various States, covering the list of Spray cooling ponds in parks, supplemented by a list of companies using Spray air washers in connection with washing and cooling the air for steam turbines. Electric railways and central station companies are among the largest users, but many other industries are also represented by large installations. The company has cooling pond installations in thirty-five States, Canada, Mexico, Cuba and South Africa, also air washer installations in twenty-one States.

NEW PUBLICATION

American and Foreign Investment Bonds.—By W. L. Raymond. Published by Houghton Mifflin Company, Boston, Mass. 324 pages. Cloth, $3 net.

"American and Foreign Investment Bonds" is an addition to the series of books on finance and business issued by the publisher. The new work is, as the publisher describes it, a complete, practical and up-to-date guide for the investor and business man, showing just what factors must be considered in determining the investment value of every class of bonds, foreign, government and domestic. It is divided into seven chapters, three of which, namely, those on railroad, public service corporation and industrial bonds, appeal particularly to readers of the ELECTRIC RAILWAY JOURNAL. The other chapters are devoted to the consideration of the field of investment, to United States and foreign government bonds, state bonds, and county, municipal and district bonds. The regulation of public service corporations by state commissions affects the safety of the bonds of these corporations and for this reason the author in his chapter on public service corporation bonds has discussed state regulation of public utilities at considerable length. A noteworthy feature of this chapter is a table of states with commissions having jurisdiction over electric railway, gas, electric light and power, and telephone companies. This table is intended to indicate the scope of the jurisdiction of such bodies and gives in footnotes the laws and chapters. The change in regulation from direct legislative enactment in fixing standards of service to giving commissions general authority over such matters is reviewed. Mr. Raymond says that no hard and fast rules can be laid down for estimating a fair value of the property upon which a fair rate of return shall be allowed, but that the very purpose of having regulatory commissions is to make possible the determination of each case on its merits, with due regard to certain general conditions. As for the stability of public service corporation bonds, Mr. Raymond points out that the decline in the prices of these securities during the past ten or fifteen years has been much less than in the cases of state, municipal and railroad bonds. As for industrial bonds the author concludes that the conditions surrounding such issues prompt greater care in their selection than do the conditions surrounding any other well-known class of investment bonds.

Electric Railway Journal

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TIME PROPITIOUS TO SELL SCRAP

The last few months have been particularly propitious for railway companies to dispose of all kinds of scrap metals and waste paper. According to prices quoted in the *Journal of Commerce* for May 4, light and heavy brass is now being sold at 13 and 15¼ cents per pound, respectively; light and heavy scrap copper at 22 and 26 cents per pound, respectively, and heavy steel scrap, No. 1 wrought railroad scrap and heavy cast scrap at $15.50, $21.50 and $17.00, respectively, per ton of 2240 lb. Mixed paper, which is the kind collected by railway companies, has advanced from 15 cents per 100 lb. last year to 30 cents at the present time. War conditions have brought about this unusual condition in the scrap market, because in the past a large portion of these materials has been obtained from Europe. Now the situation is reversed, and Europe is bidding for these various scrap materials. To intensify this situation, importations of wood pulp have been greatly curtailed, owing to the demand for bottoms for commodities bearing higher rates. The prices of the different kinds of railroad metal scrap have made enormous advances within the last year, increases in some cases ranging in the neighborhood of 100 per cent. While the time is propitious to sell all classes of scrap materials, it is necessary to keep in touch with the widely fluctuating market to take advantage of the high prices.

MEETING THE PUBLIC

"Men occupying conspicuous and leading places in finance, as in every other calling touching the people's interests, are legitimate objects for public scrutiny in the exercise of their functions." Though the author of this statement, Otto Kahn, in speaking before the American Newspaper Publishers' Association, was concerned primarily with so-called "high finance" in America, his remarks are worthy of careful consideration in the electric railway field. In fact, in Mr. Kahn's portrayal of the financier who "meets attacks with dignified silence, maintains an austere demeanor and cultivates an etiquette of reticence," it is possible to recognize a certain class of electric railway officials whose attitude of secrecy, aloofness and contempt for public criticism is decidedly irritating to democratic minds. Happily this sort of official is to-day much more rare than formerly, but there are still some operators who have to learn that the only result of trying to avoid publicity is to obtain an undesirable notoriety. As Mr. Kahn says, if inquiring or critical citizens are met with silence, impatience or resentment, the public mind naturally becomes more infested with suspicion and more inclined to credit all sorts of rumors. In the plans for one of the new bank buildings which is being erected in New York the space reserved for the chief executive officers is within a low-railed inclosure in the center of the bank, with passageways on each side and the windows of the paying and receiving tellers and similar officials against the walls. The object is, of course, to have the executive officers where they can be easily accessible to customers. We shall not here enter into a discussion of whether this arrangement of office is well adapted to the needs of a public utility company, but the thought is at least worthy of consideration. We admit that it would be a direct reversal of the idea that the rank of an officer in a public utility varies directly with the number of guards which have to be passed to secure admittance to his presence, but we wonder what the effect would be on the public—and even on the officers themselves—of such an arrangement.

ELECTRIC RAILWAY SECURITIES

In last week's issue we described at length the belief of representative investment bankers that at present electric railway securities, while not discredited, are not enjoying the same degree of popularity as the securities of other utilities, notably the lighting companies. Owing partly to natural economic forces and partly to special burdens for whose imposition the public is directly responsible, electric railways have to-day reached the point where the average investor approaches their securities with a prejudice against their relative worth. He can be easily convinced as to the merits of particular issues, it is true, but the tinge of distrust against the class is apparent. This is a condition the full meaning of which must be impressed upon the public mind. Electric railways must grow with the communities they serve, but the necessary money will not be forthcoming from the investors if the public continues to make unreasonable demands upon the capital invested or required in such utilities and upon their income-producing power. The public has as vital an interest as anyone, if not more, in the development of the electric railway industry, and it should do its part toward the restraining of unfair regulatory and legislative demands. If the railways, by virtue of their more intimate connection with the public, are more often subject to ignorant or malevolent attacks than are other utilities, then they deserve the greater protection from broad-minded and far-sighted citizens. If the public does not realize its responsibility in this matter, electric railway securities will not be readily salable in the amount needed for the expansion of the industry, and the public itself will be the worst sufferer.

THE TIME IS OPPORTUNE FOR PUBLICITY

We urged last week the adoption of a definite policy of national publicity by the electric railway companies of the country. The need for such a campaign was shown by the statistics published in last week's issue of the financing of electric railways during 1915 as compared with 1914, and the statements from investment bankers that electric railway issues are decreasing in popularity both actually and relatively as compared with other public utilities. There is no doubt that the situation is one requiring relief, but how about the opportunity? Is the public as a whole sufficiently interested in economic and corporate matters to pay attention to what may be said? In short, is this an appropriate time for undertaking this work? We believe that it is, in spite of the fact that foreign affairs and preparedness are the questions which are probably uppermost in the minds of most citizens at present. Indeed, this condition probably strengthens the situation rather than otherwise, because it emphasizes in the minds of everyone the need of cohesion among all of the elements in the country, as well as the important part in the economic and military life of the country which the railways perform or may be called upon to perform.

There is also another and perhaps an even stronger indication that the times are propitious for a fair presentation of the railway case to the public with assurance that it will receive attention. This evidence is furnished by an examination of the kind of articles which is now appearing in most of the popular magazines, and even in the daily papers. It was not many years ago that the magazines of general circulation devoted a considerable proportion of their pages to articles of a "muck-raking" character. These contributions were extensively advertised and widely read, and the sensational attacks on business enterprise contained in them provided the public with plenty of "interesting" reading. For a time this class of story brought many purchasers to the newsstands for those magazines which dealt in the exposé of business corruption. But for some considerable time there has been a cessation of "muck-raking" articles. The public got tired of them. People began to realize that a few instances of unprincipled business administration did not prove that the entire corporate interests of the country were corrupt. It is possible also that the articles have helped in the widespread movement among corporations, which has since taken place, in favor of more publicity of their affairs, especially among those of a quasi-public nature, of whose business the public has a special right to know about.

After the "muck-raking" class of article had begun to pall on the reading public, a period followed in which some of the more sensational magazines thought to retain their circulations by the publication of salacious stories, but while these attracted morbid interest for a time, the public as a whole soon began to demand decency in its reading.

Latterly, the observer of current magazine literature has seen a change in the character of articles published. It is the trade story, the article which tells how the business man of the day is developing his business and conducting it at a profit, which finds a ready sale in the publication offices of the popular magazines now. This is a good sign, but the movement of which we are now speaking is not confined purely to the magazine. An examination of the daily papers also shows that much more space is being devoted to-day to business affairs than formerly. It is possible that this may be due partly to the present prosperity of the country, through which more people have become stockholders than formerly and so are more interested in the trend of the markets and the news about corporation securities. Whatever the cause, the fact is noticeable. Five or ten years ago special columns in the daily papers devoted to export trade, public utility affairs or reviews of business conditions in various lines were a rarity, except perhaps in the largest metropolitan dailies. Now they are common in many daily papers. The public as a whole is getting to understand the fundamental principles of business and to take an interest in them. It is learning better the intimate relation of the prosperity of the transportation systems to that of other lines of business, the close connection between the welfare of the employee and that of his employer, the problems of the railroad business. It should equally understand the problems of the electric railway industry, and it is the task of the industry to make them clear.

COSTLY SERVICE IN THE RUSH HOUR

It is generally conceded that service given during the rush hours costs much more than that operated during the remainder of the day. The difference in cost, which is obviously due to the extremely low "service factor" of cars that are used only for one or two hours a day, depends upon the sharpness of the daily peak, and in cases where the evening rush lasts for an hour, or but little more, it is possible for the service at that time to involve actually double the normal expense of operation. Such cases, as a matter of fact, are by no means uncommon.

For an example there may be taken a city run on a line 7 miles long, which is covered in 45 min. If the peak is sharp and lasts for only 1½ hr., most of the cars sent out to handle the rush-hour load will make only one round trip, or 14 miles daily. Under average conditions, as displayed in the figures of the last electric railway census, if each car bears its share of the indirect expense of operation in proportion to its mileage, the indirect cost of operating one of the trippers will involve the following approximate items: Maintenance of way and line, 2.4 cents per car-mile; traffic, 0.2 cent per car-mile; general expense, 2.8 cents per car-mile, and miscellaneous transportation costs, exclusive of platform labor, 1.6 cents per car-mile. The total is 7 cents per car-mile.

Of the direct expenses the most important is platform labor. Motormen and conductors cannot be kept on a job that brings only 1½ hr. pay, and to hold in service the extra men that are used for tripper service, such as that under consideration, it has become customary to provide a minimum wage payment whether a full day is worked or not. The minimum may range from $1 for each call for service to a flat rate of $12 per week, and for an average the figure of $1.25 may be taken as typical. In the case under consideration, therefore, the platform expense will be $2.50 per trip, or 17.9 cents per mile.

The cost of power also is a large item of direct expense. During the peak this unit-cost increases for exactly the reason that applies to car operation in general, and the best demonstration of this fact may be made by considering the effect in the case of power that is purchased by the railway from a local power company. Such contracts for large amounts of energy have invariably come to the basis of a "demand charge" of about $1 per kilowatt per month, plus 0.4 cent per kilowatt-hour for energy actually furnished. The principle of the demand charge is that this sum just about covers the fixed charges on the equipment required to supply 1 kw., while the energy charge covers the direct cost of coal, water, labor and other items, including profit, involved in the actual delivery of 1 kw. for one hour's time, or 1 kw.-hr. The cost to the consumer is thus quite comparable to that involved in case the power is generated and not purchased.

Then for each kilowatt added to the peak by the operation of tripper cars, there will be a charge of $1 per month, and since in the case under consideration the peak lasts for only 1½ hr. daily, each peak-load kilowatt that is required will be used only for 45 hr. per month, and will represent the consumption of only 45 kw.-hr. per month. Each of these kilowatt-hours will thus cost 2.2 cents for demand charge alone and, with 0.4 cent added for the energy charge, will cost 2.6 cents at the switchboard. Imposed upon this cost is an overhead charge for substations and line, for which a conservatively low estimate would be one-third of the overhead charge for generation, amounting to, say, 0.7 cent, and bringing the cost of the power to 3.3 cents per kilowatt-hour at the substation. The census figures indicate that 3.8 kw.-hr. per car-mile is the approximate average power consumption measured at this point, so that the peak-load power cost becomes 12.6 cents per car-mile.

Maintenance of car equipment, the last item of direct expense, appears almost negligible after the two foregoing figures, amounting to 1.7 cents per car-mile as an average throughout the country. In the case under consideration, however, the tripper cars will make only one-quarter of the daily mileage that might be expected from the average car, and as a number of the factors involved in the item vary in accordance with the car-years rather than with the car-miles, the cost of maintenance per mile for the trippers should be considerably higher than for the cars in regular service. The increase may be approximated at 50 per cent, giving a total maintenance cost of 2.5 cents per car-mile. This, added to all of the foregoing items, makes a total of 40 cents per car-mile, yet the census figures on which this estimate is based show that the average normal operating expense throughout the day is only 17.3 cents per car-mile, actually less than half of the calculated rush-hour cost.

ALLOCATION AN ENGINEERING PROBLEM

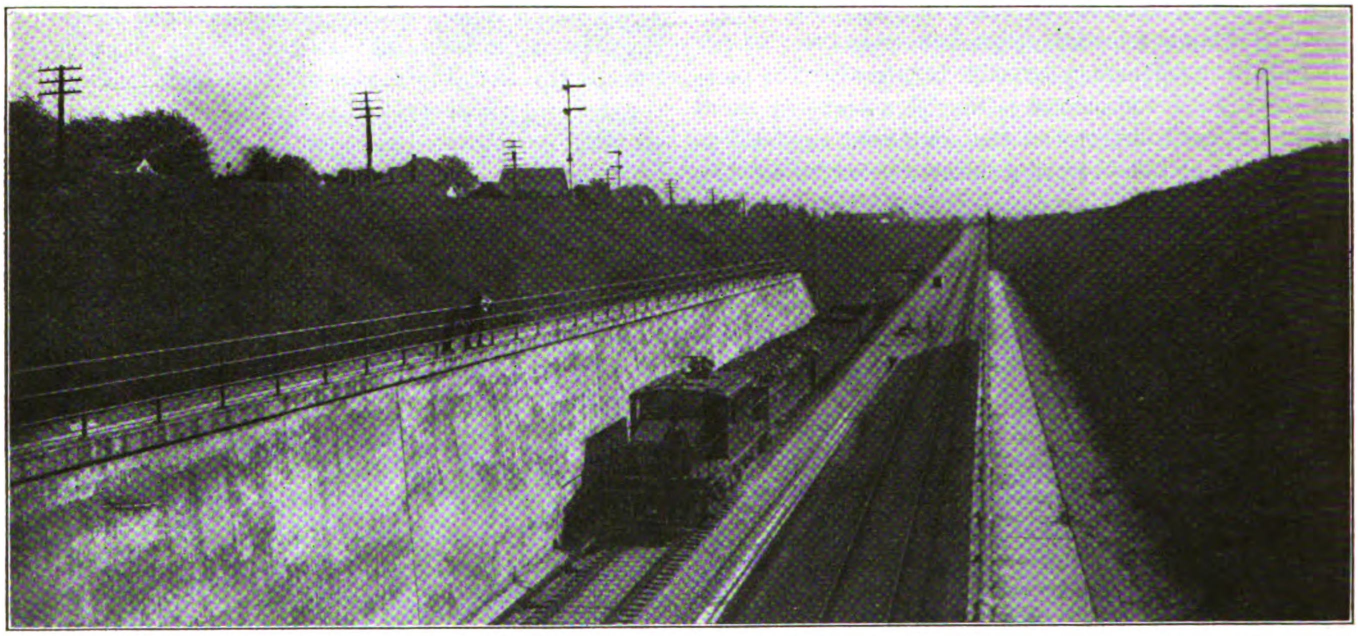
A study of the Boston street lighting rate case and of the Bay State Street Railway fare case, now being heard by the Massachusetts commission, emphasizes the great importance of skillful allocation by the engineering experts called to the stand to support the cost theories set forth by the companies. In seeking to derive the cost of installation and operation per lamp, and to get at the cost of building the railway property per route, it has been found necessary to make various sharp distinctions in plant investment, and these distinctions are so technical that it is scarcely an exaggeration to say that the engineers have blazed new trails through the wilderness of figures wherein the expert accountant is normally supposed to dwell. Without attempting the rather presumptuous task of commenting upon the cost theories involved in these cases while they are still in process of presentation, it is none the less interesting to note the very high grade of engineering ability required in any allocation of costs designed to stand the analysis of hostile technical opponents and to meet the test of the specialist accountant.

Certainly the engineer must be the final arbiter in the selection of pro-ratings, for he unquestionably has the most accurate knowledge of the inter-relations of complex equipment. For instance, in the street lighting cost determination he can follow the subdivision of energy from the turbo-generator through the transmission and translating apparatus to the distribution lines and lamp terminals as few accountants find possible without special engineering training. The same thing is true in the allocation of investment costs according to certain specified routes on a great electric railway system, although the accountant must receive great credit for the actual records and also for the co-operative suggestions which he makes in the course of such an analysis. A broad grasp of the meaning of every essential equipment function is absolutely necessary for the engineer who occupies himself with any of the problems of valuation, and it is both interesting and significant that such qualifications are demanded for engineering service of the first rank in the field of commission regulation. These qualifications, while too technical to be appreciated by the general public, are powerful factors in leading the engineer upward to a plane of recognition by high judicial authority which is bound in time to enhance the reputation of the expert witness of the right sort more than easily can be realized to-day.

Detroit River Tunnel Operation

An Analysis of the Record of Train Detentions on This Electrification, Which Handles 50,000 Tons Daily, Shows a Remarkable Degree of Reliability Notwithstanding the Severe Operating Conditions, the Mileage per Locomotive Failure Being 26,600

THE Detroit River Tunnel electrification of the Michigan Central Railroad, which was briefly described in connection with an article on maintenance practice published in the ELECTRIC RAILWAY JOURNAL of March 18, presents an unusually successful example of third-rail installation. Since the electric equipment was placed in operation, its reliability has been most satisfactory, notwithstanding the inherent difficulties with which it has had to contend, and the operating records of the electric zone are well worthy of analysis. In consequence, the record for the past year showing train detentions that were traceable to the electric rolling stock and to the contact system is presented in detail in the accompanying paragraphs, the various causes of failure being outlined in each case.



DETROIT RIVER TUNNEL OPERATION—FREIGHT TRAIN DESCENDING 1½ PER CENT TUNNEL-APPROACH GRADE

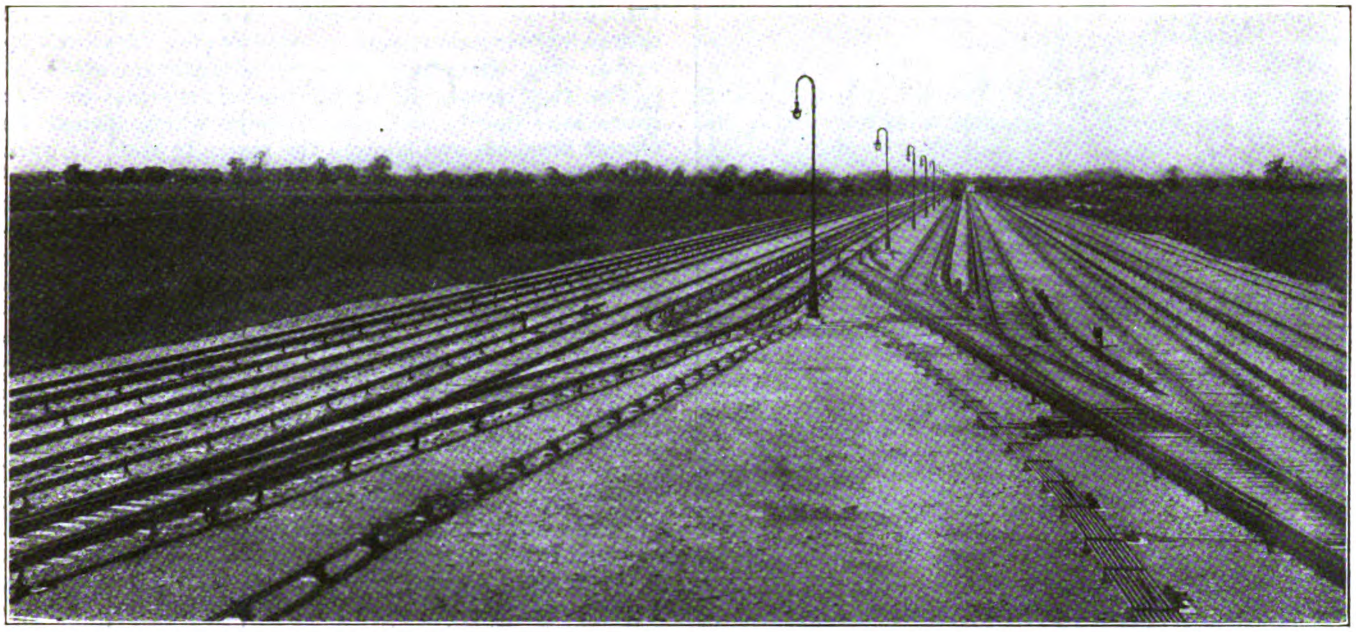
The installation, it may be said, includes at the present time about 5 route-miles and 23 miles of third-rail, together with ten electric locomotives, of which seven are regularly in active service. Both freight and passenger trains are handled, the former running as high as 2000 tons westbound up the 2 per cent grade in the west approach tunnel, and about 2500 tons eastbound on a 1½ per cent grade at the opposite side of the river, the eastbound trains having mainly loaded cars, while the westbound trains have many empties. About 17,000,000 gross tons are normally handled in the course of a year, or, say, 50,000 tons daily in both directions. Locomotive mileage for a year approximates 185,000 for all engines.

The heaviest work done by the locomotives is on freight trains, it being customary to use three engines per train and to load these up to the limit of their rating. The engines are of the eight-wheel, double-truck type having 600-volt ventilated motors with a high gear-ratio, and on heavy pulls it is not unusual to work them on sand considerably beyond rating, the idea being to get the train up the grade practically regardless of the draft of current. This brings about a rather peculiar situation in that when one engine loses power temporarily because of poor contact at the third-rail, or other cause, the whole train is quite likely to be stalled. No circuit breakers are installed on the engines, the equipment being protected by 600-amp. motor fuses and 2000-amp. shoe fuses.

Power is furnished by a substation which supplies also current for lighting in the yard and for industrial uses in the large passenger station at Detroit. It contains two 1000-kw. motor-generator sets and a storage battery, but the latter, it may be said, is carrying a continually decreasing share of the load, the discharge being 24 per cent of the total output in 1912 and 15.6 per cent in 1915. The storage-battery capacity was originally 630 amp. for eight hours, but now this has been reduced to about two-thirds of the original figure by removing plates, because greater swings are allowed by the power company which furnishes the alternating current. The regulating booster for the battery has even been cut out of service except for one hour of the day so as to decrease the battery discharge.

TRAIN DETENTION RECORDS

The most prolific cause of train detention chargeable to the electric installation appears to be that of foreign cars which fail to clear the third-rail. This is shown in the table on page 852, which covers train detentions and other equipment failures for which the electrical installation is responsible either directly or indirectly. From the table it may be seen that during the year seven detentions were charged to cars which fouled the contact rail. Two of these resulted from hopper-

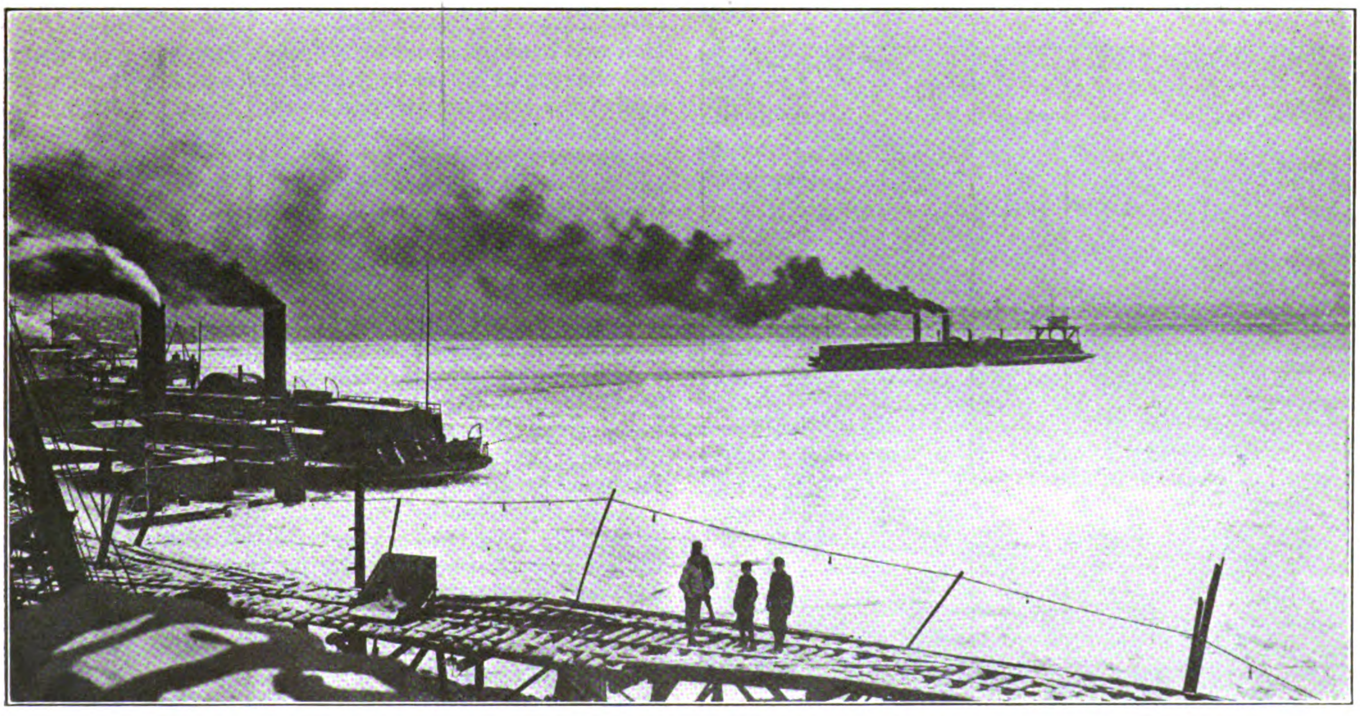


DETROIT RIVER TUNNEL OPERATION—ELECTRIC PICK-UP YARD IN WINDSOR

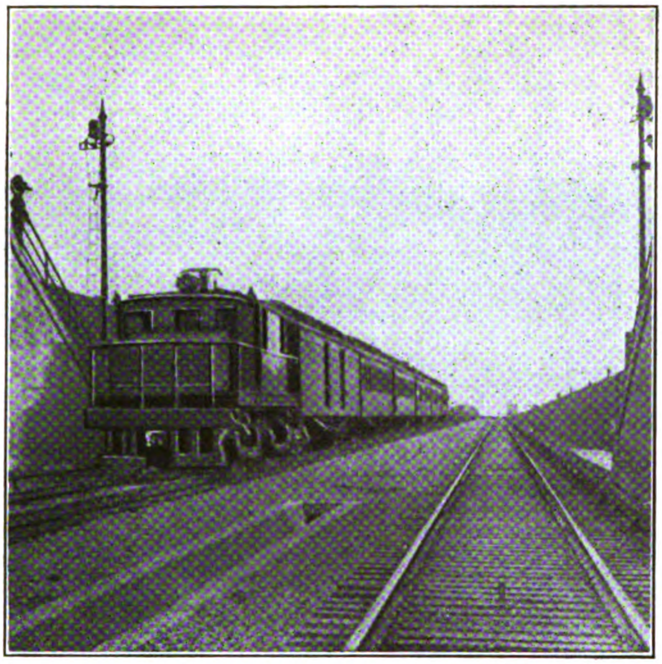
bottom cars with the hoppers down, which struck and damaged the third-rail. One of the detentions coming under this head was caused by a projecting piece from the roof of a sleeping car which touched the overhead contact rail in the station. Two others resulted from crippled foreign cars and one more was caused by some loose object, such as a brakebeam, dragging from a train and breaking a number of insulators. Still another was due to a projecting step on a steam locomotive tender.

Naturally, the presence of the third-rail beside the running rail makes it practically certain that damage will result from a derailment even of minor character, and in the list there are six detentions chargeable to this cause. In each case the derailed car or cars knocked down lengths of rail sufficient to interfere with traffic. Of a somewhat similar character are the delays charged to cars which were pushed off a derail into the third-rail, knocking it down. In connection with this it may be said that all of these detentions were brought about at a group of derails which are located at the tunnel end of the Detroit station yard where there are frequent train movements. The derails protect against runaway cars going into the tunnel. The presence of the station platform prevents the location of the third-rail on the opposite side of the track from that toward which the derails are faced, and it is undesirable to face the derail away from the third-rail and toward the station platform because more damage would be done if a car hit the platform than if it knocked over the third-rail.

Also, the location of the crossovers protected by the derails is fixed by topographical conditions so that, in turn, the derail cannot be moved along the track.



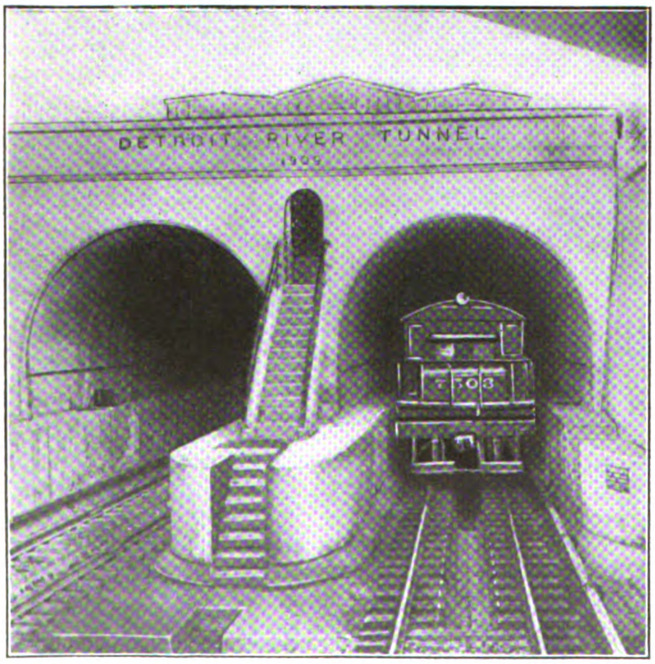
DETROIT RIVER TUNNEL OPERATION—CAR FERRIES ON DETROIT RIVER DISPLACED BY ELECTRIFIED TUNNEL



DETROIT RIVER TUNNEL OPERATION — PASSENGER TRAIN AND ELECTRIC LOCOMOTIVE

The situation, therefore, is a peculiar one and entirely local in its characteristics.

Under the general heading of failures due to the power supply there appear five detentions charged to temporary loss of power which resulted in the stalling of trains on the tunnel grades. One of these detentions was brought about by the fact that the substation circuit breakers were set too low when a heavy train was taken for the first time across a newly-built crossover on the Detroit side near the new passenger station. As the crossover was on a heavy grade, a much greater draft of current was demanded than had been normally the case in the past, and in consequence, the setting of the circuit breakers had to be raised. Some months later, two heavy trains lost power, one of them for only one and one-half car length, because of attempting to operate against traffic on a 2 per cent grade where the third-rail had become coated with a high-resistance film caused by corrosion from brine dropping from refrigerator cars. Drawbars were pulled out here also.



DETROIT RIVER TUNNEL OPERATION—LOCOMOTIVE AT TUNNEL PORTAL

The two remaining detentions chargeable to this cause were due to too-heavy tonnage which opened the circuit breakers and allowed the trains to stall. In each case the attempt to start the train again on the heavy grade resulted in a broken drawbar. Under the same general heading in the table, there appear two detentions chargeable to permanent short-circuits, the power failures in these cases being due to persistent shorts caused by the careless handling of tools by the construction gangs that were working about the passenger station in Detroit during the early part of the year.

Failures chargeable to the third-rail equipment, aside from the times when it was knocked down by crippled or derailed cars, were but three in number during the year. In two of these failures the third-rail shoe of the locomotive caught on a faulty rail, one being brought about by a low rail which resulted in broken shoes and beams on the locomotive. The other was also due to a shoe that was knocked off the locomotive by a low rail, this causing the other shoe on the locomotive to blow its fuse, thereby delaying the train. Another delay that was charged to a shoe catching on temporary construction was brought about by a broken shoe and shoe beam, the shoe catching on a temporary wooden incline installed for construction purposes at the end of a length of third-rail.

TABLE SHOWING TRAIN DETENTIONS FOR 1915, DETROIT RIVER TUNNEL ELECTRIC ZONE

Operation:	
Car fouling contact rail	7
Derailment	6
Car pushed off derail	7
Power supply:	
Power off temporarily, train stalled on grade	5
Power off, permanent short-circuit	2
Third-rail:	
Shoe caught on faulty rail	2
Shoe caught on temporary construction	1
Man failures:	
Tonnage rating exceeded, power not off	2
Stalled on gap in third-rail at crossover	1
Sanders plugged up, stalled on wet rail	1
Contactor burnt up, train brakes sticking caused abnormal draft of current	1
Locomotive failures, electrical:	
Short-circuit on commutator	1
Contactor burnt up, arc to ground	1
Locomotive failures, mechanical:	
Shoe spring lost, other shoe-fuse blown	1
Shoe broken, high shoe	2
Pantograph caught on overhead rail	1
Broken knuckle on locomotive	1

Operating Data

Annual locomotive mileage	185,470
Miles per locomotive failure	26,600

The table shows a total of five detentions charged against "man failures" in connection with the locomotives, this heading including delays that might not have occurred had the electric equipment not been installed, yet which were not chargeable to any inability of the electric equipment to do the work for which it was designed. Two of the detentions were chargeable to excessive tonnage on freight trains, an error on the part of the car checker, and owing to traffic conditions or other circumstances surrounding the movement the locomotives were unable to take the train up the grade although the power supply did not fail during the attempt. Another cause of delay was brought about by a train which stalled on a gap in the third-rail at a crossover. This was a part of the new construction work that was completed during the year, and the fact that the engine stalled was due entirely to lack of experience with the new conditions on the part of the motorman. A third detention was brought about by an engine which stalled on a wet rail because the sanders were plugged up, the engine without the sand being incapable of handling its normal rating because of excessive slipping. Another case somewhat similar to this was brought about by the burning up of a contactor because sticking air brakes on the train put an enormous load upon the engine, and the contactor was unable to break the resulting heavy current, holding the arc and finally opening the substation circuit breakers.

LOCOMOTIVE FAILURES

The real locomotive failures have been divided in the table between electrical troubles and mechanical troubles. Of the former, one was caused by a temporary short-circuit on a commutator, the resulting high current causing the motor fuse to blow. The other detention chargeable to electrical failures on the locomotives was due to a contactor burn-out in which the arc that was produced when the current was broken at the contact tips flashed over to ground and held on between the contactor and the ground until the contactor was completely burnt out.

Of the locomotive failures chargeable to mechanical defects, two were caused by broken shoes that were too high. In another case an engine under heavy load lost contact at one of its third-rail shoes, and the excessive draft of current taken by the other shoe caused that shoe fuse to blow. The loss of contact was due to a twisted shoe which finally caught on the third-rail and broke the shoe bracket, the original cause of the trouble being a weak shoe spring. Another failure was due to a pantograph shoe of a type not now in use, which caught upon the overhead contact rail in the passenger station. A third was due to a broken knuckle on a locomotive.

The operating record of the electric locomotives, made up on the basis proposed last year by the committee on electrical equipment of the American Railway Master Mechanics' Association, is 26,600 engine-miles per detention due to locomotive failure. In this only locomotive failures chargeable to electrical and mechanical defects have been considered. Man failures are not included, and, of course, the detentions chargeable to operation, power supply and to the third-rail system have been omitted also.

Columbus Safety Poster

Vehicle Owners Also Urged by Letter to Help Promote Safety

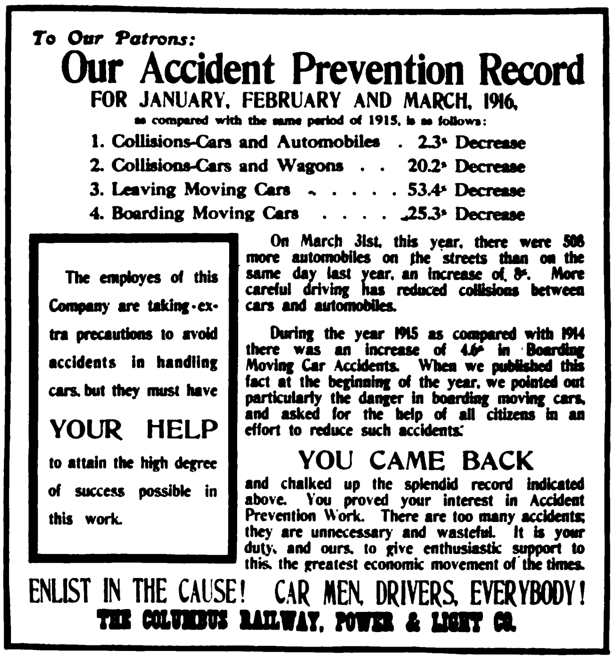
THE latest step in the safety campaign of the Columbus Railway, Power & Light Company, of which an outline was published in the issue of this paper for April 22, is the display in all car windows of the poster illustrated herewith. In addition copies of this poster were mailed to some 400 persons operating vehicles of different kinds in Columbus. Accompanying the poster was a letter signed by Harold W. Clapp, general superintendent of the company, which said, in part:

"In January we posted in the cars a statement of our 1915 record as compared with that of the year 1914, which gave these facts concerning public accidents:

1. Collisions—Cars and automobiles	3 per cent increase
(Nearly 50 per cent more machines in the streets in 1915 than in 1914.)	
2. Collisions—Cars and wagons	20.6 per cent decrease
3. Leaving moving cars	21.7 per cent decrease
4. Boarding moving cars	4.6 per cent increase

"At that time, we believed a much greater improvement could be made, but we realized that, even though our men were being constantly drilled in the careful handling of their cars, we could not hope to bring about the best results in this work unless we had the support of the public. We made a strong appeal for help. The quick and effective response accorded us is reflected in the record for the past three months.

"Accidents mean losses of various kinds; loss of earning power to the injured, loss in damaged property, physical disability with attendant suffering, etc. Statistics prove that 75 per cent of all accidents result from carelessness and thoughtlessness. If we can educate ourselves to the point where we will pause for a moment to think before acting as we daily use the streets—walking or driving—or as we ride the street cars, we will, as a community, produce savings the mere money equivalent of which would be astounding, and teach safety habits the future effects of which could not be estimated.



To Our Patrons:

Our Accident Prevention Record

FOR JANUARY, FEBRUARY AND MARCH, 1916,

as compared with the same period of 1915, is as follows:

1. Collisions-Cars and Automobiles	2.3% Decrease
2. Collisions-Cars and Wagons	20.2% Decrease
3. Leaving Moving Cars	53.4% Decrease
4. Boarding Moving Cars	25.3% Decrease

The employes of this Company are taking extra precautions to avoid accidents in handling cars, but they must have

YOUR HELP

to attain the high degree of success possible in this work.

On March 31st, this year, there were 508 more automobiles on the streets than on the same day last year, an increase of 8%. More careful driving has reduced collisions between cars and automobiles.

During the year 1915 as compared with 1914 there was an increase of 4.6% in Boarding Moving Car Accidents. When we published this fact at the beginning of the year, we pointed out particularly the danger in boarding moving cars, and asked for the help of all citizens in an effort to reduce such accidents:

YOU CAME BACK

and chalked up the splendid record indicated above. You proved your interest in Accident Prevention Work. There are too many accidents; they are unnecessary and wasteful. It is your duty, and ours, to give enthusiastic support to this, the greatest economic movement of the times.

ENLIST IN THE CAUSE! CAR MEN, DRIVERS, EVERYBODY!

THE COLUMBUS RAILWAY, POWER & LIGHT CO.

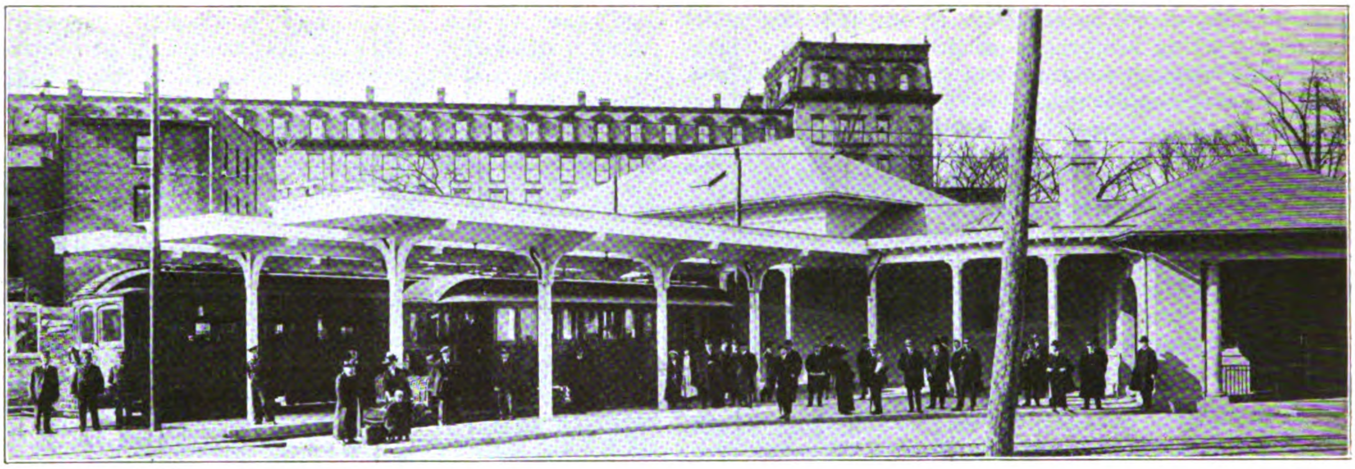
COLUMBUS SAFETY POSTER

"I am taking the liberty of writing you at length because I feel that you must be greatly interested in this work, both as a business man—an employer of persons in whom you place trust for the safe operation of your vehicles—and as a citizen desirous of lending your aid to the end that Columbus may live up to its opportunities by adding the qualification of Public Safety to the other splendid advantages it offers.

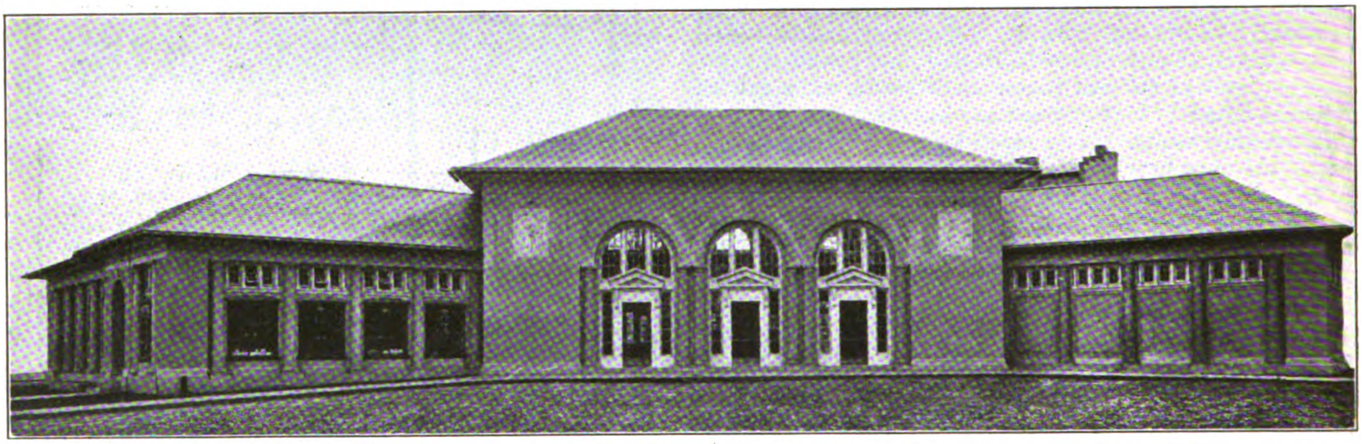
"I would appreciate very much your calling this record to the attention of your employees and others. If you should desire additional posters, they may be obtained by a telephone call to our safety department."

Foreign Specifications for Railway Material

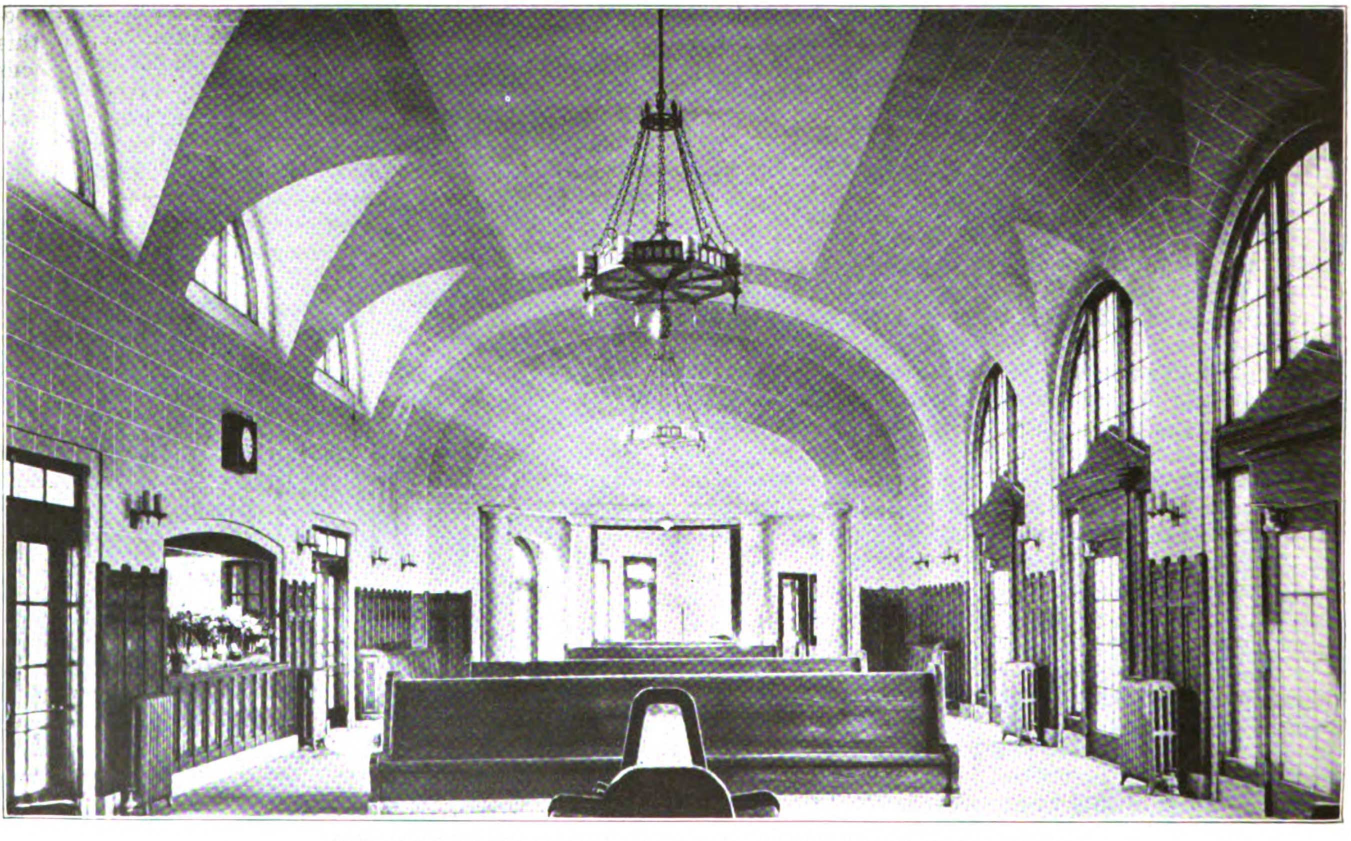
With the object of placing in convenient and accessible form before those in the United States interested in or responsible for railway materials, the Bureau of Standards, Department of Commerce, in connection with its investigation of failures of railway material, has obtained, through the courtesy of the State Department, copies of specifications for railway material—rails, axles, wheels and tires—used in several European countries. These specifications are given in full, together with a digest and discussion, in Technologic Paper No. 61, just issued. The available data concerning the types and weights of foreign railway equipment, together with those concerning derailments and accidents abroad, are also included in the publication. Persons interested may obtain copies of the paper, which is entitled "Foreign Specifications for Railway Material," without charge upon application to the Bureau of Standards, Washington, D. C.



VIEW OF TERMINAL, SHOWING CARS, PLATFORMS, AND TRAIN SHEDS



FRONT VIEW OF STATION, SHOWING APPROACHES



VIEW OF INTERIOR, SHOWING DESIGN OF FIXTURES AND ARCHITECTURE

Exterior and Interior Views of New Electric Railway Terminal in Saratoga

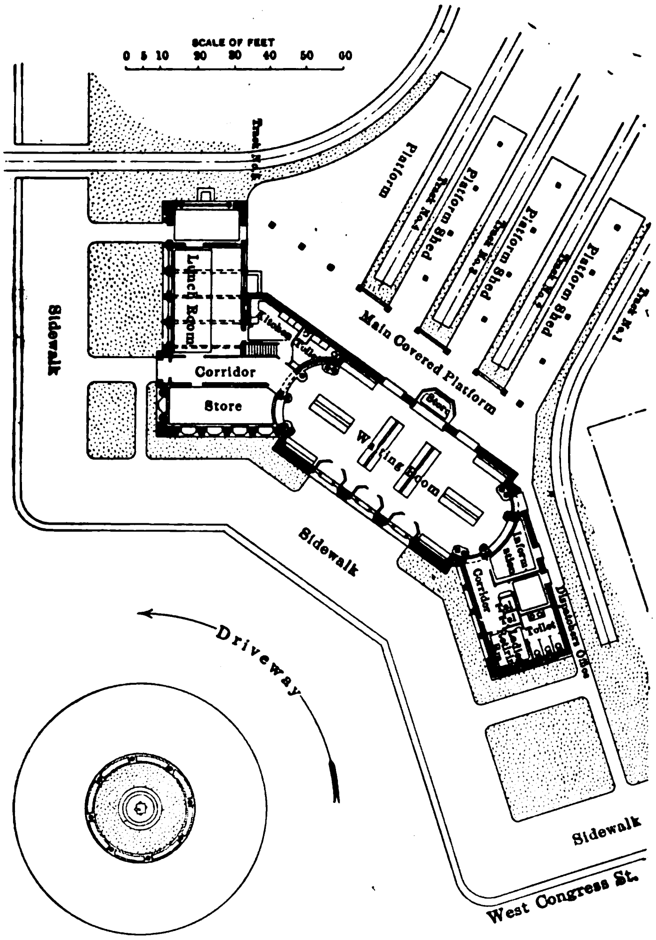
Saratoga Terminal Completed

Imposing Structure Designed to Accommodate Increasing Traffic for Many Years to Come

On Thursday, April 20, the Hudson Valley Railway of Glens Falls, N. Y., opened a handsome station at Saratoga with appropriate ceremonies, which were presided over by Mayor Walter T. Butler.

Many prominent State officials and railroad men were present, including a large delegation from Glens Falls who journeyed to Saratoga in the official car of A. E. Reynolds, general manager of the Hudson Valley Railway. Speeches were made by C. S. Sims, vice-president and general manager Delaware & Hudson Company; George D. Pratt, chairman State Conservation Commission, and George Foster Peabody, State Reservation Commission.

The station, which is located within a short distance of Broadway and close to the Grand Union Hotel, is laid out to secure a plaza effect on the side toward Broadway. For this reason the building is set diagonally on the lot 50 ft. to 60 ft. back from the street with the front facing northeast. The land was leased to the railway by the State of New York, the municipal authorities having granted the company the right to cross Broadway, thereby considerably shortening the run to Glens Falls.



SARATOGA STATION—PLAN OF STATION AND GROUNDS

To harmonize with a large memorial fountain opposite, the architects, Ludlow & Peabody, New York, made the general design of the station conform to the Italian classic school. It is constructed with concrete foundation, concrete floor and hollow terra-cotta tile wall. The roof is of mottled slate. The interior is of cream colored cement stucco trimmed with cast stone. The exterior walls contain a number of ornamental panels. Two of these represent in bas-relief historical events associated with Saratoga, such as General Burgoyne surrendering at Schuylerville and Sir William Johnson drinking the water of life at High Rock Springs.

The building consists of a main central motif containing the waiting room and office and two wings, one extending south and the other north. In the south wing is a large lunch room, with kitchen, and a store with show windows opening on Broadway. The south wing also contains the men's room. In the basement of the south wing are the boiler plant and coal rooms. In the north wing is the ladies' room, the agent's office, the parcel room, the telephone booth and the dispatcher's office.

At the rear of the building are the concrete track platforms with protected wood construction track sheds.

The waiting room has a colored cement floor with Moravian tile border, wood paneled wainscot about 7 ft. high and above this point a vaulted ceiling of cement plaster, jointed and treated to represent stone. The interior woodwork of the entire building is chestnut, with the walls and ceilings plastered. The building as arranged will take care of the traveling public in and out of Saratoga for many years to come.

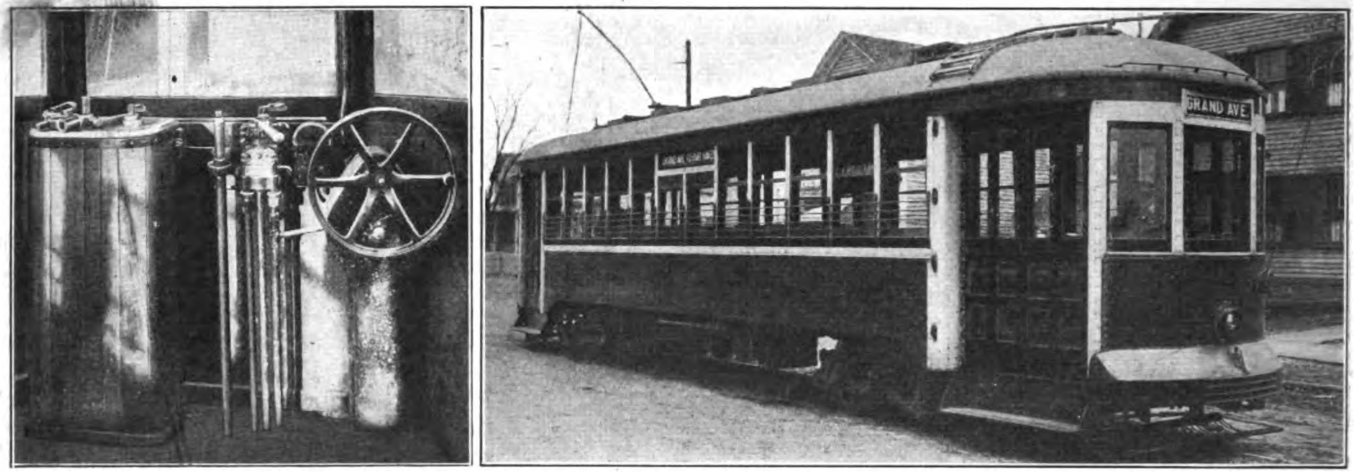
The cars of the Schenectady Railway operate to Ballston, Schenectady and Albany, and run on an hourly schedule. In addition to this the Troy line of the Hudson Valley Railway also leaves this station hourly, and the local Belt Line service car arrives and departs from the station every thirty minutes.

The service to Glens Falls on the north is operated hourly, so that in the aggregate hundreds of passengers will daily use the new station.

Franchise Extension Rejected in Valparaiso, Chile

The municipality of Valparaiso, Chile, has refused to accept the proposition made by the street railway of Valparaiso for an extension of the franchise for ninety-nine years. The propositions made by the Compañia de Tranvias Electricos de Valparaiso, which is the company now operating the electric street railways and furnishing the electric lighting of the city, were in substance as follows: The rate of fare within the city to be 20 centavos, first class, and 10 centavos, second class (with exchange at 9 pence, equal to $0.036 and $0.018 United States currency, respectively). This rate is to remain unchanged unless the exchange value of the peso should fall below 6 pence. The franchise of the company to be extended by seventy-nine years, making the total life of the franchise, from date, ninety-nine years. The company was to give the city of Valparaiso 8 per cent of its gross receipts from the traction lines, this percentage of gross receipts to be applied principally on the city debt and secondarily on the indebtedness of the city to the traction company for municipal lighting (in June, 1915, the balance due for municipal lighting amounted to $383,045 United States currency.) The company was also to double-track several of what are at present single-track lines; to do all necessary paving in that part of the streets covered by its lines, and to have the responsibility and cost of the cleaning, repair, etc., of such paving. The company was to deed to the city on certain conditions and in return for certain payments on part of its equipment, all its equipment, plants, lines, etc., on the expiration of its franchise.

The Puget Sound Electric Railway is converting its station grounds in Auburn, Wash., into a park, and is planting flowers and laying out lawns.



CONNECTICUT CARS—INTERIOR AND EXTERIOR OF NEW CARS WITH LIFTING SASH

Latest Connecticut City Cars

Ninety-two New Semi-Convertible Cars Now in Service Are Fitted with Many Safety Promoting and Traffic Accelerating Features

THE Connecticut Company has just placed in service ninety-two prepayment arch-roof cars, forty-six of which are used at New Haven, twenty-six at Hartford and twenty at Bridgeport.

While the cars are much alike in appearance, they are really of two designs, forty-six being of Brill semi-convertible type built by Wason and the others being of Osgood-Bradley construction. The cars have steel underframes, steel side frames and a ¾-in. roof covered with No. 8 duck. The fittings and equipment are exactly alike except that the Wason cars, numbering 1700 to 1745, have Agasote head and side lining, Peacock staffless brakes and EMB resistors, while the Osgood-Bradley cars, numbering 1746 to 1791, have Nevasplit head and side lining and Lord staffless brakes and GE resistors. The dimensions of these cars are as shown in the accompanying table.

	Nos. 1700-1745	Nos. 1746-1791
Length of car body	30 ft. 0½ in.	29 ft. 11 in.
Length of platform	5 ft. 7 in.	5 ft. 11½ in.
Total length	43 ft. 10 in.	44 ft. 6 in. (over buffers)
Height from top of rail to top of roof	11 ft. 2½ in.	11 ft. 4 in.
Height from top of rail to top of trolley board	11 ft. 8¼ in.	11 ft. 8¼ in.
Height to center of drawhead	20½ in.	20½ in.
Height from top of rail to underside of bolster	29½ in.	29½ in.
Width over step	8 ft. 5 in.	8 ft. 5 in.
Width over eaves	8 ft. 4 in.	8 ft. 5½ in.
Total width	8 ft. 5 in.	8 ft. 5 in.
Center to center of king bolt	22 ft. 1 in.	22 ft. 1½ in.
Number of seats	12 cross, 4 long	12 cross, 4 long
Seating capacity	44	44
Weight ready for service	36,000 lb.	36,000 lb.

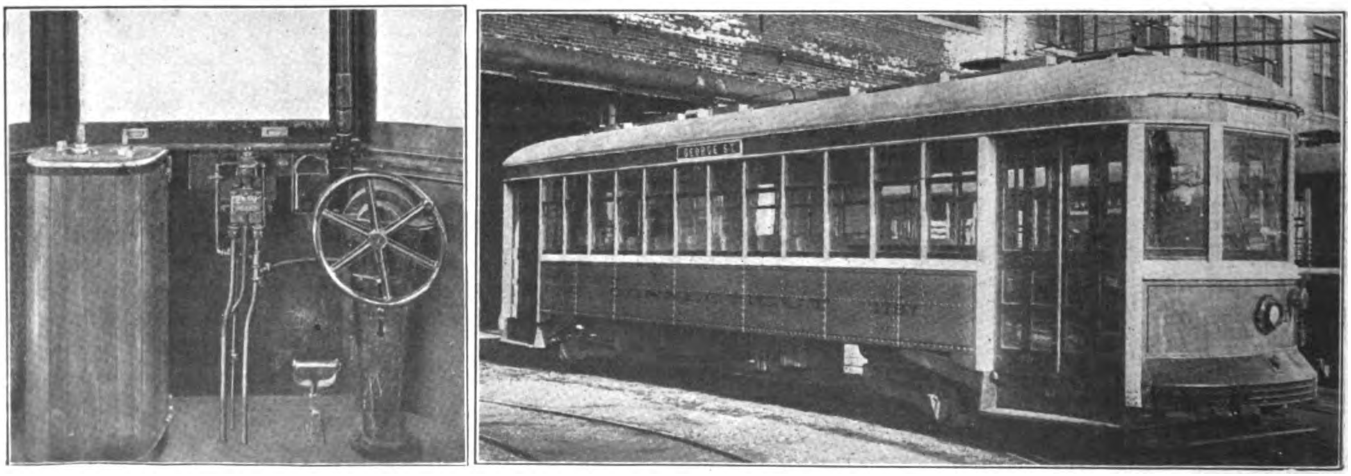
Operating Features

These cars are operated on the pay-within plan with manually-operated outwardly folding vestibule doors of clear glass. The doors are operated in connection with the National Pneumatic Company's safety interlocking door signals whereby the motorman can start with the first control point on as soon as the closing of the doors operates the starting signal. Both the steps and platform thresholds are fitted with 3-in. strips of Mason carborundum safety tread. The use of a fixed step has worked out very satisfactorily. The Consolidated buzzer push-button system is installed with buttons only near the vestibules. These were placed there, of course, to cut down the loss of time when a passenger signals from his seat and then proceeds out leisurely.

The liberal platform length and the provision of 6-ft., longitudinal seats at each end do much to facilitate quick passenger movement. Fares are collected by means of Johnson fare boxes and counterchecked on Sterling-Meaker registers.

The exterior of these cars is in the Connecticut Company's standard yellow, while the interior is in mahogany with bronze trim. Air pockets are provided between the 3/16-in. wainscoting and steel side plates. All seats are Heywood Brothers & Wakefield rattan, the cross seats having corner grab-handles so that the ceiling is free of straps except at the ends. Pantasote curtains on No. 86 ring fixtures are also used.

The efficient use of motive equipment is shown by the fact that these cars require only two 50-hp. motors



CONNECTICUT CARS— VIEWS OF CAR EQUIPPED WITH REMOVABLE SASH geared 15:69 for a schedule speed of 9 miles per hour with six stops per mile. These motors are of GE-203 L type rated 50-hp. on 600 volts and are outside-hung through end-bar suspension on Standard 0-36 maximum traction 5250-lb. trucks of 4-ft. 6-in. wheelbase. These trucks have steel drivers of 33 in. and cast-iron ponies of 21-in. diameter. The journal boxes are Symington.

The control is of K-6 type supplemented by contactors. The vagaries of the 4½-in. diameter trolley wheels are controlled by means of Ohio Brass catchers.

As previously noted, these cars have hand brakes of staffless type. However, the chief braking is left to GE air brakes including the C-P 27-B compressor and a 16-in. x 48-in. air tank. Brake-shoe wear adjustment is eliminated by the use of Smith-Ward slack adjusters. The reliability of braking is further increased by the use of air-operated sanders, insuring relief from troubles with clogging sand. Other safety equipment comprises Rico anti-climbers and H-B life guards.

Lighting for each car is afforded by seven 56-watt lamps, ranged along the center line of the car, five inside and one on each platform. Other specialties are Gold heaters and Railway Utility honeycomb ventilators, incandescent headlights and illuminated signs.

NEW CARS

Since these cars were put in operation, orders for 100 additional cars have been placed by the Connecticut Company. Thirty, the exact duplicates of those built by the Wason Company, have been ordered from that company; sixty others, practically the same as these cars only longer, are to be built by the Osgood Bradley Company, and ten of the newer type of interurban cars are to be built at the Wason works.

Railway Exhibit Educates Public

The Exhibit Demonstrates the Various Developments and Improvements in Equipment and Emphasizes the Company's Record in Accident Prevention

BY HENRY GEBHART

General Manager Oakwood Street Railway, Dayton, Ohio

WHILE a direct increase in revenue is not to be expected as the return from an exhibit in an industrial exposition, such an exhibit does demonstrate that the railway company has the right public spirit and the exhibit may be employed to educate the public and impress the fact that the service has improved greatly while the fare has remained the same. Recently the Oakwood Street Railway, Dayton, Ohio, exhibited at an industrial exposition, and it feels well paid for the expenditure of time and money. The general character of the exhibit is shown in the accompanying illustration.

A booth, 25 ft. square, was selected near the entrance to the show so that it would attract the attention of visitors before their interest lagged.

In the center and to the rear of the booth, a full-sized standard car vestibule was exhibited. This was used first to attract attention, and second, to demonstrate the several devices which the company has invented to aid in safeguarding the public. A man was in charge of this exhibit continuously in order to demonstrate and explain the details of the safety door, signal light, door operating mechanism, illuminated signs, fare boxes, etc., all of which were designed and manufactured in the railway company's shops.

A case with twenty-four 8-in. x 10-in. colored transparencies occupied space at the right front of the exhibit. These transparencies were of two kinds, and they were intended to contrast the past with the present, as well as to illustrate some of the equipment designed and built in the railway company's shops. The old shed for horse cars was contrasted with the company's new reinforced-concrete structure. The first car-building shop was shown beside the six present shops. An old horse car with all of the employees in the service in 1895 was contrasted with two views of double-truck modern cars with the day and night shifts of trainmen. The old horsedrawn snowplow was illustrated beside the modern snow sweeper. Similarly, the old power-house equipment was contrasted with the modern generating equipment; the first line wagon with the modern Packard truck, and the first single truck with the modern single truck. The remainder of the case contained transparencies of various equipment parts, simply for their illustrative and educational value. A sign placed over this transparency case read as follows: "Observe these contrasts of the past with the present and remember this—your fare has not increased." Just back of the transparency case, and on the same side of the booth, a large table with sample parts of signs, fare boxes, door signals, door mechanisms, etc., was placed to show the intricacy of the mechanical parts of these various devices.

At the left front of the booth a full-size section of modern track construction, including the sub-grade, concrete ballast, steel ties, joint construction, rails and paving, was exhibited. A placard was placed on this giving details and cost, and again reminding the public that "The fare had not increased." Alongside this track construction exhibit the various sections of rail used by the company from 1871 to 1916 were shown, beginning with the old strap rail on a wooden stringer and passing through the various stages of evolution to the modern T-rail.

THE OAKWOOD STREET RAILWAY CO

OAKWOOD STREET RAILWAY'S INDUSTRIAL EXHIBIT

Other features of the exhibit included an architect's water color of the new offices and shop buildings, a framed portrait of Maj. Charles B. Clegg, president of the company, and a number of placards of which the following are samples: "We build cars, door signals, door mechanisms, illuminated signs, fare boxes, etc. Safety First.

"Five Years' Progress, Records of 1915 and 1910:

All accidents to passengers including boarding and alighting	89.4 per cent decrease
All accidents to pedestrians	55.6 per cent decrease
All accidents to horse-drawn vehicles	34.4 per cent decrease
All accidents to automobiles and motorcycles	112.5 per cent increase
All other accidents	56.5 per cent decrease

"We are doing our part to decrease accidents. Give us your help by attention to Safety First."

Other placards called attention to delays as to grade crossings, the employees' aid association and a list of improvements which the Oakwood Street Railway was the first to adopt in Dayton.

Needed Reforms in Regulation

Dangers from Over-Regulation Discussed at Meeting in Boston—Proper Qualifications of Commissioner Defined

PRESIDENT Alexander C. Humphreys of Stevens Institute of Technology discussed necessary reforms in public utility regulation on April 21 at a meeting of the Boston Society of Civil Engineers. Having served as an expert witness in a large number of cases before public service commissions, Dr. Humphreys called to mind a number of instances in which the conduct of public hearings by legislative committees and by State commissions was not in harmony with a judicial determination of the facts at issue. The speaker pointed out that no real co-operation can be obtained where there is antagonism between the parties in interest. He held that it is not improbable that the country has suffered as much from the ill-directed zeal of honest but self-sufficient enthusiasts as from the cunningly directed activities of the reformers for personal profit.

After emphasizing the volume of superfluous or harmful legislation produced in the country under present conditions, touching upon the great cost of the federal valuation of railroads now under way, questioning the general policies of the government toward the carriers and urging a fairer attitude toward the transportation security-holder, Dr. Humphreys said that there are many engineers who might profitably give more attention to the subject of overhead charges, including such items as preliminary expenses, legal and other organization expenses, engineering, superintendence, contractor's expense, interest and taxes during construction, liability and other insurance, omissions, contingencies, etc. If the engineer's estimate is not inclusive and final, he should place the fact on record. Engineers have been responsible for much misapprehension because of their failures in this respect. Various public utility cases in which the presiding commissioner had conducted hearings without the proper judicial attitude or in which the presentation of incomplete evidence or the unfair interpretation of testimony had been allowed were touched upon. The development of a complete record is absolutely essential to just regulation.

"Under commission control," said Dr. Humphreys, "over-regulation and unnecessary interference with individual enterprise has been gaining headway year by year. The tendency to allow this one authority to exercise the three functions of government has been more in evidence year by year. The regulation of business in many cases has developed or, more correctly, degenerated into persecution, and this also applies to other business than that of public utilities. Perhaps the burden of over-regulation has rested most heavily upon our railroads. The sooner the people as a whole come to understand that upon the prosperity and efficiency of our railroads depends in large measure their own prosperity, the better for all concerned. Sooner or later they will learn whose ox is being gored, but they may not be able to distinguish the aggressor. The tendency of these commissions, both federal and State, is to get deeper and deeper into the details of management, to become more and more active in legislation and the framing of major and even minor rules, and to be more and more keen to sit as judges in trials of public service corporations. . . . Thus they exercise the authority while avoiding responsibility for final results—a most inefficient and dangerous system."

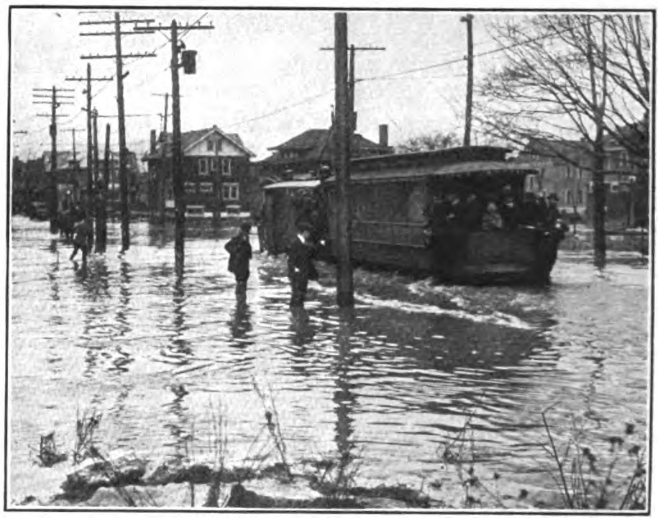
By failing to protest in many commission cases through appeal to the courts, either for reasons of policy, timidity or general lack of backbone, many corporations have suffered material loss and loss of prestige. Unless the public utility is willing to fight for its just dues, it is charged with being found in the wrong. Many of the minor troubles and injustices could be eliminated from commission control if thoroughly qualified engineers were put upon the boards. Every commission should have at least one properly qualified engineer as a member. He should be a man of high character, of sound training in theory and practice, and of wide experience in design, construction and administration.

In general, all our public service commissioners should be broadly trained, broad-minded, fair and competent as investigators (an unusual qualification), and in each commission there should be men fully qualified in the theory and practice of the professions of engineering, law, business finance and accountancy. How to get enough such men in view of the small inducements offered and the political pressure to which they are submitted is indeed a problem. In conclusion, Dr. Humphreys declared that no longer should lawyers and economists be permitted to make the laws and say how, when and where they are to be enforced.

Operation in Flooded Streets, Buffalo

International Railway, Buffalo, N. Y., Maintains Car Service in Deeply Flooded Streets

GREAT difficulties were encountered by the International Railway, Buffalo, N. Y., in handling traffic through the flood waters in the South Buffalo and Kensington sections of the city during the last week of March. More than 20 miles of streets were under water from a few inches to 4 ft. and 5 ft. deep. Service on several lines was suspended for three days, and cars on two lines are still being re-routed because of the destruction of approaches to the Bailey Avenue bridge over the Buffalo River.



SNOWPLOW (WITH TRAILER) IN FLOODED STREET, BUFFALO

The accompanying engraving shows a view on the Seneca-Hoyt line where, in places, the water was 5 ft. deep, yet the service was never abandoned. A snowplow with a trailer attached was pressed into service, and passengers were carried for almost a mile through the flooded area. Although thousands of passengers were carried through the floods during the five days, there were no accidents. The Seneca Street carhouse of the International Railway, which adjoins the river, was not damaged because it is on high ground, but it was almost entirely surrounded by water.

Electrical Conference in Atlanta

The Standard Safety Code and Electrolysis Were the Principal Subjects Discussed

THE conference held this week in Atlanta, Ga., by the Bureau of Standards under the auspices of the Affiliated Technical Societies was opened on May 2. The meetings were held at the Georgian Terrace Hotel, and were attended by some 200 prominent corporation and municipal engineers and public utility officials. The opening talk on May 2 was by A. M. Schoen, chief engineer Southeastern Fire Underwriters' Association, who was followed by Dr. E. B. Rosa, chief physicist Bureau of Standards, who described the purposes of the National Electrical Safety Code. W. J. Canada, electrical engineer of the bureau, then presented a summary of the code. The portion of the code which attracted the most discussion was that relating to transmission and distribution lines at high voltage. Those taking part in the discussion were W. G. Claytor, Roanoke, Va.; P. A. Tillery, Raleigh, N. C.; H. A. Palmer, Richmond, Va.; L. V. Sutton, Raleigh, N. C.; E. P. Peck, Atlanta, Ga., and Mr. Cummins, Birmingham, Ala.

In the evening the delegates took a trip to the Atlanta outdoor high-tension substation of the Georgia Railway & Power Company, where a demonstration by the engineers of the company was given of changing insulators and other operations on 110,000-volt lines, and the tagging of circuits. All operations were in accordance with the requirements of the safety code.

On Wednesday, Burton McCollum of the Bureau of Standards read a paper on "Electrolysis and Its Mitigation," describing the work done by the Bureau of Standards in studying the question of electrolysis from railway return circuits. An abstract of this paper is given below. The paper was illustrated with slides, and a discussion followed. Later the confrères visited the testing laboratory of the Georgia Railway & Power Company, and in the evening a meeting of the transmission engineers in attendance was held. It was devoted to experience talks.

On May 4, the last day of the meeting, the discussion was on the subject of grounding low-voltage light and power circuits.

Need for Reducing Electrolysis

Bureau of Standards Recommends Improvement of Return Circuits—Three-Wire System Under Test

AT a conference held at Atlanta May 2 to 4 under the auspices of the technical committee of the Affiliated Engineering Societies of that city, one day, May 3, was devoted to a consideration of the work of the Bureau of Standards at Washington in studying the causes and methods of relief of electrolysis of underground pipe from railway circuits.

In the paper which was presented on the work of the bureau, reference was made to the publications issued by it on the subject and to the methods which had hitherto been followed for mitigation of electrolysis. It was said that these methods may be grouped broadly under two heads: First, those that may be applied to the pipe or cable system, and second those which may be applied to the negative return and have for their object the prevention of leakage of electric currents into the earth or its reduction to so low a value that it will do practically no harm. The second method is by far the one to be preferred. Some of the methods under the second group, including the double trolley system and the use of uninsulated negative feeders in parallel with the rails, are either impracticable or else open to the objection that the expense or operating difficulties attending their applications are rendered unnecessary because of the fact that there are other adequate methods available for general application which are comparatively cheap to install and which introduce but slight complications into the operation of the system. The three-wire system is mentioned as possessing large possibilities, but attention is called to the fact that up to the present sufficient experience has not been had with it to show whether it is practicable from the operating standpoint under average conditions of service. A very complete sectionalized three-wire system is now being installed in one American city under the general direction of the Bureau of Standards, and it will be used as the basis of a thorough investigation of the practicability of this system both from the standpoint of practical operation and electrolysis mitigation.

The most effective methods that have been thoroughly tried out in practice over long periods are the use of insulated negative feeders. In some cases it is also desirable to use a moderate number of insulating joints in the pipes, or a very limited amount of pipe drainage, but as a rule an increase in the carrying capacity of the insulated return is all that is necessary.

The paper also points out that the owners of the underground utility have certain responsibilities as well in this matter, particularly if new construction is undertaken in territory already occupied by the electric railways. There are a number of things that pipe and cable owning companies can do at a very slight additional expense if such measures are taken at the time the pipes or cables are installed. Thus, in new work or repairs, pipe lines should be laid as far as practicable from the railway tracks. Where the density of service connections is sufficient to justify the use of two mains, one on each side of the street, these should be laid, in order to eliminate the necessity for running services across under the railway tracks. Wherever it is necessary to run service pipes across the street under railway tracks, care should be taken either to lay them as far as practicable below the tracks, or else to provide substantial insulation between the service pipe and the track, or between the surface and the main, by means of insulating joints. The latter plan will generally be found cheapest and most effective.

In conclusion, the paper recommends earnest co-operation between the railways and underground utilities in order that the problem should be dealt with in the most effective way. Until the reduction of electrolysis comes to be considered an engineering question, it cannot properly be solved.

Examination for Special Agent

The bureau of foreign and domestic commerce of the Department of Commerce of the United States plans to hold an examination during May for the position of special agent to investigate the markets of Africa, Australasia and the Far East for railway supplies. The salary of an appointee to this position will not exceed $10 a day for each day in the year; actual transportation expenses and an allowance for actual subsistence expenses not to exceed $5 a day will be paid. Application to take this examination should be made direct to the Bureau of Foreign and Domestic Commerce, Washington, D. C., and should set forth the applicant's education and his experience in the subject of the investigation.

Spanish engineers have completed surveys for a direct electric railway from Madrid to Valencia, with the exception of that portion of the line terminating in Madrid.

Mechanics of Railway Motors

The Author Discusses Mechanical Considerations in Railway Motor Design Which Affect Reliability of Operation and Facility of Maintenance

BY R. E. HELLMUND
Railway Engineering Department, Westinghouse Electric & Manufacturing Company

A MOST important consideration in the mechanical design of a railway motor armature is that the punchings that form the core must not be subject to loosening under vibration, and in an approved construction which has never given any trouble of this kind the punchings are pressed onto a spider and tightened with a powerful hydraulic press, being subsequently held in place by a ring nut which has practically no chance to get loose. The spider is pressed onto the shaft, which thus is made easily removable if broken. Large teeth in the armature core are desirable because they will not bend over easily in case the armature rubs against the poles, and this condition naturally leads to armatures with rather few large slots and teeth. The latter feature is also desirable because with few coils the chances of breakdown are reduced, and because larger coils are naturally stiffer and less liable to move under service conditions. On the other hand, excessively large coils are not as favorable for commutation, and it is possible for large coils to be so stiff as to make the rewinding of the armature difficult.

With regard to insulation, it may be said that the introduction of U-shaped pieces of insulation to reinforce the coils where they leave the armature core has been found of great value in avoiding coil breakdowns. To avoid shrinkage of the insulation and loosening of the coils, it is desirable to have them compressed as much as possible before they are put into the armature. For this reason the practice of pressing the straight part of the armature core is very desirable. Coils wound of cotton-covered wire and with a wire covering of fibrous material should be pressed before the outer layer of insulation is put on, but strap-wound coils with mica wrappings may be pressed after completion.

With regard to banding, it may be said that too wide bands and too many of them involve certain losses from eddy currents. The use of a strip of tin under the band wire with clips to hold the wires together has been found to increase their life considerably. When an armature is banded, a sufficient number of fillers should be put into the slot so that the coil sticks out of the slot just enough so that the pressure from the band forces the coil down until its top is flush with the top of the teeth in the core. It is very desirable to do the binding while the armature is hot, because the insulating material is most pliable in a hot condition. The use of temporary bands on the armature before putting on the final banding is considered good practice.

With very large commutators the bolted construction is still the only safe method of holding the commutator together, because the proper tightening of a large ring nut is rather difficult. The methods of manufacturing the mica V-rings and of aging the commutators under heat have, however, improved so much in recent years that the use of a ring nut in small and medium size commutators has become fully as safe as the bolted construction. Following the practice of undercutting that has become common in the last few years, the difficulties of commutator maintenance have become almost negligible. Small irregularities in the commutator surface should not cause a properly designed brush to jump, and therefore the masses that are moved up and down with the brush must be kept small, many brush-holder designs including a small vibration spring between the harness and the hammer so that the carbon can move without moving the harness. The shape of the brush-holder hammer may have a considerable influence upon brush wear. Although small sizes of hammer have less contact surface, they do not wear into the carbon any more than the larger sizes and have, moreover, the advantage of less weight.

The hammer wear, and also the wear of the carbon in the sides of the brush-holder box, are caused by small arcs forming between the carbon and the hammer and between the carbon and the brush-holder. Such arcs are formed by the vibration of the carbon in the box and by sand particles between the box and the carbon. It has been found in localities where the cars stop on the near side of the street, and where the motors carry heavy accelerating currents while the car is crossing other tracks, that the side wear of the carbon is excessive. Since the side wear will be larger if less current is carried by the hammer on top of the carbon, it is essential that the shunt between the hammer and the brush-holder be maintained in first-class condition. Also, poorly-made or broken shunts will lead to excessive wear of the pins supporting the ratchet and wheel and the inside of the ratchet wheel.

Usually it is desirable not to have the brushes too thin, as they are then more subject to breakage. A thickness of 3/4 in., or for small motors 1/2 in., gives best results. Very high graphite and low-resistance carbons are often not best for railway motors. On the other hand, care should be taken to avoid very hard carbons, and especially those with certain abrasive qualities intended for non-undercut commutators. While such brushes may show up very well in comparative tests on carbon wear, they will prove to be expensive on account of excessive commutator wear. Usually it is better to take out the armature and turn and undercut the commutators than to use abrasive brushes.

In field coils flat copper straps with asbestos tape insulation between the straps have given such excellent results that the use of wire or ribbon-wound coils has practically been abandoned except in very small motors, the insulation between various layers of the field coils usually being made of mica discs. To avoid vibration of field coils, a most important consideration, it is absolutely necessary to introduce a heavy spring underneath the coil, this taking up the inevitable shrinkage of the insulation. To bring the cables out of the core, the best practice seems to attach the cables permanently to a strap inside of the coil with a well-soldered joint and to connect the two cables between the field coils by a similar simple and rugged joint of the sleeve type, this being preferable to the frequently-used arrangement of cable terminals into which the cables are fastened by screws.

Bulletin on Credits to Foreign Buyers

The insistent demand for information on foreign trade subjects has led to the publication of a book of practical suggestions by the Bureau of Foreign and Domestic Commerce, Department of Commerce. These suggestions are not concerned with the sale of any particular lines of goods in foreign markets, but with the vexing problems which sooner or later confront exporters in every line, such as questions of credit, agencies and packing. The much-discussed question of extending credits to foreign buyers is gone into at considerable length in the bulletin, as there seems to be a disposition on the part of American exporters to regard as permanent the present short-term and cash business with countries that previously demanded long credits. Copies of the bulletin may be purchased at 15 cents each from the Superintendent of Documents, Washington, D. C., or from the district offices of the bureau.

Extensive Fire at Paris, Tex.

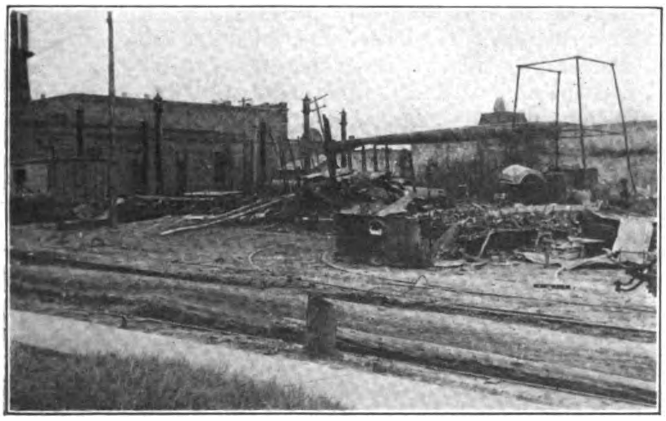
Damaged Area Covers Twenty-seven City Blocks and 1440 Buildings—Electric Properties Suffer Temporary Shutdown

ON March 21, a fire, which ranks as one of the largest in the history of Texas, destroyed twenty-seven blocks at Paris, in that State, including practically all the business section of the town and many residences. Starting from causes unknown near the south end of the town, the fire spread to the Public Square, a distance of eighteen blocks, in less than a half an hour, leaving behind a path of ruins from one to three blocks in width.

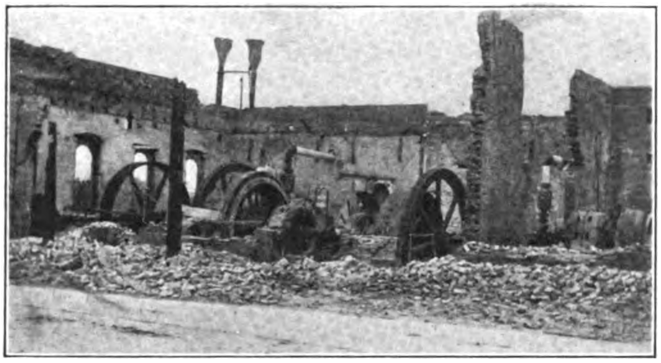
The Paris Transit Company's carhouse and offices were totally destroyed, as shown in an accompanying illustration. In addition to all the tools and repair equipment, six trolley cars which were in the carhouse were consumed. The offices and the stand-by plant of the Texas Power & Light Company, together with several miles of transmission and trolley lines, were also destroyed. The financial loss to the two electric companies resulting from this destruction was not particularly serious, due to the fact that the buildings and equipment were to a great extent covered by insurance.

The power plant, the ruins of which are illustrated, was used only during the cotton gin season to carry the peak load. It had a capacity of about 800 kw., and its equipment included two motor-generator sets of 75 kw. and 90 kw. The power and light company had a triple-feed system arranged so that in case one feeder was burned, the load would be taken care of by either of the remaining feeders. This fire covered such an area, however, that all three feeders were burned.

The work of restoring service by the transit company and the power and light company was well started before the flames died down. Large crews of men with electrical equipment were immediately rushed from Dallas by express trains in answer to telegrams sent before telegraphic connections were cut. Practically every line and trolley pole in the burned area was destroyed and most of the trolley wire was damaged. Service was restored to a portion of the town not in the path of the fire by 10.40 p. m. on the 21st, and by 10.30 a. m. on the 22nd, six hours after the fire had passed, the south end of town was again on the line. At noon on the same day the north part of town was receiving power, and by evening 75 per cent of the town was connected for lighting. Car service was restored on the Barnum line on the 23rd, but on account of a shortage of equipment four single-truck cars were borrowed from the Southern Traction Company of Waco. Construction of a transmission line to connect with the Dallas line will be started within three weeks, and it is expected the work will be completed and the line in service by Aug. 1. The Diesel plant of the lighting company is furnishing all power for both the Texas Power & Light Company and the Paris Transit Company.



RUINS OF CARHOUSE, PARIS TRANSIT COMPANY



RUINS OF OFFICE AND POWER PLANT OF TEXAS POWER & LIGHT COMPANY

No plans have been perfected as yet for the location of new offices of the companies, but it is expected that these will be located in some office building as soon as such is available for use. Temporary quarters are maintained in a local store which escaped the conflagration. Temporary quarters for the storage of cars have been selected at the amusement park of the company, about 1 mile from town. The shops are located in the basement of a dance pavilion, and several ingenious machines to take the place of the destroyed equipment have been provided. There is a shallow, sandy creek flowing under the tracks on the park grounds, and by removing a few ties and building a floating platform in the bottom this has been turned into a temporary pit. It serves very well, and has already been used for the changing of armatures on a car.

Intensive Safety Work Produces Results

A reduction of 66 per cent in five years in the total number of accidents chargeable to the transportation department is a record of which the Springfield Consolidated Railway Company, Springfield, Ill., may well feel proud. This result is largely attributed to what may be termed intensive safety work among the car crews. The transportation department of this company, after careful consideration, decided that a general safety campaign among the employees and the public through placards, buttons and signs, would not produce results in proportion to the cost of conducting the campaign. It therefore concluded to devote its energies to its employees, and particularly to the car crews. The men were informed of the number of accidents occurring annually and what they cost the company. The men were then urged to be more careful and to caution the public wherever and whenever a person did a dangerous act. At monthly meetings the men were informed of the progress being made, and at all times the service inspectors and the superintendent of transportation gave much attention to the question of safe operation. In addition the spirit of contest was created by posting the monthly accident records made by the various lines.

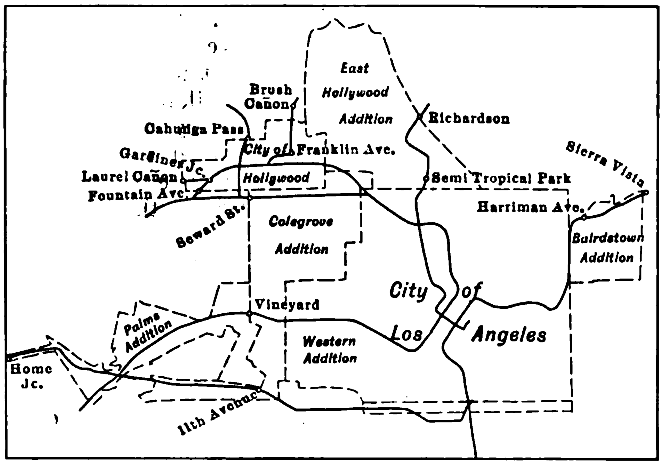
The results for the past five years of this plan of urging safer operation among the trainmen are as follows: 1269 accidents in 1911; 921 in 1912; 718 in 1913; 565 in 1914, and 430 in 1915. Moreover, the results for the first two months during 1916 indicate that the total number of accidents for this year will be less than those for last year.

Los Angeles Rate Case

Pacific Electric Railway Protests Against Extension of Five-Cent Limits

ON May 16 the Pacific Electric Railway of Los Angeles will start to put in its defense to the California State Railroad Commission against the contentions of the city for the extension of 5-cent fares to the city limits of annexed districts in Los Angeles. The principle underlying this group of rate cases, which may lead to still further action before the commission, is that the Pacific Electric is not making an adequate return on its investment.

The lines of which the Pacific Electric system is a consolidation were started by individual companies, and their fares were established by different men on different bases. This resulted in inequalities and complaints from residents of communities who thought they were being discriminated against. The present four cases, combined into one for hearing, were all brought by the city of Los Angeles to compel the company to extend 5-cent fares to the remote boundaries of districts annexed to the city since the fares were originally established. The lines involved are as follows:



MAP OF LOS ANGELES, SHOWING FARE ZONES UNDER DEBATE

Bairdstown line, present 5-cent fare limit, Harriman Avenue, 5.76 miles; limit asked, Sierra Vista, 6.75 miles.

Edendale line, present 5-cent limit, Semi-Tropical Park, 4.23 miles; limit asked, Richardson, 6.40 miles.

Hollywood case: Boulevard line, present 5-cent fare limit, Gardiner Junction, 8.7 miles; limits asked, Fountain Avenue, 9.05 miles, and Laurel Canyon, 9.20 miles; Brush Canyon line, present 5-cent fare limit Franklin Avenue, 7.47 miles; limit asked, Brush Canyon 8.70 miles; Colegrove Cahuenga Pass line, present 5-cent limit, Seward Avenue, 7.35 miles; limit asked, Cahuenga Pass, 9.16 miles.

In the case of Palms the present fares vary from 15 to 25 cents single trip to various parts of the extended district involved. There are offered, however, lower round-trip and very low commutation rates for family and individual tickets. In the Edendale and Palms cases the extended fare limits requested are beyond the present terminus of the local cars.

These figures show that the distances to Gardiner Junction and to Seward Street to which 5-cent fares are at present allowed are greater than other 5-cent fare limits. These distances came through fare extensions not voluntarily made by the company. Under an old charter provision in California a fare greater than 5 cents could not be charged for one continuous trip within a city of 100,000 population or over. When Hollywood was annexed to Los Angeles, suits were filed for charging more than a 5-cent fare, decision adverse to the company was rendered in the courts and $250 damages awarded in each case. The company then reduced the fare to 5 cents. Later another district, then outside the city and served for a 10-cent fare, was annexed and similar suits were filed, but the same justice who presided in the former case ruled that the charter provision had been nullified by the later enactment of the State public utilities act. The Pacific Electric possibly could then have restored the former 10-cent fare to Hollywood, but conditions with the company were looking favorable, and in view of the protests which a change would have made the lower rate was allowed to stand. Since then, this has been taken as a basis of comparison to provoke complaints of discrimination in other rates, and if such comparison is made before the commission it will have a tendency to throw the whole system before the commission for a comprehensive rate adjustment and claim for increased fares sufficient to allow a fair return on the investment.

A pertinent point in connection with these matters is that the Pacific Electric Railway Company was incorporated as a railroad and does a general railroad business, passenger and freight. The only difference is that its lines are operated by electricity. While the principal business of the company is suburban business, it also renders a local service over the city portions of its suburban lines. As practically all its traffic is for long hauls the full distance from a suburban point into or out of Los Angeles, it cannot, like the ordinary street railway system, afford to carry the maximum-haul passenger a long distance for the reason that it has not very large numbers of extremely short-haul downtown passengers to balance the revenue expended in hauling passengers to outer terminals.

The transfer matter is involved in this case, as within the 5-cent district of Los Angeles the lines involved issue transfers to other Pacific Electric lines when requested. From the points where the fare is now 10 cents, transfers are not issued. The complaint asks for the transfer privilege along with the 5-cent fare.

Should the matter of discrimination be urged vigorously by the complainants on the basis of comparison of some of the present extended fare limits, it is very much a possibility that the whole Pacific Electric fare situation will go before the Railroad Commission for adjustment, possibly on a mileage basis.

Safety Work in Brooklyn

During the month ended March 31, 1916, which comprised twenty-three school days, Mrs. Katherine D. Larrabee, lecturer for the Bureau of Public Safety, Brooklyn (N. Y.) Rapid Transit System, delivered forty-seven lectures on public safety, six with motion pictures, including the "Cost of Carelessness," and held two conference talks with members of safety patrols and careful clubs. Two night lectures were delivered, one to the children of the Industrial School Association and one under the auspices of the board of education. Lectures were attended by 21,590 children and 883 adults. One new safety patrol and three new careful clubs, consisting respectively of twenty boys and thirty-eight girls, were formed. Thirty-eight patrols and twenty-nine clubs, formed since October, 1915, now have an active membership respectively of 936 boys and 658 girls. One new bulletin board was installed, making a total of 353 boards for which weekly safety material was supplied. Seventy-seven schools, public and parochial, participating in the third annual safety prize essay competition, have submitted essays.

ASSOCIATION NEWS

Capital Traction Company Section Discusses Paper Making—At Hampton Section Meeting H. H. Norris Discussed "How the Employee Can Help Solve Railway Problems"—Meeting in New Haven

CAPITAL TRACTION SECTION AT WASHINGTON, D. C.

At the meeting of the Capital Traction Company Section No. 8, held in its new quarters in the General Office Building on April 13, the members were initiated into the mysteries of paper making. Through the courtesy of the District of Columbia Paper Manufacturing Company a number of slides and motion pictures were displayed, showing the different steps in the manufacture of paper from the time the stock enters the mill in the shape of wood pulp and old rags until the finished product is turned over to the shipping department. W. W. Langtry of the paper company explained, in a most interesting manner, the process of manufacture, and had on hand a number of exhibits of the stock in the various stages.

Vocal and instrumental numbers for the further entertainment of the section were given by Messrs. Proctor, Wilkinson and Claude. The meeting drew the usual large attendance.

HAMPTON SECTION

The second regular meeting of company section No. 10 was held in Newport News, Va., on April 28, with an attendance of fifty. The speaker was H. H. Norris, associate editor ELECTRIC RAILWAY JOURNAL, his topic being "How the Employee Can Help Solve Railway Problems." The problems were outlined and illustrated, the speaker first mentioning some of the reasons for the difficulties encountered in conducting the transportation business. These were that the public does not understand the transportation business, that public and employees are apt to believe that large capital necessarily produces large profits, and that employees do not fully realize the nature of the problems which the management has to solve. The difficulties involved in the business require administrative and technical talent of a high order. Mr. Norris divided railway problems into two classes, external and internal. Among external problems were: Getting the public to understand what good service is and what it owes to the railways, getting capital for extensions and securing franchises for the use of the streets under reasonable terms. Among internal problems the increasing difficulty of giving good service with the available resources was stated to be the real problem. To illustrate what this means, the speaker contrasted street railway service with what it was twenty-five years ago. During this period the nickel has lost purchasing power in most of the necessities of life, but has gained it as regards transportation. The better transportation which the nickel can now purchase involves heavier cars with more power, better lighting and heating, better sanitation, etc.

In meeting external and internal problems it is necessary that the employee should have first an intelligent grasp of the facts. Then as he comes in contact with the public he is prepared to explain circumstances which seem to require explanation. In the second place, by courteous treatment of the public he can cultivate a reasonable attitude toward the corporation. Finally, by co-operation with the management he can save money for his employer by careful use of materials, energy and time, and by suggesting improvements in details of construction and operation.

After the address, which was designed to stimulate discussion, the members of the section discussed for an hour the points raised and applied them to local conditions. The secretary read a letter from President Charles L. Henry, tentatively accepting an invitation to address the section and suggesting the date May 12. He also reported for the program committee that a list of topics had been compiled for circulation among the members, who are to check off their choices. The popular topics will be assigned to experts for consideration and report. At an early meeting R. M. Booker, secretary Newport News & Hampton Railway, Gas & Electric Company, will explain the history of the local company and furnish the members of the section with data regarding its operation.

CONNECTICUT SECTION

A meeting of the section of the Connecticut Company was held in New Haven on May 2. A talk was given by C. W. Stocks of the New York office of the association, on the development of generating systems for electric railways.

Life-Testing of Incandescent Lamps at Bureau of Standards

The lamps purchased by the federal government, amounting to about 1,250,000 annually, are inspected and tested by the Bureau of Standards, Department of Commerce. The specifications under which these lamps are tested are published by the bureau and are recognized as standard by the manufacturers as well as by the government. They are used also by many other purchasers of lamps. The lamps are first inspected for mechanical and physical defects, this being done at the factory by bureau inspectors. Representative samples are selected and sent to the bureau, where they are burned on life-test at a specified efficiency at which they must give a certain number of hours life, depending upon the kind of lamp. About 5000 lamps are thus burned on test each year. For this test great care must be taken in the measurement of the lamps and in the adjustment and regulation of the life-test voltage.

Scientific Paper No. 265, just issued by the bureau, gives a complete description of the special apparatus and of the methods used in these inspections and tests. Copies of the publication may be obtained free upon application to the Bureau of Standards, Washington, D. C.

The New York *Journal of Commerce* has prepared a tabulation showing that electric railways in the United States will have to take care of $215,353,600 of maturing securities during 1916, 1917 and 1918. This total is divided $56,175,000 for bonds and $159,178,600 for notes. The maturities for each of these three years are as follows: 1916—bonds, $20,616,000; notes, $59,959,100; 1917—bonds, $8,872,000; notes, $27,091,000; 1918—bonds, $26,687,000; notes, $72,128,500. In view of the large amount of notes maturing in 1916, the amount of maturities in the last two years may be appreciably increased on account of further short-term financing during 1916.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Special Track Layouts Made Interchangeable

BY BURR S. WATTERS
Assistant Engineer of Way Columbus Railway, Power & Light Company, Columbus, Ohio

Special track layouts have been standardized by the Columbus Railway, Power & Light Company, Columbus, Ohio, so that pieces may be interchanged. At the same time, the work of designing a layout has been greatly simplified. In 1909 the writer, under the direction of E. O. Ackerman, engineer of way, worked out a system of proposed standard track layouts. The widths of the various streets at which the company might be required at some time to lay grand unions were measured, and with these data satisfactory layouts for the various locations were designed.

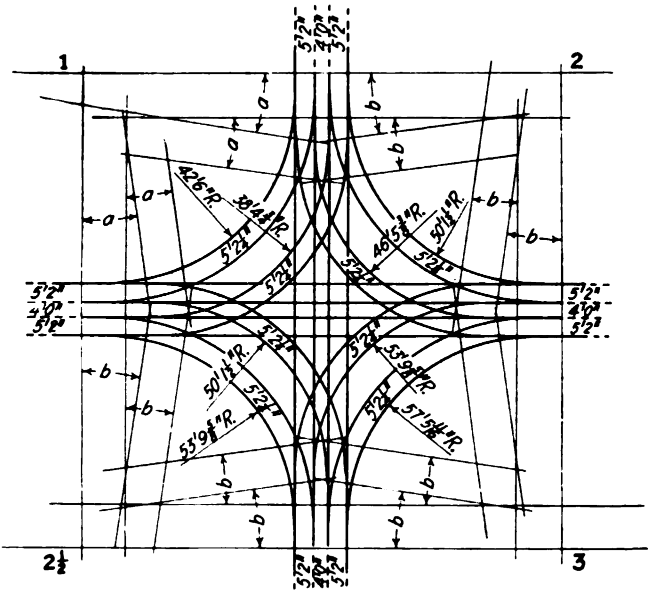
On account of the differences in street widths it was found that at least four layouts would be required. These four layouts were made by using the William Wharton, Jr., & Company's standard tongue-switch transitions, with a switch of 100-ft. inside radius. They were so designed that by using a 12-ft. switch piece, the toe of the switch piece for the inside curve came at the heel of the switch for the outside curve. These layouts were used until, in 1911, the American Electric Railway Engineering Association adopted, as recommended practice, fixed lengths and radii for switch pieces. In order to conform to the association standard we redrafted our designs for grand unions and used switches of standard recommended length but with a 97-ft. 7½-in. radius. These were so designed that the tangent point of the inside curve was 12 ft. from the tangent point of the outside curve. This fixed the toe of the switch for the inside curve at the heel of the switch for the outside curve, which conformed to our original proposed standards.

Engineering data for these are shown in the four quadrants of the accompanying layout. The grand unions were all calculated by assuming that the intersection angle was 90 deg., but of course when the angle was different some modification was required. When changes are necessary it is our practice to hold to the standard designs through the frog arms as far as possible, and to meet any condition by compounding the remainder of the curve.

These four standard plans include six layouts for a single-track curve, four layouts for a double-track curve, six layouts for a single-track left-hand or right-hand turnout, four layouts for a double-track left-hand or right-hand turnout, four layouts for a double-track Y, four layouts for a double-track through Y, and many others. We have found that these layouts will fit practically all of the conditions that have been encountered in Columbus. We have made the external arms of all frogs 4 ft., and the lengths of the internal arms of all frogs are fixed, as far as possible, at the length they would have in a grand union of the same design.

Owing to the fact that the track gage in Columbus is 5 ft. 2 in. and the width of the devil strip is 4 ft., we have not been able to adopt, to any great extent, the recommended frogs of the A. E. R. E. A. In the design of the layouts, car clearance has not been considered because there were a number of places on the system where it was practically impossible to obtain sufficient clearance. Moreover, car designs are constantly changing so that the curve that gives car clearance to-day will not take care of the car of to-morrow.

It will be noted that the radius of the inside curve indicated as layout No. 2 is the same as that of the outside curve in layout No. 2½. The radius of the inside curve in layout No. 2½ is also the same as the radius of the outside curve in layout No. 3. This, of course, materially cuts down the number of standard frogs. All switches and mates in these layouts are either right-hand or left-hand, of 100-ft. radius and 12 ft. long. All crossovers are made of a standard design by using switch pieces of 97-ft. 7½-in. radius and a frog angle of 12 deg. 45 min. Equilateral turnouts have been separated into two classes, one for a running switch, which has switch pieces of 347-ft. 7½-in. radius and a frog angle of 4 deg. 46 min., and one for a turnout at the end of the line, which has switch pieces of 197-ft. 7½-in. radius and a frog angle of 5 deg. 42 min. and 30 sec.



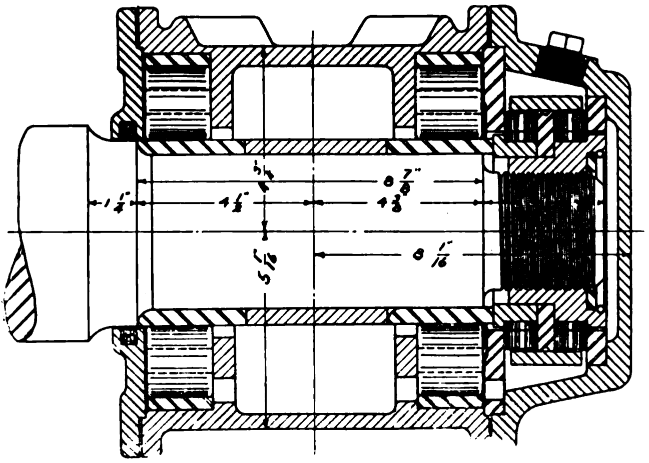
COLUMBUS RAILWAY STANDARD GRAND UNION

As to the value of these standards, we cannot say that we have been able to obtain a better price from the special-work manufacturers, but we do not see why we should not receive a reduction for pattern charges. We have, however, been able to obtain much better deliveries. For instance, we were able to obtain three complete double-track through Y's, with solid manganese switch pieces, in four weeks. This delivery was made possible owing, in part, to the fact that the general features of this layout were very much the same as a double-track Y, which we had previously ordered from the same manufacturer. Furthermore, these standards greatly facilitate the laying out of special work for a new location. Instead of spending much time in trying to obtain the best possible design, the problem simplifies itself into determining which of the standard designs best fits the conditions imposed. These standards are also valuable because most of the pieces are interchangeable. This permits a certain number of pieces to be carried in stock, thus eliminating delays that occasionally occur in emergencies. After all these advantages are taken into consideration and our experience with these standard layouts during the past five years, we feel very well repaid for our work in preparing standards, and we know that we are in a much better position for making original layouts or renewals than we were before their adoption.

Results Obtained with Roller Bearings on Interurban Cars

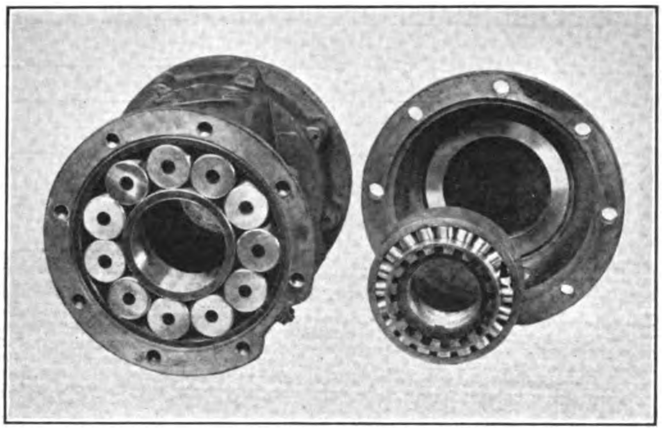
BY W. B. VOTH AND A. C. METCALFE
Respectively Chief Engineer and Master Mechanic Empire United Railways, Inc., Syracuse, N. Y.

Never in the history of the electric railway industry has the necessity for economy been emphasized as it has been within the past year or two, when gross receipts have been falling off at an alarming rate and material and labor costs have continually increased. That the need for economy is realized is indicated by the numerous and heroic efforts which are being made to introduce economies in directions where it has heretofore been thought impossible to improve. Evidence of this is shown by the increasing use of very light equipment, and by the very rapid adoption of every device known to decrease operating expenses. As a matter of fact, there is not a single item tending to produce lower cost which will not get instant and respectful hearing by any electric railway manager, a situation which did not prevail a year or two ago. The revival of general business and the easing of money credits have made it possible for electric railways to finance improvements which could not have been thought of until very recently.



CROSS-SECTION OF ROLLER BEARING

There have now been commercially developed several makes of roller and ball bearings, and it is most likely that these devices will do more to introduce economy in the costs of electric railway operation than almost any other device. There are many operating officials who have been surprised to find that the elimination of journal friction has not only saved power, but has resulted in increased speed and greater safety, and has almost wiped out journal bearing and maintenance charges. These anti-friction bearings have been improved greatly since they were first brought out five or six years ago, and our experience has convinced us that if they are as reliable and economical as found so far, it will be profitable to continue their use.



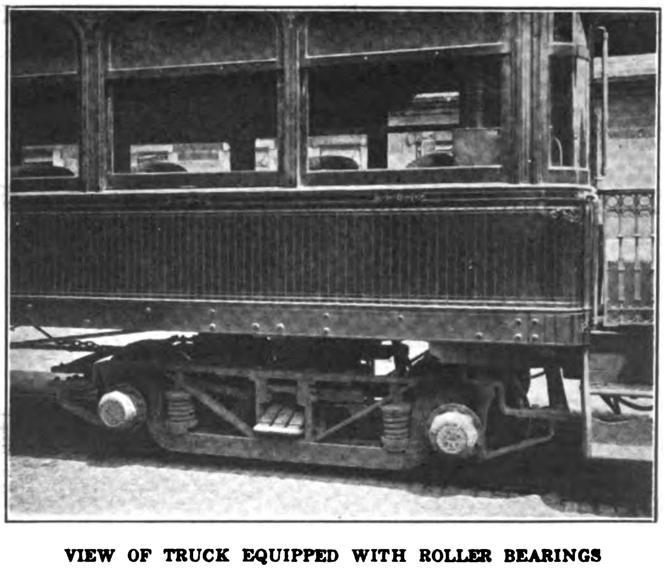
PARTS OF ROLLER BEARING

This company has recently been conducting tests of roller bearings, made by the Railway Roller Bearing Company of Syracuse, N. Y., on motor and trail cars. The results are given in the following paragraphs:

The motor car tested was of the double-truck type, weighing about 70,000 lb. It was equipped with four motors, the length over bumpers was 49 ft. 5½ in., and the diameter of axle was 5½ in. The trailers were 49 ft. over couplers, were equipped with Peckham Type-36-B trucks, and also had axles 5½ in. in diameter.

The two trailers were parlor cars, known as the "Syracuse" and "Newark." The "Syracuse" is used in limited service seven days of the week between Syracuse and Rochester, and makes a little more than 100,000 miles per year. The total distance between terminals is 86.29 miles and the scheduled time is two hours and forty minutes. The schedule allows approximately fifteen stops, and necessitates a free running speed of between 62 and 65 m.p.h. The bearings are oiled about every 40,000 car-miles with car oil, one quart of oil being used for each bearing. With oil at 20 cents per gallon and labor at 20 cents per hour, the cost of labor and oil is 1½ cents per 1000 car-miles.

The "Syracuse" has caused no trouble since it was put in operation, but has had several pull-ins on account of snow or weather conditions. When this car was operated with the plain journal bearings it was not possible to make the scheduled time. However, since the roller bearings have been installed the car has been able to make the running time. The "Newark" has had one pull-in on account of a broken drawhead, but at no time has this or the other car been pulled in on account of bearing trouble.



VIEW OF TRUCK EQUIPPED WITH ROLLER BEARINGS

TABLE I.—ENERGY AND LUBRICATION COSTS—PLAIN AND ROLLER BEARINGS, CAR WEIGHT, 70,000 LB.

	Plain Bearings	Roller Bearings
Annual mileage	103,446	103,446
Energy consumption, kilowatt-hours	372,405	327,717
Energy cost, at 1 cent per kilowatt-hour	$3,724.05	$3,277.17
Cost of oil	10.35	1.04
Cost of waste	4.14	....
Cost of rebabbitting, labor and material	10.36	....
Cost of labor for oiling	8.27	0.52
Cost of labor replacing oil every 1000 miles	3.11	....
Total annual cost	$3,760.28	$3,278.73

Difference in annual saving, $481.45 or 12.8 per cent.

TABLE II.—TOTAL ANNUAL EXPENSE, PLAIN AND ROLLER BEARINGS

	Plain Bearings	Roller Bearings
Total cost of bearing equipment	$96.00	$434.00
Interest at 5 per cent	4.80	21.70
Depreciation based on life of ten years	0.96	43.40
Cost of lubrication	10.25	0.96
Maintenance, including renewals	25.88	....
Maintenance	....	0.32
Total annual cost	$41.99	$66.66

In testing the operation of the above cars, the readings of energy consumed were taken on the car with a watt-hour meter read weekly over a long period. The car was run over the same road, and with the same schedule as another car of the same weight equipped with plain bearings. Starting tests were also made with a dynamometer connected between two cars of similar type and weight. The results of the tests are given in Tables I and II, which also contain the results reduced to total annual expense for operation, including all factors necessary for comparison between roller and plain bearings.

The average results for all service and weather conditions showed that the car equipped with roller bearings consumed 11.8 per cent less power than the one equipped with plain bearings. The starting test showed that the car equipped with plain bearings required 612.3 lb. to start it, while the one equipped with roller bearings required 408.1 lb. That is, the lower starting effort reduced the demand from friction approximately 33 1/3 per cent.

Since our power as paid for is measured at the a.c. high-tension side of the substation, we really should calculate the saving on the a.c. side. Our tests, however, were made with the meter on the car. To allow for the losses between the a.c. side of the substation and car we estimated the cost at the car to be 1 cent per kilowatt-hour corresponding to 7 mills on the a.c. side.

From the tables it is evident that the total annual expense of roller bearing equipment exceeds that for plain bearings by $66.66 — $41.99, or $24.67. As the annual saving in energy with roller bearings is $446.88, the total net annual saving is $422.21. Capitalizing the saving on a 5-per cent basis shows that it is equivalent to a capital charge of $8,444.20. From this it can be seen that the roller bearings, in this case, will pay for themselves in about one and a half years with the mileage as operated. If the general adoption of roller bearings is contemplated, it will require a somewhat greater investment for extra axles, if such are kept for making axle changes, because equipments with roller bearings are not interchangeable with plain axles. This additional investment, however, can be kept very small.

Summing up the situation in regard to roller bearings, some of the advantages of their use may be enumerated as follows: Decrease of power, especially at peaks and during acceleration; more coasting; low lubrication and maintenance costs; reduced axle fractures; reduced pull-ins; fewer cars needed, reducing the investment, and possible adoption of smaller motors and, therefore, less waste.

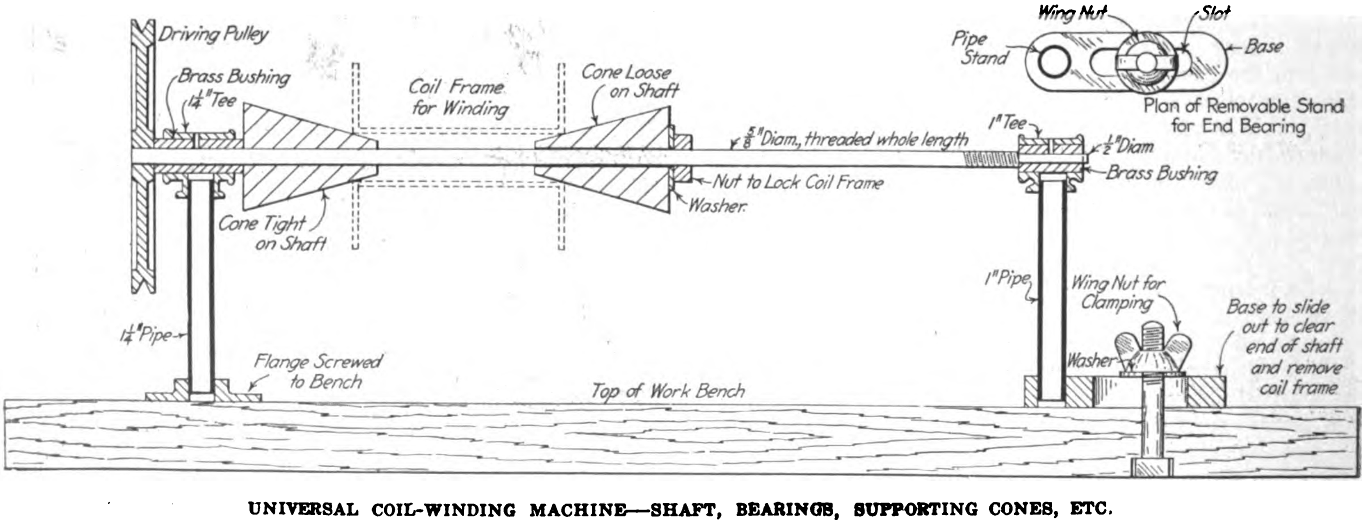
The reduced energy demand means, in addition, less wear on trolley wire and trolley wheels. With bearings of the anti-friction type, the axles are kept in the exact alignment, while with plain bearings there is considerable lost motion due to journal brass movement in the journal boxes, and to the ends of the journal being pushed to one side of the journal brass. With the anti-friction bearings there is also a reduction in brakeshoe and wheel wear. A car equipped with these bearings will coast further than one with plain bearings and will accelerate at a higher rate with the same current.

In a recent paper there was a statement that a certain automobile touring car was driven 260,000 miles, and that after this mileage had been made the roller bearings with which it was equipped were still in good condition. It would seem, therefore, that an electric car should have at least three or four times the life of an automobile, and since the average life of an automobile to-day is estimated at three years, roller bearings on an interurban car should last until the end of the useful life of the car.

Universal Coil Winding Machine

BY G. R. W. ROBERTS
General Foreman Electric Car Equipment Southern Pacific Company, Beaverton, Ore.

Many electric roads use a great number of straight wound coils in their multiple unit equipment for relays and other apparatus. As these are at all times liable to be burned out, means must be provided to rewind them quickly and cheaply. A supply of the various sizes of wire with which they are wound can always

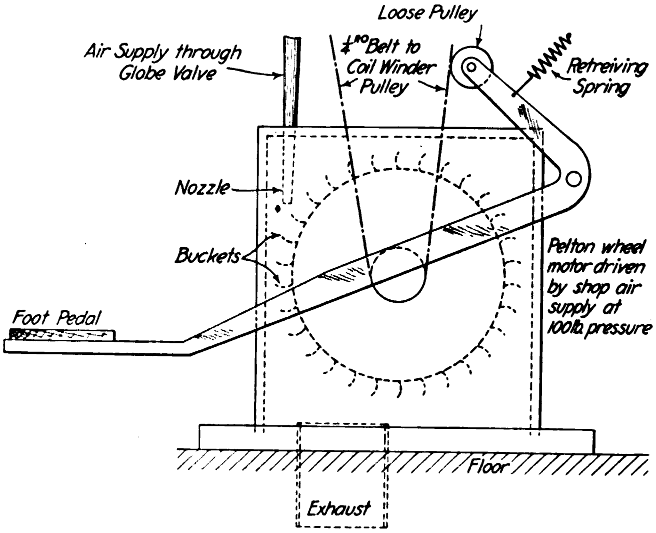


UNIVERSAL COIL-WINDING MACHINE—SHAFT, BEARINGS, SUPPORTING CONES, ETC.

be kept in stock, and whenever one burns out it is a matter of only a few hours to make repairs with a machine like the one illustrated herewith. The construction is very simple and the device can be made from fittings and other material to be found around any car shops.

The shaft of the machine is ⅝ in. in diameter by 24 in. long. It is threaded for two-thirds of its length and turned down at one end to ½-in. in diameter for the end bearing. A 1¼-in. T can be used for the main bearing by boring it out and bushing it with brass. On the driving end of the shaft is mounted a grooved pulley for a ¼-in. round belt. Two cones, with about 30 per cent taper, the big ends being about 2 in. in diameter, are provided to hold the coil frames or spools. The cone next the driving wheel is solid on the shaft, while the other slides easily over its threaded portion. By tightening the nut the coil spool is held secured for winding. The end bearing is made so that the stand for it can be slipped off the end of the shaft to clear the spools when they are to be put on or removed.

With this machine the smallest relay coil can be wound and it is adaptable for any of the straight-wound coils used for contactors, reversers or circuit breakers. It will also take the long porcelain tubes used on headlight resistances. For driving it, a Pelton water wheel about 9 in. in diameter using air instead of water from the shop air system, furnishes a cheap and efficient motor, and it is easily constructed. A hardwood box, large enough to contain the wheel and having two bearings mounted at each side, a regular nozzle and an exhaust pipe, is all that is required. The air is controlled by a globe valve handy for the operator. For stopping and starting the winder an idler pulley mounted on a bracket and having a foot pedal retrieved by a spring bears on the belt and makes the machine easy of control. We have found that this machine has saved us many times over its cost in reducing the time required to rewind our exceptionally great number of coils, owing to our double operation on 1500 and 600 volts.


Loose Pulley
Air Supply through Globe Valve
¼" Belt to Coil Winder Pulley
Retreiving Spring
Nozzle
Buckets
Pelton wheel motor driven by shop air supply at 100lb. pressure
Foot Pedal
Floor
Exhaust

UNIVERAL COIL-WINDING MACHINE—AIR MOTOR AND AUXILIARIES

According to the *Tramway and Railway World*, the Moscow (Russia) Council will shortly consider a proposal to add to Moscow Tramway's rolling stock and to make an extension of the systems. New workshops are to be built, and the total cost is expected to exceed $515,000. The town executive committee proposes that the Council should buy American cars on the instalment plan, to the extent of 100 motor cars and 150 trailers.

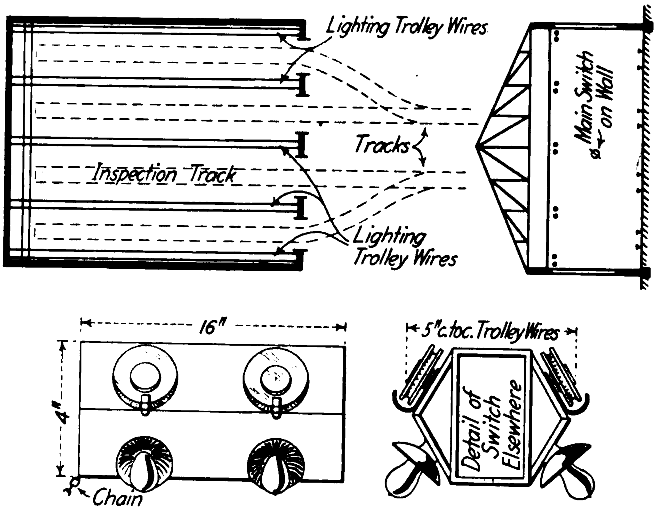
A Lamp Trolley for the Inspection Shop

BY A. OTTO REINKE

East St. Louis, Ill.

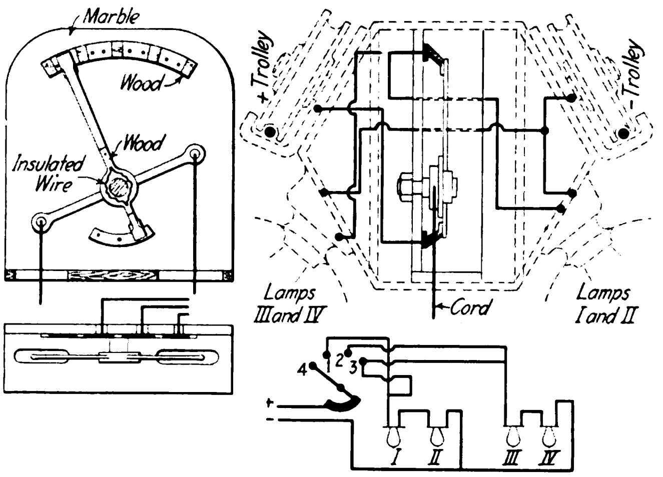
In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 26, 1916, appeared an article on "A Trolley Lighting Scheme for the Paint Shop," which brought to the mind of the writer a similar installation made several years ago in an inspection shop of a small interurban road in southern France.

The inspection shop was used for repairing large interurban cars of the 600-volt d.c. type, and contained four tracks, having a total capacity of sixteen cars. Between adjacent tracks and along the side walls were spanned two No. 4 steel trolley wires, used for the positive and negative leads of the lamp circuit, a total of five pairs of wires. In order to get a good lighting arrangement of the car platform, an additional span of wires was strung parallel to the rear wall, while in the front of the building two ordinary lamps were mounted on each door post. A switch on the rear wall controlled all the lights.


Lighting Trolley Wires
Main Switch on Wall
Tracks
Inspection Track
Lighting Trolley Wires
16"
5" c. to c. Trolley Wires
4"
Chain
Detail of Switch Elsewhere

PLAN AND ELEVATION OF INSPECTION SHOP AND LAMP TROLLEY

The lamp trolley, as shown, was hexagonal in form and constructed of ½-in. boards. The wheels which engaged the trolley wires were attached on the upper sides, and four lamps, two on each side, were mounted below.


Marble
Wood
Wood
Insulated Wire
+Trolley
-Trolley
Lamps III and IV
Cord
Lamps I and II
4 1 2 3
+
-
I II III IV

SERIAL SWITCH, DETAIL AND DIAGRAM OF LAMP TROLLEY

Inside of the lamp trolley and operated by two cords from the ground was a serial switch with four contacts which functioned as follows: Steps 1, 2 and 3 closed circuits respectively through the two lamps on the left side, two lamps on the right side and all four lamps on both sides, while the step 4 cut out all of the lamps. The voltage on the lighting circuits was 220, and the lamps were of the 60-watt, 110-volt type arranged as above. By means of the serial switch either side of the track or shops could be lighted if necessary. The construction of all the lamp trolleys were the same, with the exception of the two along the wall, which were equipped with lamps only on the track side. An insulated chain was attached to the lamp trolley so that the car could be pulled along and used wherever needed.

Emergency Snow-Fighting Equipment in Western Canada

BY F. D. ARCHIBALD

Superintendent Saskatoon Municipal Railway, Saskatchewan, Canada

The accompanying illustration shows the snowplow hastily devised by the Saskatoon Municipal Railway to clear its tracks after a recent snowstorm.

During the month of March, western Canada was visited by snowstorms of exceptional severity with continuous high winds. During the week ending March 25 the high wind, which did not diminish for four days, kept the snow sweeper of the railway working day and night, and the snowdrifts on the suburban line 5 miles across the prairie to Sutherland formed so quickly that the sweeper could not contend with them. As an experiment a snowplow was hastily constructed in the railway repair shop, to be attached to the front of a double-truck car, and this was finished by three men in eighteen hours.

EMERGENCY DETACHABLE SNOWPLOW ON SASKATOON MUNICIPAL RAILWAY

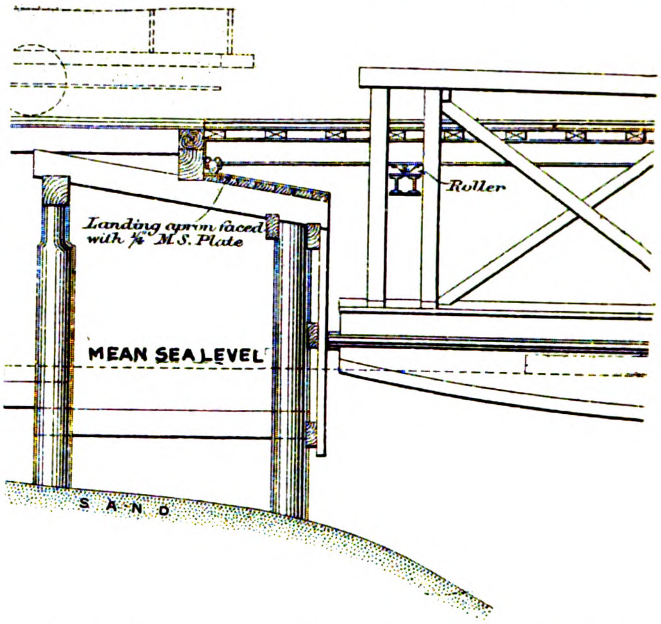
Owing to a dip in a subway the plow had to be taken out on a handcar and attached to the double-track car on the road. It plowed through about 1 mile of snowdrifts ranging from 3 ft. to 12 ft. high between the hours of 9 p. m. and 6 a. m. the next morning, at which time service was resumed.

The Genoa (Italy) City Council has approved of a plan for the electricfication of the Genoa-Ovada Railway, at present operated by steam. The electrification is made necessary by congestion of traffic from Genoa.

Car Ferry in New South Wales

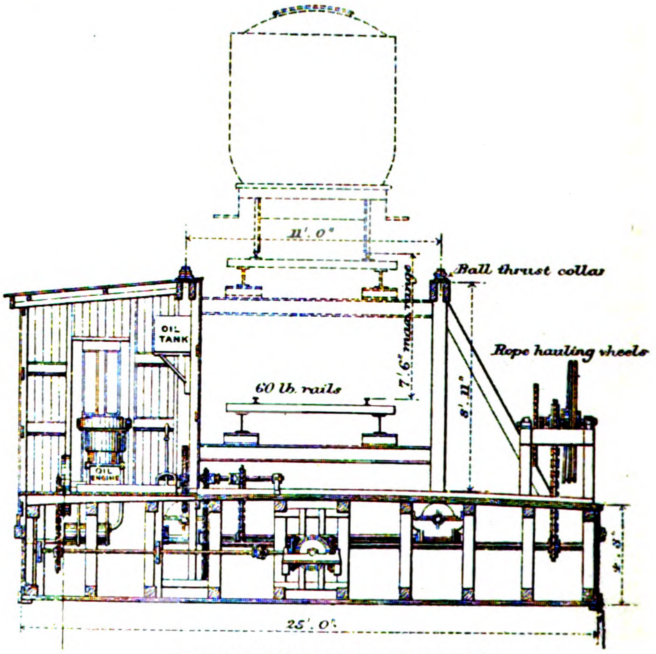
A ferryboat, built especially to carry trolley cars, is now in service in the harbor of Sydney, New South Wales. The following short account and illustrations are taken from a paper presented before the Institution of Civil Engineers, London, by John Job Crew Bradfield, M.E., M.I.C.E.

The boat, which is capable of carrying two tramcars or two loaded trucks, is 75 ft. long over perpendiculars, or 86 ft. long over ends of movable platforms. The beam is 25 ft., the depth is 4 ft. 3 in., and the draft, light, is 1 ft. 8½ in., and with 42 tons is about 2 ft. 6 in. The movable platform has a vertical range of 7 ft. 6 in., which is sufficient to provide for tidal variations.



LONGITUDINAL SECTION OF WHARF AND FRONT OF BOAT

The width of the water crossed is 800 ft. A 20-hp. oil engine operates the boat, which is hauled across this distance at a rate of 3 m.p.h. by a 2½-in. galvanized crucible steel wire rope. The oil engine drives a countershaft 2½ in. in diameter through a Morse chain re-



CROSS-SECTION OF FERRYBOAT

duction gearing, and by use of similar gears drives a rope wheel 5 ft. in diameter.

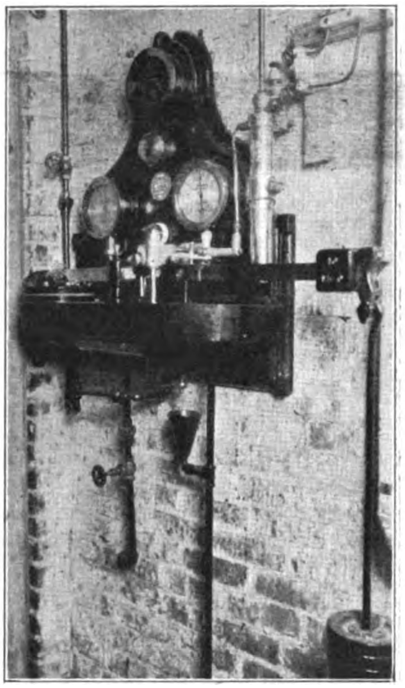
The platform which carries the tracks is adjustable in height by twelve screws, six on each side. It is constructed of steel rolled joists. The ties and rails are supported by these joists, which are spaced every 6 ft. The end of the platform projects beyond the end of the boat, so as to rest on the wharf when rolling stock is being run on or off, and at a distance of 22 ft. from each end the platform is hinged. The countershaft which is 2½ in. in diameter, through a Hercules chain gear drives a cross-shaft 2 in. in diameter with worm gearing, placed amidship. The worm gearing drives two longitudinal shafts 2½ in. in diameter, one under each set of lifting screws. These shafts drive the screws by beveled gearing. The shaft and lifting screws each have two jaw clutches, which can be operated independently by means of which the end portion of the shaft operating the end screws can be disengaged from the central portions of the shafts.

When the ferryboat is nearing the wharf, the hinged end of the platform, which is provided with end rollers, lands upon the apron of the wharf. The alignment of the platform rails and wharf rails is made automatically. An automatic locking lever is also provided, which drops into place as soon as the rail ends meet, locking the platform to the wharf.

Damper Regulator Test

Automatic regulation of the damper and stoker feed in the steam generating plant of the Chicago, Lake Shore & South Bend Railway Company, Michigan City, Ind., has reduced the quantity of coal consumed between 8 and 10 per cent for the past three years. A McDonough automatic stoker and damper regulator performs this service, and, at the same time, makes it possible to maintain a more uniform steam pressure since it responds to sudden fluctuations in load more readily than has been found possible with hand regulation. The mechanical features of this regulator were described on page 791 of the ELECTRIC RAILWAY JOURNAL for April 22. On a basis of 8 per cent saving at this plant, where the coal consumption averages 150 tons daily, and the average price of coal is $1.70 per ton, the total annual saving is about $7,500.

Recently one of these automatic damper regulators has been installed in the Hatfield generating station of the Evansville Railways Company, Evansville, Ind. The regulator installation in this plant is shown in one of the accompanying illustrations. To show graphically the effect of the regulator in and out of service in a small plant equipped with hand-fired boilers and natural draft, two charts are shown in the accompanying illustration. One of these is a twenty-four-hour record of steam pressure with the damper in service, and the other is a record for a similar period with the damper disconnected. While the contrast is marked, it is not unusually so, because the hand firing has been exceptionally well done. In this installation the damper regulator automatically controls the main damper and when pressure falls below a predetermined limit an alarm bell signals the fireman that his fires require attention.



REGULATOR IN POSITION

The Paducah (Ky.) Traction Company and the Paducah Light & Power Company have inaugurated a joint safety-first campaign, which will be in charge of four committees that have been selected from among the employees of the company.

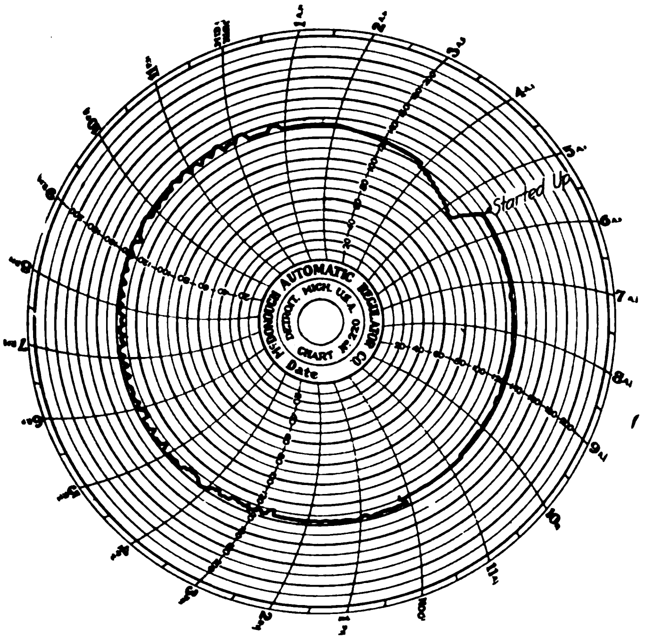


CHART OF STEAM PRESSURE WITH DAMPER REGULATOR IN SERVICE

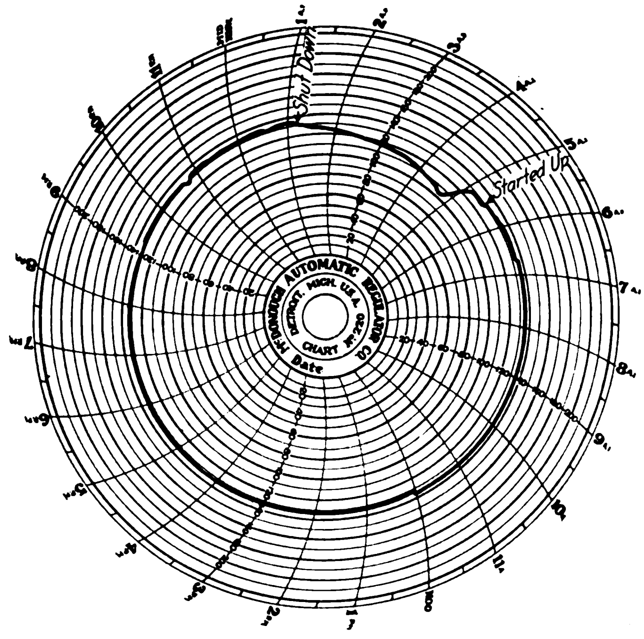


CHART OF STEAM PRESSURE WITH DAMPER REGULATOR OUT OF SERVICE

Electric Railway Legal Decisions

Charters, Ordinances, Franchises

INDIANA.—*Deed to Right-of-Way with Grantor's Covenant to Maintain Fence—Injury to Stock—Liability.*

The owner of land granted a right-of-way to defendant interurban company in 1901 with a covenant in the deed whereby the company was to fence the right-of-way and the grantor to maintain the fence. The grantor subsequently sold the land to plaintiff's lessor. The fence became out of repair, whereby plaintiff's cattle strayed on the track and were injured by a car. Held, that defendant was not liable for failure to maintain the fence, since there is no duty on interurban companies to maintain fences, except as imposed by Burns' Ann. St. 1914, Sec. 5707, which excepts existing contracts. (Union Traction Company of Indiana v. Thompson, 111 Northeastern Rep., 648.)

INDIANA.—*Passengers Who Lose Tickets Must Pay Fare.*

A rule of an interurban railroad company, that a ticket entitling a passenger to transportation shall be presented to the conductor on proper request, and if, through carelessness, inadvertence or casualty, the ticket has been lost, the legal fare may be exacted, is reasonable, and if the passenger does not produce and surrender a ticket or pay the fare, he may be ejected. (Union Traction Co. of Indiana v. Vestal, 110 Northeastern Rep., 211.)

IOWA.—*Definition of "Flooring" as Applied to Bridges.*

Under Code Supp, 1913, Sec. 1056A44, requiring that the owner of any street railway using any bridge within a city shall construct, reconstruct and repair the flooring of the bridge 3½ ft. each way from the center line of the space between the rails, a railway company was obligated, within the limits prescribed by the statute, to pay a special assessment levied against it by the city for the cost of reconstructing and repairing, not merely the planked surface on which its tracks were laid over a bridge, but also the stringers, joists and supporting timbers laid on a steel structure. The word "flooring" as used in the statute means more than "planked surface." (Cedar Rapids & Marion City Ry. v. City of Cedar Rapids, 155 Northwestern Rep., 842.)

LOUISIANA.—*Eminent Domain—Value of Property to Date from Filing of Expropriation Suit.*

Where a railway company has appropriated a tract of low vacant land and has improved it by filling and raising the level of the ground and by constructing valuable buildings upon it, and thereafter the railway company sues to expropriate the property, the value of the land is to be taken as of the date of filing the expropriation suit, without regard for the buildings constructed by the railway company. (New Orleans Railway & Light Co. v. Lavergne et al., 70 Southern Rep., 921.)

NEW JERSEY.—*Change in Location of Tracks by Freeholders.*

P. L. 1902, page 566, directing the boards of freeholders of two or more counties in which a plank road and bridge of a company whose charter had expired lay to acquire, maintain and operate such road and bridge at joint expense, does not authorize such boards to change, against the will of a street railroad operating over such a plank road, the location of its tracks. (Public Service Ry. et al. v. Board of Chosen Freeholders of Hudson and Essex counties, 96 Atlantic Rep., 98.)

PENNSYLVANIA.—*Payment for Partial Performance of Contract to Furnish Electric Power.*

A contract between an electric company and a traction company required the latter to pay a certain charge per year "based on ample power to operate not more than three double-truck cars at any one time," and it refused to pay, claiming that the power furnished was insufficient. The electric company then refused to furnish further power, until required to do so by injunction. The traction company then objected to being required to pay for the period while the power was not satisfactorily furnished, and the electric company claimed the full contract price. Held, that the court properly awarded defendant the contract price less an amount necessarily expended by plaintiff in procuring extra power. (Irwin-Herminie Traction Co. v. West Penn Traction Co., 96 Atlantic Rep., 719.)

TENNESSEE.—*Operation of Jitneys Can Be Enjoined by Railway Company.*

Where, under an act of the Legislature, municipalities are authorized to regulate by ordinance, subject to the statute, the operation of jitney buses as common carriers, and the City Council fails to regulate, a street railway company can have the operation of jitneys enjoined.

Relief by an injunction against a nuisance by which the highway is obstructed need not be sought by an abutting owner, but may be had by any individual who can show special damage to himself. (Memphis Street Railway v. Rapid Transit Co. et al., 179 Southwestern Rep., 636.)

UTAH.—*Spur Track to Carhouse—Construction—Public Use.*

Carhouses of a railroad company necessary for the convenient and economical handling of its cars and electric locomotive and the care and repair thereof are a necessary part of the company's property as a common carrier, and a way to its carhouses is a necessity as a common carrier. (Whitmeyer v. Salt Lake & Ogden Railway, 151 Pacific Rep., 48.)

VIRGINIA.—*Reservation in Deed—Lapse of Interest.*

The owner of a large farm sold the property, reserving the family burying ground, occupying about one-fourth of an acre, with the right of free ingress and egress. Subsequently the only bodies buried were removed with the consent of the grantees. Held, that the burying ground did not belong absolutely to the grantor, but he was merely entitled to use it for the specified purpose, and, having abandoned, could not grant the land with the right of ingress and egress to third persons. (Bradley v. Virginia Railway & Power Co., 87 Southeastern Rep., 721.)

WASHINGTON.—*Rates for Surplus Power Sold by Traction Company—Not Subject to Regulation.*

Under the public service commission law (Sess. Laws 1911, page 543), providing that the commission shall ascertain the probable earning capacity of each public service company under the rates now charged, the commission cannot compel a traction company to disclose its private contracts for the sale of its surplus power to private enterprises, since "rate" means a charge to the public for a service open to all and upon the same terms, and not a consideration of a private contract in which the public has no interest. (State ex rel. Public Service Commission of Washington v. Spokane & Inland Empire Railroad, 154 Pacific Rep., 1110.)

Liability for Negligence

ALABAMA.—*Wagons Suddenly Crossing Track.*

The presence of a wagon being driven along a street beside a street railway is not an indication that it is apt to turn onto the track so as to require the motorman to slacken speed in anticipation of such a move. (Hilton v. Birmingham Railway, Light & Power Co., 68 Southern Rep., 343.)

CALIFORNIA—*Company Liable for Injuries to Passenger Riding on Running Board.*

Where a passenger on the running board was injured in a collision between two cars in broad daylight, the railroad was guilty of negligence, since, if a passenger, on account of the crowded condition of a street car, takes up his position on a side step or platform, he voluntarily assumes the natural and obvious risks attending his position, but the company, in accepting his fare with knowledge of the increased danger of his position, is under greater obligation to use greater precautions in the operation of the car for his protection. (Kelly v. Santa Barbara Consolidated Ry., 153 Pacific Rep., 903.)

INDIANA.—*Master and Servant—Assumption of Risk.*

If a lineman is required by his contract to make an inspection of the poles, etc., he cannot recover for injuries resulting from his failure to inspect properly. (Walling v. Terre Haute, Indianapolis & Eastern Traction Co., 111 Northeastern Rep., 198.)

INDIANA.—*Failure to Protect Passenger from Assault and Robbery.*

Where a passenger was assaulted and robbed of his pocketbook, in the presence and view of the conductor, who failed to protect him when called upon, although young, athletic and capable of preventing the robbery, and who failed to call upon other passengers who would have helped if called upon, the company is liable. The contract of the carrier to transport a passenger includes the duty to transport a reasonable amount of personal effects and hand luggage, including a reasonable amount of money and such other articles of personal convenience, pleasure and comfort as are reasonably suited to his station in life and the journey he is taking. (Rep. v. Indianapolis, Columbus & Southern Traction Co., 111 Northeastern Rep., 614.)

INDIANA.—*Passengers Must Be Prevented from Leaving Car Prematurely.*

The stopping of a street car at or near a regular stopping place, after a signal to stop has been given by a passenger, is an invitation to such passenger to alight, and she has a right to alight the instant the car stops and to rely upon its not being started until a reasonable time for her to alight has been afforded. If, after a signal has been given, a stop near the regular stopping place is made for some other purpose than to allow the passenger to alight, the duty is then on the car crew to prevent passengers from then alighting. (Terre Haute, Indianapolis & Eastern Traction Co. v. York, 110 Northeastern Rep., 999.)

KANSAS.—*Injuries to Pedestrian Due to Change in Street Grade.*

Where a street railway company maintains its tracks in a city on the grade required by ordinance and is not required by ordinance to build crosswalks or keep them in repair and the city constructs a walk across the railway tracks and places the top of the walk 9 in. below the top of the rails, the company is not liable for injuries sustained by a pedestrian by being tripped by the rail while attempting to cross the railway track on the walk. (Nicholas v. Topeka Ry., 153 Pacific Rep., 506.)

KENTUCKY.—*Duty to Passenger a Continuing One Until He Reaches His Destination.*

Where a carrier sold a ticket to a city in which a street car strike was in progress, without warning that carriers would not be taken to the terminal station, and the passenger was put off at the outskirts of the city on a bad night, where there was no accommodation for her safety or comfort, and she had to make her way to the central part of the city, some 3 miles distant, she is not limited to a recovery for her loss of time and actual expense incurred in completing the journey to the terminal station and in returning to her home, but may also recover for any discomfort or sickness resulting directly from the failure of the company to transport her to the terminal station, though her action has its origin in contract, and it may not have been in the contemplation of either of the parties that what followed would happen. Louisville & Northern Railway & Lighting Co. v. Comley, 183 Southwestern Rep., 207.)

MARYLAND.—*Operation of Cars at High Speed by Crossings Not Negligence.*

It is not negligence for a street railroad to operate its cars at crossings at a high speed, though there are passengers waiting to board the car, there being no rule of law requiring the company to stop its cars at all points on signal to take on passengers. (Westerman v. United Railways & Electric Co., 96 Atlantic Rep., 355.)

MASSACHUSETTS.—*Failure to Sound Gong or Operation at Too High Speed Does Not Excuse Contributory Negligence.*

Operation at too high a speed, or the fact that the gong of a street car was not sounded nor any signal given of its approach is immaterial as to the contributory negligence of one who knew that it was approaching within plain sight. (Welsh v. Concord, Maynard & Hudson Street Ry., 111 Northeastern Rep., 693.)

MASSACHUSETTS.—*Injury to Motorman Who Failed to Follow Rules.*

A motorman who was injured by his car running into one ahead, which had stopped on a down-grade, because his brake and the reverse refused to work, was guilty of contributory negligence, as it was shown that he attempted the descent without first testing his brake and taking other precautions required by the rules, even though he knew it was doubtful whether the brake would work. (Cummings v. Boston Elevated Ry., 111 Northeastern Rep., 163.)

MASSACHUSETTS.—*Injury to Person on Track in Snowstorm.*

Where plaintiff's intestate in the daytime came from behind one car, holding an umbrella in front of her in the face of a snowstorm, and was struck by a slowly moving car on the other track, and in plain sight, she was, as a matter of law, guilty of contributory negligence. (Moran v. Boston Elevated Ry., 110 Northeastern Rep., 1037.)

MICHIGAN.—*Workmen's Compensation Act Must Be Legally Accepted by Employer.*

An employer can bring himself within the employers' liability and workmen's compensation act only by the means provided in the act, and the fact that the employee made statements or accepted compensation provided for will not bring the accident within the act. (Bernard v. Michigan United Traction Co., 154 Northwestern Rep., 565.)

MINNESOTA.—*Release, When Granted Under Mutual Mistake, May Be Set Aside.*

Plaintiff, while a passenger on one of defendant's cars, was injured in a collision. About nine days after the accident, plaintiff and defendant, believing the injuries to be slight, and relying on the statement of their physicians to that effect, settled the claim. Plaintiff received a cash payment from defendant and signed a release. About six months afterward plaintiff brought an action for damages for severe injuries received by her in the accident. Defendant set up the release, which plaintiff sought to avoid on the ground of mutual mistake of the parties and physicians in overlooking substantial injuries, of which the parties and the physicians had no knowledge at the time of the settlement. Held, that the law of the case as contained in the charge not having been challenged by the defendant by motion for a new trial, there is, under such charge, evidence sufficient to support the verdict for the plaintiff. (Smith v. Minneapolis Street Railway, 155 Northwestern Rep., 1046.)

MISSOURI.—*Liability for Injuries When Taking Up Passengers.*

Where a street car, before crossing an intersecting street to its regular stopping place on the far side of the crossing, had come to a very low speed, and the motorman saw persons attempting to board it, he was bound to see that they had an opportunity to do so in safety, as a person attempting to board the car was a potential passenger, and the relation of passenger and carrier was then created and existed between him and the company. (Gobel v. United Railways of St. Louis, 181 Southwestern Rep., 1051.)

NORTH CAROLINA.—*Piling Ties on Right-of-Way—Duties to Trespassers.*

It is not negligence for a corporation operating an electric railway to pile cross-ties 4 ft. high along its track in such a way that trespassers must walk dangerously near to the track, since the corporation has a right to pile cross-ties on its right-of-way. (Foard v. Tidewater Power Co., 86 Southeastern Rep., 804.)

TENNESSEE.—*Imputed Negligence—Automobile Accident—Husband and Wife.*

The negligence of the driver of an automobile, in consequence of which the machine ran into an obstruction negligently left at the roadside by defendant, was not imputable to his wife, who was riding with him, so as to bar her right to recover for her own injuries, where it did not appear that the danger was obvious or known to her, and that she did not rely on the assumption that her husband would exercise care and caution. (Knoxville Railway & Light Co. v. Vangilder et ux., 178 Southwestern Rep., 1117.)

VIRGINIA.—*Duty to Look and Listen a Continuing One.*

The duty to look and listen before crossing a railway track, which is imposed upon travelers upon a highway, continues as long as the occasion for the exercise of such duty continues, and if there is any point at which by looking and listening the person injured could have avoided the accident and he failed to do so, his contributory negligence defeats a recovery. (Springs v. Virginia Railway & Power Co., 86 Southeastern Rep., 65.)

NEWS OF ELECTRIC RAILWAYS

SHORT STRIKE IN PITTSBURGH

Pittsburgh Railways Agrees to Advance in Wages Conditioned Upon Prospect of Fare Readjustment to Secure More Income

The motormen and conductors in the employ of the Pittsburgh (Pa.) Railways went on strike at midnight on Sunday after breaking off negotiations with the company regarding wages and terms of service. The demand of the men as regards wages were for 30 cents an hour for the first year, working up to a maximum of 38 cents an hour for the third year and thereafter. The minimum had been 25 cents and the maximum of the four years 30 cents.

At a conference on April 29 the men consented to reduce their maximum demand of 38 cents an hour to 36 cents. The company said that the best it could do was to raise its maximum from 30 cents to 32 cents. This left an irreconcilable difference of 4 cents between the two parties to the negotiations. At the conclusion of the conference J. D. Callery, president of the company, issued a statement in which he said that the company had done everything in its power amicably to settle the differences. He made an offer of arbitration public to the newspapers.

The points of disagreement covered a number of subjects other than that of wages. Among them were the operation of interurban cars in the city, whether the trainmen should be permitted to enter saloons in uniform without punishment, the length of life of the agreement, whether passenger conductors should be placed on the interurban freight cars or the present freight messengers be continued on these cars and whether mail, freight and other miscellaneous cars should be subjected to frequent changes in men operating them, or whether men now running those cars should retain them as long as they desired.

The strike lasted less than thirty-nine hours. It was settled on May 1 at a midnight conference of railway officials and representatives of the men with members of the retail merchants' association and the newspaper publishers. The employees approved the decision by a vote of 1312 to 392 and the first cars were operated at 2 a. m. on May 2.

Under the settlement there will be separate scales of wages for the local lines and for the Beaver and Washington lines. On the local lines the pay per hour for the first six months will be 27 cents, an increase of 3½ cents; for the second six months, 29 cents, an increase of 4 cents; two years, 31 cents, an increase of 4½ cents, three years, 33 cents, an increase of 5 cents; four years, 34 cents, an increase of 5 cents; after four years, 35 cents, an increase of 5 cents. On the Beaver and Washington lines the pay per hour for the first six months will be 26 cents, an increase of 4 cents; second six months, 28 cents, an increase of 5½ cents; second year, 30 cents, an increase of 7 cents; third year, 32 cents, an increase of 6 cents; fourth year, 33 cents, an increase of 6 cents; after the fourth year, 34 cents, an increase of 6 cents. The agreement is to continue for two years from May 1.

The Pittsburgh Railways carried a full-page advertisement in the Pittsburgh papers of Wednesday morning, May 3, addressed to the people of Pittsburgh. It said that the settlement of the strike meant that the company would pay annually almost $500,000 more in wages than it had paid before. This was more than the company could afford to pay from the present earnings. The men would not recede from their position, and inasmuch as the demands made imposed a burden greater than the company could afford to bear, the men were permitted to carry out their threat to strike. The company would have been happy to pay its men the increase in wages they asked if the business could have borne the increase. The company said that when it replied during the arbitration that the increase in the payroll was impossible it was suggested that the public would acquiesce in a readjustment of the fares in order to secure sufficient revenue to meet the added expense. It was upon the condition that the company would receive the co-operation of the mediators in securing necessary additional revenue that it consented to pay an advance in wages greater than its present earnings would permit. The company said that the 5-cent fare was not sufficient for the complete ride on such long lines as those to Aspinwall, Sharpsburg, Aetna, Millvale and other similar outlying places, and that night cars were notoriously unprofitable. The fares for the night cars are 5 cents within the city limits. They should be 10 cents. In municipalities such as McKeesport, Wilkinsburg and Edgewood the fares in vogue would have to be increased to meet the new conditions. In conclusion, the company said: "The company desires it distinctly understood that if it is to pay the wages demanded it will be necessary to provide increased fares partially to cover the same and that action will be taken for such adjustments of the fare zone as are proper and reasonable."

CALIFORNIA ELECTRIC RAILWAY ASSOCIATION ORGANIZED

The California Electric Railway Association has been organized to facilitate concerted action on franchise and paving questions, to foster a better understanding between the public and the electric railways, to promote co-operation among the railways themselves, to collect and distribute data of value to the railways, and to secure proper regulation of auto competition. G. K. Weeks, president of the San Francisco-Oakland Terminal Railways, Oakland, is president of the association; William Clayton, vice-president and managing director of the San Diego Electric Railway, is vice-president; and W. V. Hill, tax and contract agent of the Pacific Electric Railway, Los Angeles, is manager, with offices in San Francisco. The directors of the association are Mr. Weeks, the president; Mr. Clayton, the vice-president; Paul Shoup, president of the Pacific Electric Railway; W. E. Dunn, vice-president of the Los Angeles Railway Corporation, and Jesse W. Lilienthal, president of the United Railroads, San Francisco. Mr. Hill will have a secretary to attend to office matters so his time can be given to paramount issues. Every electric railroad in California is represented, including the electrified steam lines.

FURTHER OPPOSITION TO REDUCTION OF MASSACHUSETTS COMMISSION

The ways and means committee of the Massachusetts Legislature held a final hearing on April 27 on the bill to reduce the membership of the Public Service Commission from five to three. Bentley W. Warren, for the Massachusetts Street Railway Association, opposed the provision in the bill assessing a portion of the cost of the commission's work upon the carriers. He urged that the financial condition of the street railways in the State would not allow of additional burdens being placed upon them, and said that it was not good public policy to transfer the cost of regulation from the taxpayer to the carrier.

Chairman McLeod of the commission stated that it was absolutely impossible for a commission of three men to conduct the public business efficiently and properly, in view of its volume and character. A body mainly executive could work with fewer men, but the speaker challenged any advocate of the bill to find any living ex-member of the board who would favor a commission of three instead of five at present. Mr. McLeod said that the commission and its predecessor had been at work in Massachusetts almost half a century and contended that it was a poor time in which to overthrow the established policy of a secure tenure of office which has placed the commission on a plane with the Supreme Judicial Court. The commission handled from 600 to 700 cases a year. The board courted the fullest investigation of its work. Mr. McLeod stated that the settlement of the Bay State fare case would probably be prolonged at least six months beyond Sept. 1 if a new commission of three men were substituted for the present tribunal.

CLEVELAND WAGES SETTLED

Unusual Conditions Attended Settlement in Which City Has Direct and Material Interest Under Tayler Franchise

At a conference of the representatives of the motormen and conductors and the officials of the Cleveland (Ohio) Railway, on April 27, John J. Stanley, president of the company, informed the men that the proposition of an increase of 1 cent an hour this year and the same next year, with a minimum day of five hours was the best he could make without increasing the rate of fare. This the company had no right to do. He said further that the establishment of schedules was in the hands of the city and that the company could not, under the Tayler franchise, submit them to arbitration. Mr. Stanley repeated that the proposition made to the men would mean additional operating expenses of $400,000 for the two years, and that Fielder Sanders, street railway commissioner, agreed to recommend to Council that it allow this increase.

The men's representatives discussed the matter with the street railway committee of the City Council the following day. The committee agreed to recommend the proposition made to the men by the company, but it refused to go beyond this. The men insisted on a flat wage of 40 cents an hour and an eight-hour day for 90 per cent of the men.

Mr. Sanders said on April 29 that there were 2500 motormen and conductors in the employ of the company. Of this number about 1750 had regular runs. Their average monthly wage was $90. Of the other 750 men 25 per cent received between $70 and $90 a month; 55 per cent, between $60 and $70 a month; 17 per cent receiver under $50 a month, and 3 per cent, under $40 a month. Mr. Stanley has said several times that he would be glad to do something for the extra men, but that it was almost impossible when the number of cars operated during the entire day bore such a small proportion to those used during the rush hours. He recommended an increase in the amount of service during the day, but the city has objected to this.

The demands of the men were considered at a conference on May 2, attended by Mayor Harry L. Davis, President J. J. Stanley, General Manager George L. Radcliffe and Engineer Joseph Alexander of the Cleveland Railway, Street Railway Commissioner Fielder Sanders and City Law Director W. S. Fitzgerald.

At the solicitation of the city officials Mr. Stanley late on the evening of May 3 agreed to make his proposition still more favorable to the men by advancing the wages 2 cents an hour for the present year, which would mean 31 cents for first-year men and 34 cents for all others, with wages for 1917 at 32 cents for first-year men and 35 cents for the others. He specified a five-hour minimum work-day for the two years. The men also modified their demands, asking for an increase of 3 cents an hour for the two years, with a minimum work day of five hours the first year and eight hours the second. They also asked for pay for twenty minutes in taking their cars out and returning them to the houses, and pay for time spent in going to and from relief runs. Mr. Stanley refused to consider these last demands. He announced that he had made his final offer. His offer will add $532,000 to the payroll for the two years.

The offer of Mr. Stanley just mentioned was submitted to a vote of the men on the evening of May 3. The result of the balloting was announced on May 4. The vote was 1123 for and 496 against.

Engineer Joseph Alexander has made the following estimate of the increased expenses on the terms demanded by the men: wage increase, 1916, $210,000; five-hour minimum day, $91,000; extra twenty minutes' pay, $76,092; pay for relief runs, $16,193; wage increase, 1917, $210 000; eight-hour minimum day, $240 250; extra twenty minutes' pay, $76,092; relief runs, $16,193. Total $935,820.

A peculiar feature of the controversy is the fact that the city's representatives say that the fixing of schedules is a matter for the street railway commissioner and the City Council, but that the amount of wages to be paid and the number of hours a day the men shall work are the company's affair. It is clear that the company's privilege in fixing a wage scale and the work-day is so limited by the Tayler franchise and by the city's assumed authority in the matter of schedules that it has little to say on anything.

ENGINEERS TO PARADE FOR PREPAREDNESS

A citizens' parade in favor of preparedness will be held in New York City on Saturday, May 13, and will be reviewed by Mayor Mitchell, Major-General Wood and Rear Admiral Usher. More than forty trades and professions have already signified their intention of taking part. The parade will be entirely non-partisan. It has been indorsed by the Mayor's committee on preparedness by the National Security League and other organizations in favor of national defense. The object is to demonstrate in a conclusive manner the overwhelming sentiment of the business and professional men of New York in favor of preparedness. The engineers' division of the parade will be made up of four general subdivisions, civil, mining, mechanical and electrical. These subdivisions are made for convenience in organization, and are not in any sense representative of any engineering society. Engineers are invited to parade as engineers, whether or not they are members of any organization. The committee which has had charge of the military lectures has undertaken the general organization of this division and for convenience has appointed the following sub-committees representing each general subdivision: civil engineers, Charles Warren Hunt, chairman; mining engineers, Bradley Stoughton, chairman; mechanical engineers, Calvin W. Rice, chairman; electrical engineers, F. L. Hutchinson, chairman.

ANOTHER DEADLOCK IN SAN FRANCISCO

Resort to Legal Action Necessary to Settle Dispute Over Connections With Two New Municipal Lines

The Church Street extension of the San Francisco Municipal Railway, which is being constructed to serve a district south of Market Street, will be completed on June 10 and negotiations have been under way for some time to provide connection between the Market Street terminus of this line and other parts of the municipal system. The United Railroads has tracks on Church Street for two blocks from Market Street, so that to connect the Church Street municipal extension with the nearest point on the municipal system now in operation it would be necessary to travel over, or parallel the United States Railroads' tracks for two blocks on Church Street and six blocks on Market Street from Church to Van Ness Avenue.

A number of conferences have been held between officers of the United Railroads and the public utility committee of the Board of Supervisors, with the result that the United Railroads offered to permit the transfer of passengers from Church Street to Market Street cars on a sixty-forty basis, favoring the United Railroads. The United Railroads also offered to permit the Church Street municipal cars to use United Railroads' tracks in return for the payment of a reasonable rental plus a proportion of the construction and maintenance costs plus an indemnity which it was estimated that the United Railroads would suffer as a result of business diverted to municipal lines. The city officials have not looked upon these propositions with favor.

The Twin Peaks tunnel is to be completed within a year and it is expected that municipal lines operating through this tunnel will bring to the outer end of Market Street a volume of business that will rapidly increase as the new residence district beyond the tunnel develops. It is in consideration of the provision that will be necessary for this traffic that the board of supervisors will plan the present Church Street connections, as it is manifest that the same problems of transfer, joint operation, or paralleling affecting the Church Street connection will also apply to the proposed municipal line through the Twin Peaks tunnel. City officials tendered the United Railroads a fifty-fifty transfer offer pending legal action over the respective rights on Church and Market streets. This proposition was refused.

On April 26 the public utilities committee passed a resolution instructing the board of works to proceed with the laying of tracks down Market Street to Van Ness Avenue, and also to pass an ordinance providing for the construction of municipal tracks down Market Street from the east portal of Twin Peaks tunnel to a connection with the Geary Street municipal line at Geary and Market streets. Such new construction would provide direct route from Twin Peaks tunnel and from Church Street and Van Ness Avenue extensions direct to the ferries. These resolutions were to come before the board of works on May 1. The indications were that the resolutions would be promptly passed and the Mayor has already signified his intentions of signing the resolutions if passed. Jesse W. Lilienthal, president of the United Railroads, has announced that upon the passage of such resolutions by the board of public works he would feel called upon to secure an injunction preventing the construction of the proposed tracks paralleling the United Railroads' lines.

RECENT WAGE INCREASES

Outlines of Changes in the Wage Schedules of Nine Traction Companies

A. Benham, general manager of the Ohio Electric Railway, Springfield, Ohio, announced that beginning May 1 all trainmen of the road would receive an increase in wages amounting to about 10 per cent. The scale of increase will be based on the length of time in the company's service.

The East Liverpool Traction & Light Company, East Liverpool, Ohio, has announced an increase of 2 cents an hour in the wages of its motormen and conductors. The men formerly received 26, 28, 30 and 32 cents an hour for the first, second, third and fourth years, respectively, and thereafter.

The Columbus Railway, Power & Light Company, Columbus, Ohio, has advanced wages from one-half cent to 2 cents an hour, applicable to platform men. A new schedule is also being worked out for other employees. The minimum for the trainmen was increased from 20½ cents to 21 cents and the maximum from 27 cents to 29 cents an hour.

The York (Pa.) Railways has announced an increase in the wages of its trainmen. All men who have been with the company less than ten years will receive 1 cent additional over that now paid, while men who have been with the company more than ten years will receive an advance of 2 cents an hour. The sliding scale which has been in effect provides for a minimum of 19 cents an hour.

The Frankford, Tacony & Holmesburg Railway, Tacony, Pa., granted a wage increase to its employees on May 1. Motormen and conductors have been receiving 22½ cents an hour. Hereafter the wage will be 23 cents an hour after three years of service and 24 cents after four years. All the shopmen and other employees have also had their wages advanced about 10 per cent.

The officers of the Citizens' Traction Company, Oil City, Pa., and the employees have agreed to an increase in wages. The new scale dates back to April 15. It does not make any change in the wages that are paid first-year and second-year men, but increases the third, fourth and fifth-year men, and creates a new class, those men who have been employed for a period of at least five years. With the increase of the first of the year it will mean that the first-year men are getting 2 cents an hour more than last year, the second-year employees 1 cent more, the third, fourth and fifth-year men 2 cents more and the sixth-year men 3 cents more.

A new agreement covering wages was accepted on April 21 by all of the employees of the New York State Railways following the recent controversy on these lines. The terms, which apply to the Rochester, Syracuse, Utica and Oneida lines, specify a wage increase of 2 cents an hour for the first two years and a 1-cent increase the third year. The new contract went into effect on May 1. Under it employees will receive 26 cents an hour for the first six months, 28 cents after six months and 30 cents after the first year. Interurban men will receive 32 cents an hour with the exception of employees on the Oneida line, who will draw 35½ cents. The working day for all employees for the year will remain at nine hours as before. The matter of the working day, however, is to become an open question at the end of each year.

The Springfield & Xenia Railway, Springfield, Ohio, has announced an increase in wages from 25 to 29 cents an hour for its platform employees, effective on May 1. This is the second voluntary increase received by the trainmen in the last five years.

The Harrisburg (Pa.) Railways increased the wages of its trainmen 1 cent an hour on May 1.

TERMINAL OPENS AT NEWARK

Inspection of Building and Subway Follows Address by President of Public Service Railway

The Public Service Corporation of New Jersey formally opened its new terminal building in Newark on April 28. On the evening of that day the sections of the railway, gas and electric companies, with the Terminal Club, and invited guests, held a joint meeting which was addressed by Thomas N. McCarter, president of the corporation, who spoke on the subject "Transportation."

Mr. McCarter reviewed the history of the public utility companies in the Newark district and their successor, the Public Service Corporation. He referred to the opening of the terminal as the most auspicious occasion in the organic life of the company and as a fortuitous coincidence that it should come on the eve of the 250th anniversary celebration of the founding of Newark. In this sketch of the early history of the railway he paid tribute to the enterprise of some of the early builders of the properties, among them Bernard Shanley, E. F. C. Young, Leslie Ward and Garrett A. Hobart. He also traced the progress of the gas and electric utilities now operated by the Public Service Corporation and spoke of the contributions which residents of Newark or its environs had made to the act, citing particularly the names of Edward Weston and Thomas A. Edison.

He then gave a short résumé of the enormous task which was undertaken by the Public Service Corporation at the time of the consolidation of the railway, gas and electric companies in 1903 and showed what had been accomplished in the thirteen years of the corporation's existence. In speaking of the railway he said:

"The study of improving transportation facilities has developed a curious and troublesome fact; the more such facilities are improved, the more insistent the demand becomes for still greater improvement. The demand for better means of passage from place to place increases by efforts to comply with it, and no matter how successful these efforts may be, the demand for still better means becomes constantly louder."

The total business of the Public Service Corporation for the year 1915 amounted to approximately $37,500,000, having more than doubled since the organization of the company, according to Mr. McCarter.

The meeting was closed by the singing of "America," accompanied by the Public Service Orchestra. The terminal was then thrown open and the company officials and guests inspected the building, subway and approaches.

Wage Demands in Massachusetts.—The members of the unions of employees on the lines of the New England Investment & Security Company in Worcester and Springfield, Mass., recently signified their intention of presenting to the company demands for changes in the terms of service under the working agreement which will expire on June 1.

Steam Road to Electrify.—The Salt Lake & Los Angeles Railway, Salt Lake City, Utah, has employed H. A. Strauss, consulting engineer of Chicago, to undertake the design of the complete electrification and extension of this 15-mile steam road between Salt Lake City and Salt Lake. Bonds to provide funds for this improvement are to be underwritten by the C. F. Childs Company, Chicago.

Arbitration Decided Upon in Akron.—The management of the Northern Ohio Traction & Light Company, Akron, Ohio, and the platform employees have reached an agreement to submit the wage dispute to arbitration. The company has selected John J. Stanley, president of the Cleveland Railway, as its member of the board of arbitration and the men will soon select their member. The union has conceded the open shop principle to the company.

Telephones in New York Subway Stations.—The Public Service Commission for the First District of New York has issued an order directing the New York Telephone Company to install slot telephones in subway stations. Soundproof booths are to be built of masonry. Where the quarterly gross receipts of a booth amount to $25 or less, the city is to receive 15 per cent. On higher receipts the city is to get 20 per cent.

Evidence Completed in Holyoke Arbitration Case.—The presentation of evidence was concluded on April 21 before the wages arbitration board sitting in the Holyoke (Mass.) Street Railway investigation. Prof. Albert S. Richey of the Worcester Polytechnic Institute, was the last witness for the company. He criticised the time-table offered by the union representatives on the ground of its cost and impracticability in certain details and submitted testimony in rebuttal of the cost of living evidence presented by the union. Final arguments by counsel for each side will be heard in the near future. Printed briefs will be filed.

New Plans Suggested for Elevated in Philadelphia.—A system of elevated railways serving the centers of population contemplated under the proposed transit plans, which could be operated independently or in connection with the lines of the Philadelphia (Pa.) Rapid Transit Company and which it is said would be less costly in construction and less expensive in operating than the lines contemplated in plans presented previously is outlined in a survey of the municipal transit problem made by Charles G. Darrach, a consulting engineer, at the request of Wharton Barker. Mr. Darrach estimates the cost of the system as proposed by him at $40,700,000.

Stockton Road Offered to the City.—F. W. Webster, general manager of the Stockton (Cal.) Electric Railroad, operating 16 miles of line in that city, suggested to the City Commissioners recently that they take over the company's holdings and operate the line as a municipal railroad. Mr. Webster said that the operating expenses and taxes were altogether disproportionate to the company's revenue. At present 5¼ per cent of the company's gross receipts went to the State, while about 12 per cent was consumed in the upkeep of the road exclusive of the rolling stock. The company also paid the city of Stockton a franchise tax on its gross revenue.

Five Million Dollar Fire at Augusta.—The fire at Augusta, Ga., on March 22, which razed thirty city blocks of office buildings, cotton warehouses and residences caused a loss of approximately $31,000 to the Augusta-Aiken Railway & Electric Corporation. The loss consisted principally of poles, transformers, meters, wire and equipment. One car was destroyed. After the fire the wires were strung on dead trees and service was resumed shortly thereafter. Tentative reconstruction plans call for the removal of the tracks within the burned area from the center of the street to the sides, and the conversion of the space between the tracks into a park or central roadway.

Hearing on New York Bus Line Extensions.—The subject of motor buses was considered by the Board of Estimate of New York on April 28. Bids for additional motor-bus franchises for Manhattan Streets were received last June. The New York Motor Bus Company set forth that its bid had been made, its $60,000 guarantee lost to it for ten months and the type of vehicle determined. The president of the Fifth Avenue Coach Company, which is at present operating in New York, wrote of the high standard and efficiency of his company, attained after years of costly experimentation, and called attention to the increased income the city would enjoy if the coach company's offer of extended service were accepted.

Chicago Home Rule Plan Opposed.—Opposition to utility home rule for Chicago has developed before the special legislative committee investigating the subject. At a hearing in Danville, Ill., it was brought out that the objection to home rule for Chicago was based on a fear that within a few years Cook County, in which Chicago is situated, would have a majority representation in the State Legislature. It was asserted that the down-state legislators would never consent to give Chicago home rule unless Cook County's representation was greatly reduced. Similar objection to Chicago home rule was brought out in the Peoria hearing, where Chairman Medill McCormick intimated that the opposition was fostered by the public utility corporations. The question before the legislative committee is whether it shall recommend that Chicago have a separate commission or the power to regulate Chicago utilties be conferred upon the City Council.

Extension of Seattle Municipal Line Contemplated.—The utilities and the franchise committees of the City Council of Seattle, Wash., at a recent meeting, discussed the question of extending Division "A" of the municipal railway into Ballard. Councilman R. H. Thomson, former city engineer, has been delegated to obtain data relative to the proposed extension. He has also been asked to investigate and report on the question of the city charging a rental to the Puget Sound Traction, Light & Power Company for the use of canal bridges at Fifteenth Avenue N. W., Fremont Avenue and Tenth Avenue N. E. The city is laying track on the three bridges. A. L. Kempster, manager of the Puget Sound corporation, said his company was willing to pay a rental for the use of the bridges, if other common carriers in competition with the street railway were required to pay a proportionate tax. This was taken to refer to jitney bus competition.

Cincinnati Suburban Line Grant.—The West End Rapid Transit Company, Cincinnati, Ohio, was granted a perpetual franchise by the Cincinnati City Council on April 18 to construct and operate a rapid transit line between Anderson's Ferry and the west line of Race Street at the intersection of Third, in the heart of the business district. This line will give the Cincinnati, Lawrenceburg & Aurora Electric Street Railway an entrance to the city. Up to this time its terminus has been at Anderson's Ferry. The fare into the city will be 5 cents. Provision has been made for connection with the rapid transit belt line. After five years a division of the profits is to be made with the city. The city is to receive the first 1 per cent based on the capitalization, while the company is to have the next 7 per cent. All above 8 per cent is to be divided equally between the city and the company. Stanley Shaffer, secretary and attorney of the company, said that the road will cost about $800,000. Construction work will begin in September. A goodly portion of the line will be on private right-of-way, and at two points in the city it will be elevated.

Seattle Valuation to Continue.—The Public Service Commission of the State of Washington will resume the valuation of the properties of the Puget Sound Traction, Light & Power Company where it left off last year, because of the statement of the City Council of Seattle that the city cannot properly undertake the work. The valuation will be carried on by the commission's engineering staff from the funds of the commission. The hearing on the application of the company for relief from franchise obligations in Seattle will await the termination of the valuation proceedings. According to Commissioner Spinning sufficient funds may not be on hand to complete the work of valuation, but as much work as possible will be done at this time. Hugh M. Caldwell, corporation counsel, has requested the commission not to hold the hearing until the commission has completed the valuation. The purpose of the valuation is to determine whether the company is earning a fair return on its investment. Chairman Reynolds of the commission states that the hearing on the franchise obligations undoubtedly will be postponed until the valuation by the commission is finished.

Thompson Committee Hearings Resumed. — The Thompson Committee, which suspended activities during the closing sessions of the New York Legislature, resumed its hearings on May 1, when the cave-in accidents of last September on the Broadway and Seventh Avenue sections of the new subway were investigated. Leonard M. Wallstein, commissioner of accounts, was the principal witness and told of the investigation he had made in conjunction with the Mayor's especially appointed committee of engineers. J. O. Hammitt of the Fire Department explained that he reported, after an investigation, that a seam in a rock had not been observed by the blasters. Richard P. Babbage, vice-president and general counsel of the U. S. Realty & Improvement Company, contractors for the sections on which the accidents occurred, testified that all but a few of the ninety-nine claims filed against his company had been settled. The sum disbursed amounted to approximately $170,000. On May 2, Alfred Craven, chief engineer of the commission, was questioned regarding his knowledge of the conditions surrounding the cave-ins. On May 3 the committee inquired into the reasonableness of the subway construction bids. Henry B. Seaman, formerly chief engineer of the commission, testified that in his opinion the city could have saved considerably by reletting contracts on the Lexington Avenue line.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Accountants' Association

The Central Electric Railway Accountants' Association will meet at Toledo, Ohio, on June 6 and 7.

New York Electric Railway Association

The annual meeting of the New York Electric Railway Association will be held at the International Hotel, Niagara Falls, N. Y., on June 27 and 28.

General Conference on National Safety Code

A conference will be held at the La Salle Hotel, Chicago, on May 29 and 30, 1916, upon the National Electrical Safety Code which has been prepared by the Bureau of Standards. Sessions will begin on May 29 at 10 a. m.

The official representatives of the National Electric Light Association, the American Institute of Electrical Engineers, the American Electric Railway Association, the American Railway Association, the Association of Edison Illuminating Companies and of several other associations are being invited to this conference. The purpose of the meeting is to consider the code as it is now revised for publication, and this will be the last conference before publication. A large amount of work has been done upon the code since the New York meeting of last October, and many changes have been made in some parts, especially in the section upon overhead lines. These changes have been submitted for criticism and discussion at a considerable number of conferences, and it is believed by the bureau that they will receive the approval of the conference at Chicago. It is expected that the code will be adopted for a year's trial by commissions and municipal authorities after it has been published, with the recommendation that it be observed as far as possible during the first year, but that its complete observance will not in all cases be expected until after the experience of a year has shown what, if any, changes would be necessary.

A limited number of copies of the revised code have been prepared for the use of those who attend the Chicago conference, but no copies will be available for general distribution until after the Chicago conference, when the code will be published as soon as possible.

Pennsylvania Street Railway Association

The Spring meeting of the Pennsylvania Street Railway Association will be held at the Hotel Brunswick, Lancaster, on May 9 and 10. The meeting will be called at 1.30 p. m. on May 9. Thomas A. Wright, Wilkes-Barre, president of the association, will deliver his address, the treasurer will present his report and an address will be made by Charles L. Henry, president of the American Electric Railway Association. The following papers will then be read:

"Court Trials in Damage Suits," by D. I. McCahill of Pittsburgh.

"Current Street Railway Problems," by J. A. Keppelman, Reading.

"Physical Examination for Employees," by Francis D. Patterson, M.D., of the division of industrial hygiene and engineering in the Department of Labor and Industry.

At the session of the association on May 10 the following papers will be read:

"Legal Points in the Operation of Jitneys," by E. H. Davis of the Williamsport Passenger Railway.

"One-Man Car Operation," by W. E. Moore Pittsburgh, and L. H. Palmer of the Eastern Pennsylvania Railways, Pottsville.

"Street Railway Freight and Mail Service Rates," by J. E. Wayne of the York Railways.

"Manual of Standards," by F. R. Phillips of the Pittsburgh Railways.

"Rush-Hour Traffic," by P. T. Reilly of the Scranton Railways.

"Handling Accident Reserves," by F. J. Pryor, Jr., of the American Railways.

"Training of Platform Men," by W. A. Heindle of the Southern Pennsylvania Traction Company.

On the evening of May 9 at 7.30 o'clock there will be an informal dinner at the Hotel Brunswick.

Financial and Corporate

NEW BRITISH CAPITAL ISSUED

Most New Capital Being Turned to Government Use—Utility Enterprises Are Showing Almost a Total Suspension of New Financing

According to statistics reported by the London *Economist*, the new securities issued by Great Britain in the calendar year 1915 totaled £685,241,700 as compared to £512,522,600 in 1914. These figures, it may be said, are entirely for security issues newly created and do not include any figures covering refunding operations. The main point to be noted in connection with the new financing is the strict control that was exercised by the treasury department over the capital market. Exclusive of colonial government loans, the British government alone took £614,250,700 of the new securities in 1915 as compared to £332,500,000 in 1914, and in general the functions of London as a money lender were narrowed down almost entirely during the last calendar year to the raising of money for direct war purposes. This same tendency was exhibited in the case of the British railroads, which required £3,294,000 of new capital as compared to £2,161,500 in 1914, presumably on account of their further necessary development to serve as military aids to the government.

The extent to which the new capital available for use in Great Britain was turned almost entirely to government purposes naturally had a restrictive effect upon the financing of utility enterprises throughout the country. For example, tramway and omnibus financing fell off from £5,868,800 in 1914 to £432,500 in 1915, while electric light, power, telegraph, etc., companies; gas and water companies, and motor companies showed similar large decreases in new financing in the last year. The following comparative table gives the total financing for 1914 and 1915, but only such detailed figures thereunder as are deemed to be of interest to electric railway operators:

Group	1915	1914
Total new financing................	£685,241,700	£512,522,600
New financing in selected groups:		
British government	614,250,700	332,500,000
Tramway and omnibus...........	432,500	5,868,800
Electric light, power, telegraph, etc.	546,900	6,746,400
Gas and water..................	20,000	699,400
Motor traction and manufacturing.	130,000	1,558,900
British railroads	3,294,000	2,161,500
Indian and colonial railroads......	3,965,000	23,377,600
American railroads	....	1,415,700
Foreign railroads	2,940,000	12,755,500

Since the beginning of 1916 the amount of new capital raised over and above that borrowed by the government has been insignificant. Out of a total of £145,724,690 for the first quarter £143,220,000 comes under the heading of British government loans. In the remaining £2,504,690 of new capital the British railways at £1,176,000 had the largest share, with docks, harbors and shipping running second at £800,000. Tramways and omnibuses and the electrical companies placed no new issues at all, and the gas and water companies only a small amount. Motor traction and manufacturing companies and foreign railways showed slight gains over 1915, but the totals were very small as compared to those in 1914. The great change that has taken place in British financing is shown by the following comparative table for the first quarter in 1914, 1915 and 1916:

Group	1916	1915	1914
Total new financing........	£145,724,690	£46,313,500	£97,610,200
New financing in selected groups:			
British government......	143,220,000	29,250,700	....
Tramways and omnibus..	....	....	1,839,000
Electric light, power, telegraph, etc.	....	356,200	4,336,900
Gas and water...........	16,440	....	183,200
Motor traction and manufacturing	106,250	25,000	613,400
British railroads	1,176,000	65,500	120,000
Indian and colonial railroads	....	....	13,269,200
American railroads	....	....	354,100
Foreign railroads	384,000	....	8,145,500

ANNUAL REPORTS

Illinois Traction System

The comparative statement of income, profit and loss of the Illinois Traction System, Peoria, Ill., for the calendar years 1914 and 1915, follows:

	1915	Per Cent	1914	Per Cent
Interurban lines	$3,559,028	31.8	$3,626,635	32.6
City lines	2,871,035	25.6	3,021,859	27.1
Gas	905,702	8.0	877,982	7.9
Electric	3,325,410	29.7	3,002,378	27.0
Heat	317,579	3.8	314,640	2.8
Water	14,215	0.1	14,385	0.1
Miscellaneous	195,022	1.7	254,972	2.2
Total gross earnings	$11,187,994	100.0	$11,112,854	100.0
Operating expenses and taxes	6,657,569	59.5	6,587,462	59.2
Gross income	$4,530,425	40.4	$4,525,391	40.7
Interest on bonds	3,268,607	29.2	3,290,786	29.6
Net income available for depreciation and dividends	$1,261,818	11.2	$1,234,605	11.1

The foregoing statement shows that the Illinois Traction System a little more than held its own during 1915 as compared to 1914. This showing, however, was brought about by the substantial increase in lighting receipts, particularly electric, inasmuch as both the interurban and the city railways showed decreases on account of jitney buses, automobile competition for business and pleasure purposes and unstable business conditions. The decrease in interurban earnings for the year was $67,607 or 1.8 per cent and in city railway earnings $150,824 or 4.9 per cent. The report of the company contains no data in regard to the detailed operating expenses, or even as to the division between operating expenses and taxes. The gross income showed a gain of $5,034, which was increased to $27,213 by lower interest charges on bonds.

In the early months of the year the jitney movement reached the cities served by the company's street railway lines, and during the height of the craze the railway receipts were reduced from 5 to 10 per cent. The city authorities in due course recognized the necessity for some regulation of this class of transportation service and in the latter months of the year the jitneys practically disappeared.

It is said that renewed efforts were applied in furtherance of interurban freight traffic development. Toward this end through rates were put into effect with two connecting steam railroads and a track connection established with the terminal railroad at Peoria which allows access to the principal industries of that city, as well as track connections with important steam lines not otherwise available. Additional grain elevators, brick factories and a large powder factory were constructed on the line and other new industrial tracks were installed. All of this, in conjunction with the increased earnings from the growth of coal traffic, will provide a substantial expansion in freight revenues.

Federal Light & Traction Company

The comparative consolidated statement of income, profit and loss of the Federal Light & Traction Company, New York, N. Y., and its subsidiary companies for the calendar years 1914 and 1915, follows:

	1915	Per Cent	1914	Per Cent
Gross earnings	$2,352,015	100.0	$2,416,960	100.0
Operating and administrative expenses and taxes	1,545,716	65.7	1,528,307	63.2
Gross income	$806,299	34.3	$888,653	36.8
Interest charges	589,342	25.1	586,155	24.3
Central Arkansas Railway & Light Corporation dividend	84,000	3.5	84,000	3.5
Springfield Railway & Light Company dividend	23,890	1.0	......	...
Federal Light & Traction Company dividend	......	...	112,500	4.7
Balance	$109,067	4.6	$105,998	4.3

Owing to decreased earnings and increased expenses, as shown above, the operating ratio for this group of companies increased from 63.2 per cent in 1914 to 65.7 per cent in 1915. The gross earnings of the companies decreased $64,945 or 2.7 per cent, as compared to 1914, while the operating expenses increased $17,409 or 1.1 per cent, so that the gross income decreased $82,354 or 9.3 per cent. The balance, with no holding company dividend as in the previous year, showed an advance of $3,069 after providing for a Springfield Railway & Light Company dividend not paid the year before.

The decrease in gross earnings was caused principally by a reduction in gas sales of $21,196 and a drop in water sales of $11,744 resulting in part from such failures in gas supply, and by a decrease in railway earnings of $146,356 principally attributable to jitney competition. These reductions in gross earnings were partially offset by an increase in gross earnings of the electrical department of $113,189 or 8.4 per cent, and an increase of $1,481 or 15.6 per cent in the steam heating department. The decrease in total income was caused principally by a reduction in net earnings in the gas department of $7,409, and also by a reduction in net earnings in the railway department of $137,850. These were partially offset by an increase in net earnings in the electrical department of $82,195 or 16.1 per cent, and by an increase in the water department of $3,772 or 11.8 per cent.

In order to meet jitney competition and to conform to franchise requirements as to frequency of service, the regular railway schedules were maintained and, in fact, slightly increased at Springfield and at Tucson. Every other effort was made to reduce the railway operating expenses, but owing largely to floods at Trinidad, necessitating extraordinary expenditures for maintenance, the reduction in operating expenses in the railway department for the year amounted to but $8,500.

The figures given above show that the principal decreases in earnings sustained during 1915 were in the railway department and that the present important problem is that of meeting and dealing with jitney competition.

Grays Harbor suffered severely from jitney competition and stagnation in the lumber business, the loss in railway gross earnings there aggregating more than $50,000 or 42.6 per cent.

COMPREHENSIVE FINANCING BY NORTHERN STATES POWER COMPANY

The Northern States Power Company, a Byllesby corporation, has called for redemption interest bearing securities aggregating $23,833,415, principal, interest and premiums. These securities represent all the divisional bonds and notes of the various units making up the Northern States Power Company's system, with the exception of the first mortgage bonds of the Minneapolis General Electric Company. They include bonds and notes of the Consumers' Power Company of Minnesota, notes of the Minneapolis General Electric Company, bonds of the Northern Mississippi River Power Company, and underlying bonds of operating companies at St. Paul, Fargo, Grand Forks, Minot, Sioux Falls, Mankato, Faribault, Stillwater and Galena.

When the present financing is completed the company's funded debt will consist of $18,000,000 of twenty-five year 5 per cent first and refunding mortgage bonds, $8,000,000 ten-year 6 per cent gold notes, and $7,632,000 first mortgage 5 per cent bonds of the Minneapolis General Electric Company. Besides consolidating the heretofore existing funded debts the sale of the bonds will produce $2,000,000 cash to be used for construction purposes during the remainder of the present year.

The present financing consists of three distinct phases, the first being an offering to investors of $8,000,000 of ten-year 6 per cent notes on April 11, by a syndicate composed of the Guaranty Trust Company, New York; H. M. Byllesby & Company, William P. Bonbright & Company and Spencer Trask & Company.

The second phase was the offering on April 17 of $2,000,000 of 7 per cent preferred stock at 97½ by a syndicate composed of William P. Bonbright & Company, H. M. Byllesby & Company and Spencer Trask & Company.

The third and final step was the public offering a few days since of $18,000,000 of first and refunding 5 per cent bonds by a syndicate which has purchased the same, composed of Harris Trust & Savings Bank, Chicago; H. M. Byllesby & Company, Guaranty Trust Company, William P. Bonbright & Company and H. F. Bachman & Company.

In conformity with its policy of frankness toward the public served by operating units and to give its customers an opportunity to become owners of its securities, the Northern States Power Company will publish newspaper advertisements in all of the cities served, briefly describing the present financing, pointing out the benefits which will be derived by the communities concerned, and offering the securities to resident investors.

LOSS ON SEATTLE MUNICIPAL LINES

Official Report Shows True Loss of $56,721 for 1915—Councilman Moves for Searching Investigation Into Future of Lines

According to official figures filed with Mayor H. C. Gill and City Comptroller H. W. Carroll by the State Bureau of Inspection and Supervision of Public Offices, the city of Seattle during 1915 lost $56,721 in the operation of Division "A" and Division "C" of the Seattle Municipal Street Railway. The gross revenue of Division "A" amounted to $16,395, which was $1,324 less than the interest on its funded debt of $425,000.

State Examiners W. W. Clark and Frank L. Mitten, who prepared the report, declare that the transfer of the Division "C" and Aloha Street substations from the public utility department to the lighting fund was contrary to law. The transfer of these substations was accomplished by the Council, notwithstanding the veto of the bill by Mayor Gill. The report states:

"The substations, which were constructed and equipped by the street railway out of the proceeds of the railway bond sale and loans at a cost of $60,528, were transferred to the lighting department for a consideration of $55,000. This amount was to be paid in power to be furnished the street railway for operating purposes. In other words, the $60,528 part of the bond money voted by the people for construction purposes is being used for operation. This, we believe, is contrary to law. No part of the payroll of the public utility department, which has direct charge of the street railway and supervises and keeps all its accounts, is charged to operating expenses, but all such accounting and general expenses is paid out of the general fund. At a very conservative figure, $1,200 per annum to cover accounting and general overhead supervision expenses should be borne by the street railway. The general fund has advanced to Division "A" $19,000, and to Division "C" $28,095 in the shape of loans, making a total of $47,095, on which no interest is being charged. Inasmuch as the general fund is on a warrant basis and is paying 5 per cent interest on outstanding warrants the same rate of interest on this loan is properly chargeable to the street railway, making an annual interest charge of $2,355. The general fund has also paid out on engineers' claim sheets $5,241 on account of the construction of Division "A." This amount should be repaid at once, as there remains in the bond fund $32,036, and the above amount was advanced for construction purposes."

The municipal lighting department is furnishing power for the operation of the street railway at $0.0124 cents per kilowatt-hour, this being $0.0123 cents less than production costs. In 1915, a total of 946,369 kw.-hr. was supplied, which means a lighting department loss of $11,649. A true statement based on all losses is shown by the following for one year, 1915: Division "C," $9,503; Division "A," $32,169; accounting, etc., utility department, $1,200; general fund, interest on loans, $2,200, and lighting department loss on power, $11,649—a total of $56,721. There is also an undetermined loss to the city of Seattle for sundry legal experts.

Councilman R. H. Thomson, former city engineer, has introduced a resolution in Council, asking for information concerning the municipal lines, with an estimate of what losses have been sustained by the city, how long these losses are to continue and how many years will be required to repay them. The resolution was referred to the city utilities committee, of which Mr. Thomson is chairman. The resolution asks the department for its plans regarding extensions to increase revenues, as well as for information about the routes to be chosen for extensions, the number of persons to be served and the net income to be derived. The resolution also calls for definite information regarding earnings, operating expenses, depreciation, taxes and interest on the investment. Finally, it is asked when the lines will become profitable at a 5-cent fare if they are not so now, and whether the service rendered by either of the present lines is such as would justify the city in charging a higher fare.

Division "A" and Division "C" have been operated approximately two and one-half years at a loss. For the last two years frequent announcements have been made of the intention of the Council to extend Division "A" into the Ballard section, and plans for the connection of Division "A" with the Lake Burien line have been proposed at various times.

Bay State Street Railway, Boston, Mass.—The Bay State Street Railway has invited proposals to sell to it $35,000 par value of first mortgage 5 per cent bonds of the Lowell, Lawrence & Haverhill Street Railway, the date thereof being June 1, 1893.

Boston & Worcester Street Railway, Boston, Mass.—The Boston & Worcester Street Railway has made application to the Massachusetts Public Service Commission for authority to issue for $105,600 at par additional shares of 6 per cent cumulative preferred stock of which there is at present authorized and outstanding $397,000. The company also desires to issue $60,000 of twenty-year 4½ per cent first mortgage gold bonds, making $2,460,000 outstanding of an authorized issue of $2,500,000. The proceeds from the sale of the new securities are to be expended for improvements.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The Chicago & Milwaukee Electric Railroad was sold on May 1 under foreclosure to the reorganization committee for $4,550,000, of which $2,500,000 was for the Illinois division and $2,050,000 for the Wisconsin division. The price now obtained for the property is $1,300,000 larger than that in 1912 when the sale was set aside by the court. The committee will at once submit to the court plans for reorganization. The property has been in the hands of receivers since January, 1908. The reorganization committee that bought in the property and represents the bondholders is composed of George M. Reynolds, president of the Continental & Commercial National Bank, chairman; E. A. Hamill, president of the Corn Exchange National Bank; W. E. Stavert, former manager of the Bank of Montreal, Ont.; Miller Lash, Toronto, Ont.; Robert Cassels, Toronto, Ont.; R. Floyd Clinch of Crerar, Clinch & Company, Chicago; E. A. Shedd of E. A. Shedd & Company, Chicago; John R. Thompson, president of the John R. Thompson Company, and H. S. Osler, Toronto, Ont.

Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio.—The Cleveland, Painesville & Eastern Railroad has been authorized by the Ohio Public Utilities Commission to issue its forty-year 5 per cent refunding and extension mortgage gold bonds of the principal sum of $28,000 for not less than 80 per cent of the par value. The proceeds are to be used to reimburse the company's treasury for $28,553 expended from income during 1915 for the construction of additions and improvements to its facilities.

Columbus, Delaware & Marion Railway, Cincinnati, Ohio.—Eli M. West, receiver of the Columbus, Delaware & Marion Railway, has applied to the Ohio courts for permission to issue $105,000 of receiver's certificates to pay the company's share for improvements, consisting of street paving in Columbus, Franklin County, Delaware and Marion, Ohio.

Fresno (Cal.) Interurban Railway.—The Fresno Interurban Railway has filed with the California Railroad Commission an application for authority to issue $141,000 face value of its stock at $80, and $250,000 of its bonds at $90, to net a total of $337,400.

Kansas City Railway & Light Company, Kansas City, Mo.—The stockholders of Kansas City Railway & Light Company, at a meeting in Chicago on April 28, unanimously agreed to trustee the common and the preferred stocks with two sets of trustees who will issue participation certificates against the trusteed stock in the ratio of two-thirds for the street railway and one-third for the light and power participation. All the stock except 500 shares was represented and the committee was authorized to try to get in this remaining stock and also to ask Judge Hook to allow an extension of the time for the deposit of stock so that all may participate on an equal basis. Stockholders elected Robert J. Dunham and Charles W. Armour as street railway trustees and John H. Lucas and T. J. Connors for the light and power stock, each two trustees to select a third. The form of participation certificate was approved.

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—Clarence G. Taylor, receiver for the Lake Erie, Bowling Green & Napoleon Railway, has filed a petition in the Federal Court at Toledo for permission to sell the road, either as a going concern or as junk. Mr. Taylor has, however, asked permission to continue the operation of the electric light and power plant at Bowling Green, which shows a profit. He asserts the railroad has been operated at a loss since its construction in 1903.

Lake Shore Electric Railway, Cleveland, Ohio.—The Lake Shore Electric Railway has been authorized by the Ohio Public Service Commission to issue its general mortgage 5 per cent gold bonds to the sum of $47,000 for not less than 85 per cent of the par value and pending the sale of the bonds may pledge them as security for a loan for not less than 60 per cent of the par value of the bonds. The money secured by the issue and disposition of the bonds is to be used to reimburse the applicant's treasury for 80 per cent of the money expended from income, within the period from Oct. 1, 1914, to Dec. 31, 1915, for the construction of additions and extensions to its facilities, of the total cost of $58,398.

Los Angeles & San Diego Beach Railway, San Diego, Cal.—The California Railroad Commission has issued an order authorizing the Los Angeles & San Diego Beach Railway to issue promissory notes for not more than two years from April 30, 1916, in renewal of other notes amounting to $53,500 at 7 per cent. These notes are to banks at San Diego and Los Angeles and range from $2,500 to $21,000 each, and if desired the maker is permitted to issue four notes of $4,750 each to the Citizens National Bank, Los Angeles, in place of notes for $19 000 authorized.

Monterey & Pacific Grove Railway, Monterey, Cal.—The California Railroad Commission recently issued an order finding the reproduction cost less depreciation of the property of the Monterey & Pacific Grove Railway, as of June 30, 1914, to be $102,541. The company, which operates an electric railway in Monterey and Pacific Grove, is controlled by the Coast Valleys Gas & Electric Company, and is conducted as a subsidiary of that company. The valuation case was upon the commission's own initiative for the general purpose of ascertaining and reporting certain facts and estimates of cost which entered into the valuation of the property of various railroad corporations in California.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Howard B. Smith, a stockholder of the Oakland, Antioch & Eastern Railway, has applied for a receiver for the company. He alleges that the company is being mismanaged. The petitioner asks that the $5,000,000 of first mortgage 5 per cent sinking fund bonds, of which $2,500,000 is outstanding, be foreclosed and the property sold at auction.

Public Service Corporation of New Jersey, Newark, N. J.—The Public Service Railway has filed with the Secretary of State of New Jersey a certificate certifying the issuance of $100,000 of 5 per cent Weehawken extension bonds of the Hudson County Railway. There are three issues of North Hudson County Railway bonds, namely, $3,000,000 of consolidated 5's, of which $2,998,000 is outstanding; $1,500,000 of improvement 5's, of which $1,291,000 is outstanding, and $100,000 of Weehawken extension bonds. The last-mentioned issue fell due on Feb. 1, 1915, and was extended for a period of thirty years. The certificate filed with the State covers that issue. Garret A. Hobart, Jr., has been elected a director of the Public Service Corporation of New Jersey and subsidiary companies. Mr. Hobart succeeds the late Thomas Dolan. He will serve until 1915. Other directors were re-elected.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has deposited with the Mercantile National Bank funds for the payment of the Jan. 1 coupon on the East Shore & Suburban Railway first mortgage 5 per cent bonds. The company has also deposited with the First Federal Trust Company funds for the payment of the principal instalment of the Oakland Traction Company 6 per cent equipment notes, which matured on Jan. 1, 1916. This payment will reduce the amount of these notes outstanding from $126,000 to $95,000.

Southern Traction Company, Dallas, Tex.—The St. Louis Union Trust Company, syndicate manager, has issued a notice to the subscribers to the Southern Traction Company of an offer to purchase all the securities held by the syndicate. Practically all the stock and the bonds of the road are owned in St. Louis. The notice says that the offer, which has been accepted, is subject to examination of the property to be concluded on or before June 15, 1916. If this is satisfactory it is proposed that a definite contract be entered into under which it is expected that payment will be made for securities not later than Aug. 1, 1916. The outstanding securities of the company include $5,000,000 of common and $2,000,000 of preferred stock as well as $6,000,000 of first mortgage 5 per cent gold bonds and $500,000 of second mortgage 5 per cent gold bonds. The company operates an interurban service from Dallas to Waco, 96 miles, and from Dallas to Corsicana, 56 miles, and also local lines in Waco, Corsicana and Waxahachie. With sidings and turn-outs, and 6.5 miles in Dallas operated under trackage rights, the company has 184.5 miles of track. It began operations Jan. 1, 1914.

Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—J. S. Orler & Company, Boston, Mass., are offering at 97½ and accrued interest the twenty-five year 6 per cent first mortgage bonds of the Tuscaloosa Railway & Utilities Company, dated July 1, 1915. Of an authorized issue of $1,000,000 a total of $800,000 has been issued. These bonds are available in denominations of $1,000, $500 and $100, and they are subject to call at 102 and interest on and after July 1, 1918. The Tuscaloosa Railway & Utilities Company was created in October, 1915, by the consolidation of the Belt Steam Railway and the Tuscaloosa Ice & Light Company. The railway was operated as a steam line until 1914, at which time it was extended and electrified. It is strictly a belt and terminal railway, handling freight and passengers to and from all railway stations. It has interchange tracks with all steam railroads and spurs and sidings to local industrial houses. The company controls all of the local utilities with the exception of the municipally owned waterworks.

Worcester & Warren Street Railway, Brookfield, Mass.—The Massachusetts Public Service Commission has authorized the issue of 106 additional shares of stock of the Worcester & Warren Street Railway, and $72,000 of twenty-year 5 per cent bonds of the company to be sold for not less than 90, to pay floating debt incurred in the purchase of the Warren, Brookfield & Spencer Street Railway and improvements on the property.

DIVIDENDS DECLARED

American Railways, Philadelphia, Pa., quarterly, 1¾ per cent, preferred.

Boston (Mass.) Elevated Railway, quarterly, one-half of 1 per cent.

Bristol & Plainville Tramway, Bristol, Conn., 2 per cent.

Cumberland County Power & Light Company, Portland, Me., quarterly, 1½ per cent, preferred.

Detroit (Mich.) United Railway, quarterly, 1¾ per cent.

Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.

Lehigh Valley Transit Company, Allentown, Pa., quarterly, 1¼ per cent, preferred.

Rio de Janeiro Tramway, Light & Power Company, Toronto, Ont., quarterly, 1¼ per cent.

Sao Paulo Tramway, Light & Power Company, Toronto, Ont., 2½ per cent.

Union Street Railway, New Bedford, Mass., quarterly, 2 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$146,546	$96,806	$49,740	$46,830	$2,910
1 " "	'15	139,636	94,395	45,241	44,664	577
9 " "	'16	1,463,961	937,304	526,657	408,023	118,635
9 " "	'15	1,511,809	964,526	547,283	390,643	156,640

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

1m., Mar.,	'16	$63,794	*$35,896	$27,898	$17,653	$10,245
1 " "	'15	63,222	*28,927	34,295	17,695	16,600
12 " "	'16	792,384	*416,006	376,378	212,798	163,580
12 " "	'15	783,153	*373,008	410,065	209,717	200,348

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

1m., Feb.,	'16	$7,282	*$7,721	†$439	$1,094	†$1,533
1 " "	'15	6,277	*7,216	†989	1,127	†2,116
12 " "	'16	116,877	*97,005	19,872	13,420	6,452
12 " "	'15	122,326	*102,007	20,319	13,282	7,037

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Mar.,	'16	$100,095	*$60,568	$39,527	$29,793	$9,734
1 " "	'15	83,439	*59,227	24,212	29,338	†5,126
12 " "	'16	1,142,425	*737,509	404,916	357,353	47,563
12 " "	'15	1,052,266	*704,083	348,183	344,499	3,684

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Mar.	'16	$639,780	$19,079	$620,701	$44,716	$575,985
1 " "	'15	347,372	12,315	335,057	40,833	294,224
12 " "	'16	5,295,093	190,217	5,104,876	499,368	4,605,508
12 " "	'15	3,941,424	131,272	3,810,152	455,000	3,355,152

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO.

1m., Mar.,	'16	$288,094	*$169,962	$118,132	$44,375	$73,757
1 " "	'15	254,656	*150,327	104,329	39,225	65,104
12 " "	'16	3,201,382	*1,891,333	1,310,049	489,482	820,567
12 " "	'15	3,075,551	*1,863,999	1,211,552	475,816	735,736

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., Mar.,	'16	$1,353,713	*$728,071	$625,642	$423,203	$202,439
1 " "	'15	1,138,211	*610,462	527,749	367,264	160,485
12 " "	'16	15,192,163	*8,095,324	7,096,839	4,659,042	2,437,797
12 " "	'15	14,031,558	*7,523,913	6,507,645	4,261,763	2,245,882

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Mar.,	'16	$751,504	$545,299	$206,205	$97,847	‡$130,775
1 " "	'15	621,542	432,428	189,114	98,297	‡112,268
9 " "	'16	6,586,804	4,477,871	2,108,933	886,638	‡1,429,356
9 " "	'15	5,974,544	4,360,129	1,614,415	884,532	‡924,545

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., Mar.,	'16	$209,374	*$139,620	$69,754	$66,371	$3,383
1 " "	'15	188,728	*110,258	78,470	62,964	15,506
12 " "	'16	2,692,080	*1,568,691	1,123,389	802,370	321,019
12 " "	'15	2,543,661	*1,441,273	1,102,388	756,302	346,086

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Mar.,	'16	$231,887	*$141,868	$90,019	$63,645	$26,374
1 " "	'15	198,612	*120,944	77,668	64,663	13,005
12 " "	'16	2,563,131	*1,532,202	1,030,929	753,772	277,157
12 " "	'15	2,552,109	*1,543,449	1,008,660	732,515	276,145

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

1m., Feb.,	'16	$145,763	*$99,442	$46,321	$36,617	$9,704
1 " "	'15	148,940	*694,347	54,593	36,208	18,385
12 " "	'16	1,927,491	*1,215,644	711,847	434,099	277,748
12 " "	'15	2,362,731	*1,280,569	1,082,162	438,096	644,066

GRAND RAPIDS (MICH.) RAILWAY

1m., Mar.,	'16	$107,618	*$67,418	$40,200	$14,086	$26,114
1 " "	'15	93,284	*69,168	24,116	13,706	10,410
12 " "	'16	1,200,414	*829,505	370,909	167,168	203,741
12 " "	'15	1,276,581	*835,091	441,490	161,998	279,492

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

1m., Feb.,	'16	$24,165	*$16,077	$8,088	$5,524	$2,565
1 " "	'15	18,765	*13,918	4,847	5,598	†751
12 " "	'16	286,881	*160,712	126,169	66,358	59,811
12 " "	'15	272,330	*178,326	94,004	67,063	26,941

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1m., Mar.,	'16	$3,405,051	$1,309,213	$2,095,838	$1,105,187	‡$939,070
1 " "	'15	3,055,708	1,143,052	1,912,656	1,111,794	‡857,141
9 " "	'16	26,458,814	10,395,029	16,063,785	10,182,821	‡6,303,841
9 " "	'15	24,912,836	9,690,490	15,222,346	9,781,320	‡5,878,138

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

1m., Feb.,	'16	$141,880	*$88,509	$53,371	$28,725	$24,646
1 " "	'15	121,300	*75,277	46,023	27,204	18,819
12 " "	'16	1,739,749	*1,070,285	669,464	334,159	335,305
12 " "	'15	2,008,002	*1,112,669	895,333	322,405	572,928

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., Feb.,	'16	$597,214	*$432,928	$164,286	$183,795	†$19,509
1 " "	'15	591,691	*385,442	206,249	181,472	24,778
12 " "	'16	7,563,813	*4,811,870	2,751,943	2,186,819	565,125
12 " "	'15	8,268,052	*4,973,698	3,294,354	2,129,059	1,165,295

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

ROCHESTER-LOCKPORT OPERATION APPROVED

Public Service Commission Accepts Findings of Its Expert With Respect to Buffalo, Lockport & Rochester Line

The Public Service Commission for the Second District of New York has received and adopted the report of Charles R. Barnes, electric railway inspector of the commission, upon an inquiry into the condition of the Buffalo, Lockport & Rochester Railroad with regard to safety of operation made when the district attorney of Monroe County, John F. Barrett, transmitted to the commission the recommendations of the Grand Jury which investigated the Elm Grove wreck in which one man was killed on the road last July. Mr. Barnes' findings are that the road is now operated "under modern and approved methods." Mr. Barnes says in his report:

"Notwithstanding that this road is not equipped with a block-signal system, it is operated under modern and approved methods; although with the possibility of man-failure always present, no absolute guarantee of safety in operation can ever be predicated. With the exceptions of the possible necessity for adoption by it of a higher standard of track maintenance, for additions to its snow-fighting equipment, illumination of crossing signs and necessary future replacements of trolley wire, no recommendations affecting the element of safety for immediate improvement in physical conditions, equipment, or methods of operation which could be made within reasonable financial limits, are at present deemed necessary by me."

Mr. Barnes divides his report into thirty-five conclusions with regard to the condition of the road. Many of these show that conditions have been materially improved since the fatal accident of last July, in which a passenger car collided with a work train which was standing on the main track. For instance, since then no work train has been permitted on the main track during the time when passenger cars are operated, except on urgent necessity, and then only with the permission of the general manager.

Reviewing the financial history of the road, Mr. Barnes has this to say of the adoption of a block-signal system, which he believes would go further than anything else toward establishing safety of operation:

"Several interurban railroads in this public service district similar in character to this one, are equipped with automatic track circuit control block signals. Supplementing methods employed on this road, such a system of signal equipment would be an added element of safety in the operation of it. The cost of such a system would exceed $100,000, and its maintenance would materially increase operating expenses. In view of the present and apparently near future prospective earnings of the company, the time when it will be financially able to make such an expenditure and provide for necessary increased operating expenses is problematic. It should, however, be done as soon as financial conditions permit."

Mr. Barnes' report was made after a careful physical examination of the roadbed and equipment, frequent rides on the cars to observe the manner in which employees observed the rules, and a study of the rules, operating records and other reports of the company as to up-keep, etc. Mr. Barnes says that the telephone system for dispatching is properly installed and operated; that the rules in book and time-table are proper for safe operation; that the rate of speed required by time-table is not excessive nor such as to increase probability of accident; that limited trains are eliminated so that all trains meet on the same switches on each run; that when extra service is required it is furnished by two or three-car trains and not in separate trains with separate schedules; and that the safety of operation has been materially increased by new rules of last September with regard to freight trains, requiring them to clear passenger trains by five minutes, reporting to the dispatcher when clear.

EAST CLEVELAND FARE INSUFFICIENT

The check of patrons of the Cleveland (Ohio) Railway living in East Cleveland made a few weeks ago on the order of Fielder Sanders, street railway commissioner, shows that the average length of the ride is 4.71 miles. A total of 10,468 people used the cars within twenty-four hours. A computation made by the company officials, it is claimed, would indicate that the rate of fare for East Cleveland residents would have to be increased from 3 cents to 7.3 cents before the company could afford to operate the lines, estimating that 30 per cent of the riders used transfers. The actual cost of service per passenger, according to the estimate, is 5.61 cents.

Mr. Sanders said he would ask for a meeting of East Cleveland officers to determine on a rate of fare that will relieve the city patrons from paying a portion of the expense for operating the cars for East Cleveland. The present franchise on Euclid Avenue does not expire until 1921. Under it East Cleveland has a contract with the company that the fare shall be the same as in the city.

BAY STATE FARE HEARINGS PROGRESSING

Cross-examination of R. M. Feustel, valuation expert of the Bay State Street Railway, continues to be the leading feature of the fare hearings before the Massachusetts Public Service Commission. At the session of April 26 details were given of the contract under which the engineering firm of Sloan, Huddle, Feustel & Freeman, Madison, Wis., agreed to make a study and survey of the Bay State company's property. The work included a complete field examination combined with a study of book records, and also included plans for an investigation of the rates charged by the different traction companies of the Middle West and Eastern States, for suburban and interurban service. The firm's terms for the above work were $50 a day and expenses for the time of any of the principals, and $20 a day and expenses for the time of the field engineer in charge, with 40 per cent on the pay-roll for the staff. The company also agreed to pay all traveling, general office and general field expenses for the staff. Subsequently the work was developed to cover the allocation of the investment and revenue requirements of ninety-six selected routes in Massachusetts.

Mr. Feustel stated that the probability of some diminution in traffic in case of increased fares was conceded in studying the revenue requirements. In general, a loss of 5 per cent was taken in the cities on the system, and on certain outside lines where a doubling of the fare is planned, due to adding a new fare zone, a 15 per cent maximum local traffic loss was estimated. Most of the additional revenue required is to come from the increase in the fare unit, only a small portion coming from zone changes. Only nineteen new zones are contemplated, and as far as possible these are added at so-called neutral points where the through traffic is relatively small. As far as possible the attempt has been made to eliminate discriminations in fares for particular lengths of haul. The short-haul passenger naturally will be the first to withhold patronage because of the fare increase. The witness said that whereas a fare increase would doubtless tend to stimulate jitney competition, there is no way in which the reception of an increase can be predicted for a given community. Mr. Feustel said that his firm was not employed by the company in the capacity of efficiency engineers charged to attempt a full solution of the company's problem of securing increased revenue.

In responding to inquiries the witness stated that an attempt had been made to design a zone system of fares for the Bay State company, but it was found impracticable from the actual physical collection standpoint through a greater part of the territory close around Boston, even out as far as Reading on the north and Brockton on the south. In regard to interurban lines in the Middle West, the witness stated that while most of these operate on a private right-of-way, the lines from Fort Wayne (Ind.) to Auburn and Springfield and from Lafayette to Soldiers' Home compare with the Bay State intercity lines in being located on highways. A passenger fare of 2 cents per mile is common, and the fares are arranged in 5-cent increments. Owing to zone changes in a few cases on the Bay State system the proposed new fare is 12 cents, as against 5 cents at present. The witness said that there must be some portions of the Bay State system where the introduction of the one-man car would result in an increase in net revenue through the saving in expense secured, but he disclaimed any general advocacy of such units. At the close of the April 28 hearing it was agreed to hold only three sessions during the week ended May 6, and on alternate days.

REROUTEING AND CAR TYPES CONSIDERED AT TOLEDO

A meeting of the Council committee appointed to consider plans for rerouteing cars and improving the service of the Toledo Railways & Light Company was held on April 27. A number of Summit Street merchants protested against the proposed removal of two or three lines from that thoroughfare temporarily until additional cars can be secured. Councilmen replied that the merchants should think of the entire city instead of merely their own businesses and the street on which they are located.

The Toledo *Times* on April 24 suggested that before going too far with the rerouteing plan the wishes of the people be secured.

The company has been trying out different types of cars to ascertain which would be best fitted for relieving congestion and furnishing the proper service. A motor car of the front entrance, center exit type, was sent from Cleveland, and tested during the rush hours at the Willys-Overland plant. Peter Witt, Cleveland, presented a front entrance, center exit car of his own design. Dwight Dean, of the G. C. Kuhlman Car Company, and others, have also conferred with the company officials.

D. U. R. Baseball Calendar.—The Detroit (Mich.) United Railways has issued a calendar for the baseball season, which gives the schedule of the Detroit team. The "at home" dates are printed in red and the others in black. The months are prefixed by "Practice Safety First."

Disinfecting Little Rock Cars.—The Little Rock Railway & Electric Company, Little Rock, Ark., is installing in all of its cars on all lines the Sanzone system of deodorizing and disinfecting. This is said to be the only system which kills all germs and animal life with formaldehyde gas not necessarily by actual contact.

Daylight Saving Schedule Adopted.—The Winnipeg (Man.) Electric Railway has changed its schedule to conform with the "Daylight Saving" by-law recently passed by the City Council advancing the time at the City Hall one hour. A motion made in the City Council to increase the time for the sale of workingmen's tickets one hour in the morning and evening was defeated.

Car-Capacity Ordinance Defeated.—An ordinance proposed to the General Council by the Allied Civic Clubs of Louisville, Ky., which sought to impose a fine whenever more than ten passengers had to stand in a car of the Louisville Railway, was voted down unanimously in the Council when the railroad committee returned the measure with an unfavorable report.

Hearing on McKinley Fares Concluded.—The hearing in the case before the Interstate Commerce Commission on the proposed increase in fare from 5 to 10 cents over the Illinois Traction System between St. Louis and Granite City was concluded in St. Louis on April 25. The testimony of both sides was largely a reiteration of that presented on the two previous days of the hearing as reported in the ELECTRIC RAILWAY JOURNAL of April 29, page 840.

Hit the Sunday Trail Over the Railway.—The Kansas City (Mo.) Railways is circulating widely, in Kansas City and on trains in surrounding towns, a folder advertising the meetings of "Billy" Sunday, scheduled to begin in that city on April 30. The folder bears a plan picture of the tabernacle, data on the building and its location, and directions for getting there by electric railway from various parts of the city. There is also a small map of the city showing the location of the tabernacle, and a list of other interesting places to visit. The 5-cent fare that prevails to all parts of the city is emphasized. The catch-line on the folder is "Hit the Steel Trail." The company will carry cards on the cars passing the tabernacle indicating that fact, and will advertise the meetings on all its cars.

Through Routes and Exchange of Transfers Ordered.—The Public Service Commission for the First District of New York has ordered the Third Avenue Railway, the Belt Line Railway Corporation and the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway and the Second Avenue Railroad to establish through routes and exchange transfers so that passengers may ride over the Queensboro Bridge from any of these lines without the payment of an additional fare. The Belt Line, the Forty-second Street Company and the Third Avenue are ordered to construct such interchange or connecting tracks as may be necessary to permit of the operation of the routes required by the order of the commission.

Commission Holds Extension Unjustified.—In the case of the petition to the Railroad Commission of California to compel the Santa Barbara & Suburban Railway to construct an extension from its present terminus at Haley and Milpas Streets, in Santa Barbara, to the Santa Barbara Cemetery, the commission held that the estimated cost of the proposed extension would approximate $78,552, with operating expenses and taxes $19,054 per annum, while the estimated revenue would amount to only $6,160, effecting an annual loss to the company of approximately $12,894; that under such conditions the construction of this extension was not warranted, particularly in view of the fact that a local auto bus line proposed putting several buses in operation along the same route.

Certificates of Convenience and Necessity for Illinois Jitneys.—Jitney buses cannot operate in cities of Illinois along specified routes unless they have a certificate of convenience and necessity. This was announced in a decision handed down by the Illinois Public Utilities Commission on May 1. The decision was made in the case of the Tri-City Railway, Moline, and the Rock Island & Eastern Traction Company, Rock Island, against the Illinois Taxicab Company and others. The complaint against a number of defendants who were doing a cab service and not operating along certain routes was dismissed. The commission directed that all those who operate along given routes for hire must desist until they obtain a certificate of convenience and necessity. The case has been under consideration by the commission for some time.

Market Street Association Takes Action Against San Francisco Jitneys.—The Market Street Association of San Francisco, representing $50,000,000 worth of property, claims that owing to the traffic congestion caused by jitney buses on Market Street property controlled by the association has depreciated 25 per cent in value. For this reason it will ask the Board of Supervisors to reduce the annual Market Street property assessments by about $600,000. The association points out that there are eight lines of vehicles on Market Street and, rather than risk the danger of crossing, shoppers buy elsewhere, thereby injuring business. The association claims further that jitney drivers are constantly violating the law, due to an insufficient number of traffic policemen, and if the number of officers is increased it will mean an additional burden on the taxpayers, who will also be called upon to make up the reduction of $600,000 for which the association asks.

Automobile Competition in Havana.—The Havana Electric Railway, Light & Power Company, Havana, Cuba, has to contend with about 1000 Fords that take people nearly everywhere charging 20 cents for one or more passengers. Many of these cars have been in service more than a year. The price of gasoline in Havana on April 26 was 40 cents to 41 cents. Many of the cars are owned by one individual, who rents them out at $3 a day, the driver getting all over that amount. The cabs in the city are operated in much the same manner, but they charge only 10 cents. It is estimated that there are nearly as many cabs as Fords. The people in Havana ride more than do the people in the States; in fact, very few persons in Havana ever walk more than three blocks. Despite this competition the statistics of the railway department of the Havana Electric Railway, Light & Power Company for the year ended Dec. 31, 1915, show a decrease of only 2.84 per cent in passenger earnings. The operating expenses, however, were decreased by 8.11 per cent and net earnings from operation actually increased 6.72 per cent.

Personal Mention

Mr. Charles J. Murphy, Brookston, Ind., has tendered his resignation as a member of the Public Service Commission of Indiana to Gov. Samuel M. Ralston.

Mr. Anthony Deahl, an attorney of Goshen, Ind., has been appointed by Gov. Samuel M. Ralston to the Public Service Commission to succeed Mr. Charles J. Murphy, resigned.

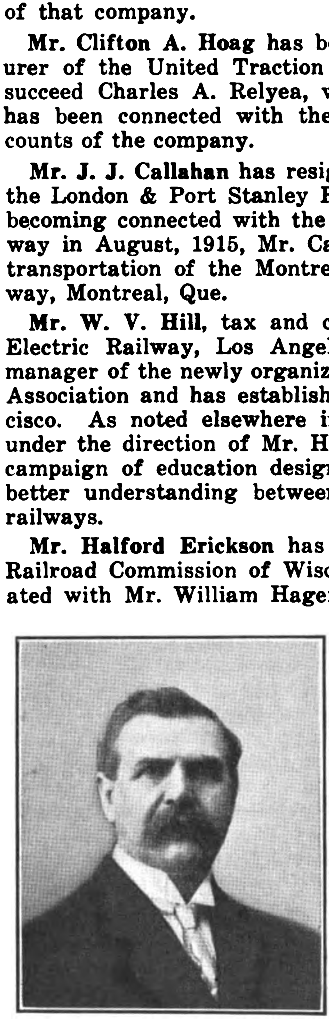
Mr. J. W. Lee, Jr., publicity agent of the Pennsylvania Railroad, who resigned recently, will leave the company's service on May 15. He will be associated in business in New York with Mr. Ivy L. Lee.

Mr. Peter Witt, formerly street railway commissioner at Cleveland, Ohio, has been engaged by the Cincinnati (Ohio) Traction Company to study the transfer problem in connection with the pending revision of the terms of the franchise of that company.

Mr. Clifton A. Hoag has been appointed assistant treasurer of the United Traction Company, Albany, N. Y., to succeed Charles A. Relyea, who died recently. Mr. Hoag has been connected with the bureau of departmental accounts of the company.

Mr. J. J. Callahan has resigned as operating manager of the London & Port Stanley Railway, London, Ont. Before becoming connected with the London & Port Stanley Railway in August, 1915, Mr. Callahan was superintendent of transportation of the Montreal & Southern Counties Railway, Montreal, Que.

Mr. W. V. Hill, tax and contract agent for the Pacific Electric Railway, Los Angeles, Cal., has been appointed manager of the newly organized California Electric Railway Association and has established headquarters in San Francisco. As noted elsewhere in this issue the organization, under the direction of Mr. Hill, will undertake a statewide campaign of education designed to establish and maintain better understanding between the public and the electric railways.


HALFORD ERICKSON

Mr. Halford Erickson has resigned as chairman of the Railroad Commission of Wisconsin and will become associated with Mr. William Hagenah in making appraisals and other investigations of public utility properties. He will make his headquarters in the First National Bank Building, Chicago, Ill. Mr. Erickson had served on the Railroad Commission of Wisconsin since its creation in 1905, and the enviable reputation which this commission has gained is in a large measure due to Mr. Erickson's efforts and ability. He was born and educated in Sweden, and came to the United States in 1884. He continued his education in Minneapolis, Minn., and entered the service of the Chicago, St. Paul, Minneapolis & Omaha Railroad in 1890. After serving in various capacities with that company he was appointed a labor commissioner of Wisconsin in 1896. Mr. Erickson continued in that office until 1905, when he was appointed a member of the original Railroad Commission of Wisconsin by Governor La Follette.

Mr. Frank N. Robinson has been appointed assistant secretary of the Public Service Commission of the First District of New York to succeed Mr. Matthew J. Harrington, resigned. Mr. Robinson has been the city hall and political reporter for the *Evening Mail* for several years, and for the last three years has been the Albany legislative correspondent for that paper. He began newspaper work in New York City in 1900 as a reporter for the Church News

Association, and later went to the New York City News Association. While with the latter association he was assigned to cover the Public Service Commission during the lengthy negotiations over the dual contracts, gaining wide information as to the activities of the commission.

Mr. Walton M. Wentz, formerly information clerk in the publicity department of the Pennsylvania Railroad, has been appointed assistant publicity agent of the company. Mr. Wentz has been with the Pennsylvania Railroad since December, 1902. He entered the service of the company as a clerk in the superintendent's office at Baltimore, and after six years in that department he was transferred to the office of the publicity agent in Philadelphia, where for the last two years he has been information clerk.

Mr. George B. Harley, formerly an assistant in the office of the Publicity agent of the Pennsylvania Railroad, has been appointed publicity agent. He will succeed Mr. J. W. Lee, Jr., whose resignation takes effect on May 15. Mr. Harley has been connected with the publicity department of the Pennsylvania Railroad since June, 1914. He entered the college department of the University of Pennsylvania in the class of 1901, and was transferred to the law school of the university, graduating with the class of 1902. He was on the reportorial staff of the Philadelphia *Press* from 1908 to 1910, the Philadelphia *News Bureau* from 1910 to 1914, and from February to June, 1914, he was on the staff of the Philadelphia *Public Ledger*.

OBITUARY

William Wallace, superintendent of the Eighth Street division of the Cincinnati (Ohio) Traction Company, died at Seton Hospital in Cincinnati on April 26 as a result of injuries sustained by being struck by an automobile some days previously. Mr. Wallace entered the service of the company as driver of a horse car.

Stephen Kendall Poole, secretary of Poole Brothers, Chicago, Ill., and the youngest son of George A. Poole, the founder of the company, is dead. Mr. Poole was born in Chicago on Aug. 2, 1883. He was educated in the Chicago public schools and was graduated from the Massachusetts Institute of Technology. He is survived by a widow and two children.

William H. Capel, secretary of the New England Westinghouse Company and the J. Stevens Arms & Tool Company, Springfield, Mass., died suddenly on April 23. Mr. Capel was born in New York City in 1867. In April, 1899, he entered the employ of the Westinghouse Electric & Manufacturing Company in New York. For several years past he had been closely associated with Mr. L. A. Osborne, vice-president. On June 2, 1915, he was elected secretary of the companies mentioned previously.

Julius E. Rugg, for fifty years actively employed in street railway service in Boston and vicinity, and for nine years superintendent of the transportation department of the Boston Elevated Railway, died at his home in Brookline on April 19. Mr. Rugg was born at Rindge, N. H., in 1838. He went to Boston in 1863 and entered the employ of the Lynn & Boston Street Railway as a conductor. When the Highland Street Railway was organized Mr. Rugg became its superintendent, and upon the consolidation of the road with the West End Street Railway he went to Minneapolis, serving there for a time as superintendent of the local street railway system. After a term as superintendent of the Citizens' Traction Company, Pittsburgh, Pa., Mr. Rugg returned to Boston in 1896 to become superintendent of the West End company. From 1898 to 1907 he was superintendent of transportation of the Boston Elevated Railway, and during the last years of his active railway life was head of the employment and discharge office. Among his inventions was a reversible car seat. Of distinguished personal appearance, Mr. Rugg was a gentleman of the old school, and his acquaintance with transportation men throughout the country was unusually extensive. He was twice married.

William B. Rockwell, manager of the Eastern Pennsylvania Railways and the Eastern Pennsylvania Light, Heat & Power Company, Pottsville, Pa., died suddenly at the Polyclinic Hospital at Philadelphia on April 30 as a result of complication following an operation performed on April 27. Mr. Rockwell had been connected with the properties at Pottsville for six years. He was born in New York City, but was reared in Scranton, Pa., where his father was a coal operator. Mr. Rockwell entered business in Scranton, and lived in that city for more than thirty years. He was one of the pioneers of the electric railway field, having taken an active part in the construction of the Van Depoele road in Scranton in 1885. Later he assisted in building electric railways at Athens, Pa., and Middletown, N. Y. He also assisted in constructing the Staten Island Midland Electric Railway, and in 1895 planned and built Midland Beach, on the southern shore of Staten Island, now one of the most popular beach resorts around New York City. He left Staten Island to become manager of the Syracuse, Lake Shore & Baldwinsville Railway, and then of the Syracuse, Lake Shore & Northern Railway, but resigned the latter position to become general manager of the Syracuse & Suburban Railroad. It was from the Syracuse & Suburban Railroad that he resigned in June, 1910, to become connected with the properties in Pottsville. Mr. Rockwell is survived by his widow, two daughters and two sons, Mr. J. C. Rockwell, manager of the electrical department of the Manila Electric Railroad & Light Company, Manila, Philippine Islands, and Mr. R. W. Rockwell, Philadelphia. Mr. Rockwell was unusually successful in his relations with the public and with his men. Both the Pottsville *Evening Chronicle* and the Pottsville *Journal* of May 1 devoted their leading editorials to Mr. Rockwell and acknowledged his death as a great loss to the community. Mr. Rockwell's characteristics may, perhaps, be summed up best in the words of the *Journal*, which said that "he had the heart of a boy and the soul of a gentleman."

NORFOLK FRANCHISE REPORT BEFORE COUNCIL

The special joint committee of the Council of Norfolk, Va., which has been considering the matter of new franchises to be granted to the Virginia Railway & Power Company submitted its report to the Council on the evening of May 2. Consideration of the matter was postponed to a meeting of the Council as a committee of the whole to be held the latter part of the month. The committee says that in an effort to agree on a franchise that would eliminate all the differences which exist between the city and the company and to avoid the possibility of differences during the term of the proposed grant and at the same time reach a conclusion acceptable to both the city and the company, the committee went into the matter with the company, considering it from the standpoint of cooperation and mutual understanding.

It developed during the consideration of the matter that the various differences could be adjusted best by making new franchises and the surrender of the old ones, rather than by trying to amend the existing franchises. There are three operating subsidiaries, however, involving the interests of three separate sets of stock and bondholders, and in order to avoid any complications it was agreed to draw three separate grants similar in terms and conditions. The franchises now in force expire at different times and contain conditions at variance with each other. The committee gives at length its reasons for believing that the proposed ordinances are preferable to the several franchises now in existence.

A digest of the terms of the proposed franchises was published in the ELECTRIC RAILWAY JOURNAL of April 22, page 792. It was stated in that account that some of the lines in Norfolk were standard gage and some 5-ft. 2-in. gage and that the new grant prescribes that "all of the lines shall be standardized." This was, perhaps, somewhat misleading. The ordinance provides for the gage to be made uniform at 5 ft. 2 in. The fare on the old city division is at present 5 cents or six tickets for a quarter. The tickets are not sold on the cars, but at stations in different parts of the city. The other fare conditions as given previously in the ELECTRIC RAILWAY JOURNAL are correct.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Tampa & Eastern Traction Company, Tampa, Fla.—Application has been made by this company for a charter to construct an electric line from Tampa to Lakeland via Plant City. Capital stock, $750,000. Headquarters, Tampa. Officers: F. W. Cole, president; E. J. Binford, vice-president and general counsel; Frank L. Cooper, secretary, and F. M. Williams, treasurer. [April 15, '16.]

FRANCHISES

Miami, Fla.—The Miami Traction Company has received a franchise from the Council to construct a 1-mile extension on Biscayne Drive, Miami.

***Tallahassee, Fla.**—A. S. Metzner and associates have asked the Council for a franchise to construct a line on Depot, Gaines, Monroe and Copeland Streets and Park Avenue. Mrs. F. R. S. Phillips, secretary Tallahassee Boosters' Club, may give information.

Atlanta, Ga.—The Federal Construction Company has received a franchise from the Board of Aldermen of Atlanta to construct an electric railway from the city limits to Spring and Walton Streets. [Feb. 12, '16.]

Pocatello, Idaho.—The Pocatello Traction & Interurban Company has received a fifty-year franchise from the Council to construct and operate an electric line in Pocatello. [March 18, '16.]

Wichita, Kan.—The Arkansas Valley Interurban Railway has asked the Council for a franchise to construct a line over certain streets in Wichita. This is in connection with a proposed extension down the Arkansas River to Winfield and Arkansas City.

Newport, Ky.—The City Commissioners have granted the Cincinnati, Newport & Covington Street Railway a twenty-year franchise in Newport.

Newburgh, N. Y.—The Orange County Traction Company reports that it has received a thirty-year franchise from the Council to construct an extension on Lake Street from Broadway to the Newburgh Bleachery.

Cincinnati, Ohio.—The Cincinnati Traction Company has received a franchise from the Council to construct an extension of the Avondale line to Bond Hill.

TRACK AND ROADWAY

Calgary, Alta.—The Council of Calgary has adopted the recommendation of the city commissioners for the construction of a temporary street railway line to Sarcee military camp. The cost is estimated at $6,000.

Visalia Electric Railroad, Exeter, Cal.—This company will construct an extension from a point a half mile below Terminus to Point of Rocks. The cost of the extension will be about $5,000.

Marin County Electric Railway, Mill Valley, Cal.—This company's project to provide street car service in Mill Valley and the construction of a line from the Northwestern Pacific Railroad station in Mill Valley to the Cascades has been abandoned and the recently constructed mile of track is being torn up. The town trustees refused further extensions of time to the promoters within which the road should be constructed and ordered a $3,000 bond forfeited. [Sept. 4, '15.]

Willimantic & Manchester Street Railway, Hartford, Conn.—This company has awarded a contract to the C. E. Coon Construction Company, Cleveland, Ohio, for the construction of a line from Manchester Green to Willimantic, about 20 miles. The contract, it is reported, will involve an expenditure of about $1,000,000. John T. Henderson, Hartford, engineer. [May 22, '15.]

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—This company proposes to extend its North Shore line to Southland Seminary. The construction will include a bridge over Coffee-Pot Bayou.

Alton & Jacksonville Railway, Alton, Ill.—It is reported that this company's line may be extended from Jerseyville to Jacksonville.

Chicago Heights (Ill.) Street Railway.—It is reported that this company will construct an extension this summer on Fourteenth Street and will later connect with Sixteenth Street by West Side loop.

Evansville (Ind.) Railway.—This company will extend its Michigan and Garvin Street line five blocks from the present terminal at Oregon Street to the plant of the Faultless Castor Company.

Newport & Alexandria Interurban Railroad, Newport, Ky.—Negotiations are under way between Gotlieb Hartweg, Col. Louis C. Wildrig, president of the Alexandria Turnpike Company, Newport, and others, for the purchase of a portion of the Alexandria turnpike as a right-of-way for this company's proposed line from Cincinnati to a point four miles beyond Fort Thomas. The company also intends to purchase a right-of-way over the Grand Avenue Turnpike Company's holdings from Newport to Fort Thomas. It is stated that the company plans to arrange a right-of-way over the tracks of the Cincinnati, Newport & Covington Railway from Cincinnati to the intersection of Tenth Street and Grand Avenue, Newport. The proposed route after reaching Grand Avenue is to continue to Fort Thomas Avenue, thence to the Alexandria turnpike. [March 18, '16.]

***Mandeville, La.**—It is reported that plans are being made to construct a line from Mandeville to Madisonville and Hammond, about 25 miles. The Town Council of Mandeville may be able to give further information.

Boston (Mass.) Elevated Railway.—Work has been begun by this company on the construction of an extension from the Sullivan Square terminal to the Boston & Maine station in Everett, about 1 mile.

Berkshire Street Railway, Pittsfield, Mass.—This company has purchased 5000 cedar ties which it proposes to use as an experiment. Chestnut ties are in general use, but it is believed that the cedar ties will last longer.

Detroit (Mich.) United Railway.—It is reported that the Detroit United Railway has agreed to accept the right-of-way and the franchises granted the Highland Park & Royal Oak Railroad, and will extend its tracks out Oakland Avenue, Highland Park, through Greenfield Township to Royal Oak, connecting with the Rochester interurban line. It is stated that the route has been donated to the Detroit United Railway by the Troyoak Land Company, and the contract with the company stipulates that the road be built and cars placed in operation within two years.

St. Joseph, Mich.—In reply to an inquiry, M. W. Stock advises that he is not interested in the construction of an electric railway from St. Joseph to Michigan City, as reported in the ELECTRIC RAILWAY JOURNAL for April 22.

Kansas City (Mo.) Railways.—Work has been begun by this company on the reconstruction of its track on Eighteenth Street from Main Street to Woodland Avenue. The city widened Eighteenth Street 15 ft. and thus necessitated a removal of the street car tracks to the center of the thoroughfare. The tracks are being laid on new sawed-oak ties on a solid concrete base. It is estimated that the cost will be about $75,000.

Great Falls (Mont.) Street Railway.—James R. Hobbins, superintendent of the Great Falls Street Railway, reports official authorization of extensions of the line on Sixth Avenue South to Sixteenth Street, thence Third Avenue North, thence to Fourth Street, making a complete loop for the South Side. An extension will also be built from the Eighth Avenue line at Fifteenth Street, where it will connect with the new Fourth Avenue line, extending east from Fifteenth Street to Thirty-sixth Street, or Boston Heights, where it will connect with the present trackage. It is expected that these extensions will be ready for use by Sept. 1. According to estimates, 6000 new ties will be required for the work and 422 tons of steel will be used for tracks. The electrical equipment has been ordered.

***New Egypt, N. J.**—The leading business men of New Egypt are making an effort to finance an electric railway from New Egypt to Bordentown, to connect with the lines of the Public Service Corporation. The length of the proposed line will be about 12 miles.

New York Municipal Railway, Brooklyn, N. Y.—Bids will be received by this company until May 16 for construction of tracks and installation of electrical equipment on its Jamaica line. For plans and further information apply to chief engineer, 85 Clinton Street.

Interborough Rapid Transit Company, New York, N. Y.—Bids will be received by the Interborough Rapid Transit Company until May 11 for the construction of Section No. 4-C of the Queensboro Bridge line, comprising a part of the Manhattan approach to the Queensboro Bridge, between Bent No. 1 near the east building line of Second Avenue and Bent No. 15 near the west building line of First Avenue and a part of the Queens approach from Bent No. 60 near the west building line of Van Alst Avenue to Bent No. 2-2, about 44 ft. east of the east building line of Ely Avenue.

Newbern-Ghent Street Railway, Newbern, N. C.—This company is contemplating the construction of an extension into Jones County.

Cleveland (Ohio) Railway.—The proposition for subway approaches to the new high-level bridge across the Cuyahoga River at Cleveland, Ohio, was approved by a vote of more than two to one at the election on April 25. This will enable the street cars to reach the bridge without danger of congestion and will insure continuous operation between the city proper and the West Side. The Cuyahoga County Commissioners will have charge of the construction of the subways and a bond issue of $1,000,000 has already been authorized for that purpose.

Lancaster Traction & Power Company, Lancaster, Ohio.—A report from this company states that it expects to construct a 2-mile extension of its lines. All material for the construction has been purchased.

***Tulsa, Okla.**—Surveys have been made for the construction of an interurban railway from Tulsa to Coweta, 25 miles. H. D. Patee, Tulsa, is interested.

Johnstown-Somerset Traction Company, Johnstown, Pa.—This company has awarded a contract to the Phoenix Bridge Company of Phoenixville for the construction of a 650-ft. steel span bridge, to be erected on the outskirts of Boswell. It is stated that the cost of construction will be about $50,000. The Cambria Steel Company has been awarded a contract to furnish 4000 tons of rails for extensions in Boswell. [March 25, '16.]

Lancaster & York Furnace Street Railway, Millersville, Pa.—At a recent meeting of the owners of the Lancaster & York Furnace Street Railway it was decided to repair and operate the line. Operation was suspended some months ago, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 22, page 187.

Eastern Pennsylvania Railways, Pottsville, Pa.—Operation has been begun on this company's extension from Pottsville to Frackville.

Providence & Danielson Railway, Providence, R. I.—Surveys have been begun by the engineers of the Water Supply Board on the new route of the Providence & Danielson Railway to be constructed by the city of Providence from North Scituate to Rockland to replace the present route, which must be abandoned because it passes through the area to be occupied by the Providence reservoir. The new line will be about 5 miles long and give a shorter route between North Scituate and Rockland than the existing one.

***Cross Anchor, S. C.**—Plans are being made to construct an electric railway from Spartanburg to Clinton via Walnut Grove, Hobbysville, Cross Anchor and Tylersville, about 35 miles. Among those interested are Dr. W. B. Patton, Cross Anchor; A. B. Calvert, Spartanburg, and T. B. Thackston, Walnut Grove.

Knoxville Railway & Light Company, Knoxville, Tenn.—The city of Knoxville has entered into a contract with the Knoxville Railway & Light Company for lighting the streets of the city for a period of ten years.

Dallas (Tex.) Consolidated Electric Street Railway.—This company has just completed the laying of 4255 ft. of double track on Commerce Street, using 103-lb. girder rail and International steel tie with 7-in. concrete paving base and bitulithic concrete with wood block heading. The cost of this construction was $78,000. The company proposes to reconstruct 2500 ft. of double track on Main Street, using similar construction and will spend $3,000 for the installation of manganese crossings.

Ogden, Logan & Idaho Railway, Ogden, Utah.—This company has awarded a contract to the Utah Construction Company of Ogden for constructing grade for the Brigham-Hot Springs cut-off.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—This company, in a proposal to the City Council, offered to eliminate the right-angle turn in the street railway at Aloha Street and Taylor Avenue, providing the Council will give the company an extension of time to erect a steel or reinforced concrete viaduct along Taylor Avenue, between Republican and Mercer Streets. Superintendent A. L. Kempster states that his company is willing to pay a fair share of the condemnation of a new street to cross private property from the intersection of Fifth Avenue North and Aloha Street, to the intersection of Taylor Avenue and Prospect Street, which would eliminate the right-angle turn. In an agreement with the traction company four years ago, it was stipulated that not later than Oct. 14, 1916, the company should erect a viaduct to carry vehicular and foot traffic on Taylor Avenue between Republican and Mercer Streets.

SHOPS AND BUILDINGS

New York Municipal Railway, Brooklyn, N. Y.—Bids will be received by this company until May 16 for the construction of elevated stations on its Jamaica line. For plans and further information apply to chief engineer, 85 Clinton Street.

Interborough Rapid Transit Company, New York, N. Y.—Bids will be received by the Public Service Commission for the First District of New York until May 25 for the construction of station finish for seven stations on the Seventh Avenue-Lexington Avenue line.

Brantford & Hamilton Electric Railway, Hamilton, Ont.—A contract has been awarded to Schultz Brothers & Company, Ltd., for the construction of a brick station on Colborne Street, Brantford, to be used jointly by the Lake Erie & Northern Railway and the Brantford & Hamilton Electric Railway. The structure will be 36 ft. wide and 76 ft. long.

Rhode Island Company, Providence, R. I.—Arrangements have been completed by the Rhode Island Company for the construction of a new terminal on Eddy Street, between Richmond and Point Streets, Providence, as a receiving station for freight. It is expected that the structure and the rearranged tracks will be ready for business the latter part of July or early in August. The building will have an area about one-third greater than that of the present two freight houses combined. The cost is estimated at about $75,000.

POWER HOUSES AND SUBSTATIONS

Connecticut Company, New Haven, Conn.—This company has ordered from the General Electric Company three 2000-kw. rotary converter equipments, including transformer and switchboard apparatus; one 200-kw. motor-driven exciter and one 200-kw. turbine-driven exciter.

Kentucky Traction & Terminal Company, Lexington, Ky.—This company will shortly add a new 500-hp. boiler to its power plant and make other improvements to the plant amounting to about $40,000.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Preparations are being made by the Columbus Railway, Power & Light Company for the erection of a new power plant on Kimball Street near Broad Street on the Scioto River, Columbus, at a cost of about $375,000.

Milwaukee Light, Heat & Traction Company, Milwaukee, Wis.—Work has been begun by this company on the construction of a transmission line from Pewaukee to Merton and Lake Five.

Manufactures and Supplies

LUMBER PRICES REMAIN NORMAL

Reports from the National Lumber Manufacturers' Association headquarers, Chicago, Ill., show that while there have been marked increases in many other articles of manufacture, especially in the building line, the rise in the price of lumber has been but slight. The lumbermen have adhered to the policy of asking only a fair return on their production and have recognized the truth of the proverb that "it is not the runaway horse that does the work." Reports from all over the country indicate that prices are practically the same as they were in 1912, and this is particularly emphasized in the roofing material. Shortage of paper, rags and other such material used for patent roofing has greatly increased the price of this product, and therefore increased the demand for wooden shingles. In spite of this fact, however, the price of shingles has remained the same. During the past few weeks large contracts have been placed for timber, especially for car building and for railroad construction and repairs. Orders for carefully selected lumber running into many millions of feet have been placed within the past week or ten days by the steam railroads and the car manufacturers. To give further impetus to this situation the federal government has recently placed contracts for several million feet of bridge timber.

ROLLING STOCK

Rhode Island Company, Providence, R. I., has ordered two express car bodies from the Laconia Car Company.

Montgomery Light and Traction Company, Montgomery, Ala., has ordered six single-truck cars from the Southern Car Company.

Worcester Consolidated Street Railway, Worcester, Mass., has just placed in service a new prepayment car which was built by the Osgood-Bradley Car Company.

Boston (Mass.) Elevated Railway, reported in the ELECTRIC RAILWAY JOURNAL of April 22 as being in the market for fifty-two articulated center-section bodies, has ordered this equipment from the Laconia Car Company.

Reading Transit & Light Company, Reading, Pa., is reported to be in the market for ten double-truck cars, in addition to the order for fifteen cars recently placed with The J. G. Brill Company, as noted in the ELECTRIC RAILWAY JOURNAL for April 15.

Toronto (Ont.) Civic Railway, through Works Commissioner R. C. Harris, has recommended that the contract for the thirteen car bodies for the Bloor Street car line be awarded to the Preston Car & Coach Company at the price of $4,907 per body. It is proposed that the thirteen cars will cost a total of $112,000.

Bay State Street Railway, Boston, Mass., has ordered from the Wason Manufacturing Company seven steel underframe express cars, 40 ft. over all, equipped with G.E.-201 motors, 75 hp., similar to those described and illustrated in ELECTRIC RAILWAY JOURNAL of Sept. 27, 1913; also five express box trailers of wooden construction and the same general dimensions.

Connecticut Company, New Haven, Conn., has ordered 100 additional cars. Thirty of these are to be exact duplicates of those recently built by the Wason Manufacturing Company described on another page of this issue and are to be built at the Wason plant. Sixty are to be built by the Osgood-Bradley Car Company, and will be practically the same, only longer. Ten interurban cars are also to be built by the Wason Manufacturing Company.

TRADE NOTES

Railway Storage Battery Car Company, New York, N. Y., is now located at 50 Broad Street, in rooms 1022 to 1026.

Hale & Kilburn Company, Philadelphia, Pa., has moved its New York offices from Suite 1433, 30 Church Street, to Suite 1412 in the same building.

Ohio Brass Company, Mansfield, Ohio, has received a large orders for strain insulators and trolley ears from the Shore Line Electric Railway.

American General Engineering Company and **Imperial** Rubber Company have moved from 253 Broadway to the Equitable Building, 120 Broadway, New York.

Holden & White, Chicago, Ill., have been appointed district representatives in the Atlantic Coast States from New England to Florida, for the U. S. Metal & Manufacturing Company.

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip with ventilators the twenty cars now being built by the Laconia Car Company for the Boston Elevated Railway.

Atlas Preservative Company of America, New York, N. Y., will move in the next few days to much larger quarters in the same building, 95 Liberty Street, to take care of its greatly increased business.

Western Electric Company, New York, N. Y., has appointed F. L. Gilman, formerly assistant general superintendent of the Hawthorne Works, as assistant chief engineer, with headquarters at New York.

Dielectric Manufacturing Company, St. Louis, Mo., has issued a booklet entitled "Data on Dependable Insulation" which contains information on the company's various insulating specialties. Prices of the material are also given.

F. Castiglioni, electrical engineer of the Railway Improvement Company, New York, N. Y., has been called to the colors by the Italian City Consulate in New York. He sailed on the Dante Alighieri on May 2.

A. L. Whipple has been appointed sales manager of the Railway Improvement Company. Mr. Whipple has long been a prominent factor in the supply business and was chairman of the entertainment committee at a number of steam and electric railway conventions.

Automatic Ventilator Company, New York, N. Y., has received orders to equip with ventilators the five cars now being built by the American Car Company for the Southwest Missouri Railroad, the fifty cars being built by the Laconia Car Company for the Rhode Island Company and the twelve semi-convertible cars being built by the same company for the Massachusetts Northeastern Railway.

G. S. Ackley, 50 Church Street, New York, N. Y., representing the Ackley Companies, is now carrying on a broader campaign throughout the world for the sale of Ackley no-staff and adjustable brakes, Tool Steel gears and pinions, Wasson air-retrieving trolley bases and other railway specialties for which these companies are sole export agents. These companies have agencies in all parts of the world, and their experience is available for the introduction and sale of additional American specialties.

Standard Underground Cable Company, Pittsburgh, Pa., announces the removal of its Chicago office from The Rookery to the Conway Building. The Detroit office has moved from the Free Press Building to the Whitney Building. A new office will shortly be opened in Minneapolis, Minn., in charge of W. J. Weld. The Portland (Ore.) office of the Pacific Coast department has been discontinued and a new office opened in the Newhouse Building, Salt Lake City, Utah, in charge of F. W. Wilson.

ADVERTISING LITERATURE

Stow Manufacturing Company, Binghamton, N. Y., has issued a booklet entitled "Portable Tools of Proven Value," which illustrates and gives details of portable electric tools, motor sets, combinations and flexible shafts of all sizes from ¼ in. up.

Searchlight Company, Chicago, Ill., has issued a circular dealing with the difference between dry acetylene and wet acetylene. The circular explains the effect which the presence of solvent acetylene has on the efficiency of the welding flame.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued bulletin No. 34-Q, which shows a few applications of its "Giant" gas and fuel-oil engines and suggests how oil and gas as fuels may be used advantageously for operating generators, pumps, air compressors, etc., in direct-connected or belt-driven units.

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STORED COAL AFFECTS BUSINESS CONDITIONS The large quantity of coal stored by industries throughout the Central West in anticipation of the biennial miners' strike period has seriously reacted on business conditions. A temporary depression prevails, and it is being particularly felt by the street and interurban railways in the coal fields. Prior to April 1, all of the mines were operating to capacity in order to supply the demand for coal for storage purposes, and since that time most of the mines have been practically shut down. In central Illinois, where the conditions in the coal mining industry largely control business conditions, this financial depression is being especially felt. Relief is expected soon, however, because the quantity of coal in storage is being rapidly exhausted. Another result of this wholesale buying of coal for storage purposes is the marked reduction in the fuel value of the coal purchased. As a rule, most of the large coal consumers are operating on a heat-unit-basis contract, but when the demand was great for coal just prior to April 1, coal of all kinds was purchased on a large scale. This in turn increased the cost of fuel at the boiler because, in many cases, additional rehandling was necessary, and the departure from a fuel-value standard reduced the efficiency of the fuel when it was used. Some of the larger companies have adopted the practice of buying high-grade coal in large quantities and carry it in storage at all times. This permits the making of better contracts, and when high-grade fuel is available it may be purchased in large quantities. This plan of buying fuel also has made it possible to utilize the sub-aqueous storage pits which were designed primarily for the storage of screenings. These screenings, by the way, are no longer a drug on the market.

ENFORCING JITNEY REGULATIONS That legal restrictions without enforcement are not very effective is rather a trite statement, but it is one of great present interest to electric railways in Pennsylvania which are still struggling with jitney competition. As part of the discussion at Lancaster before the Pennsylvania Street Railway Association brought out, the legal question in this State has been partly cleared up through the recent decision in the Scranton case, making jitney lines with fixed termini and fixed rates common carriers and requiring them to secure certificates of public convenience and necessity. This, of course, is a manifestly proper protection of the existing electric railway investment, but there seemed to be some question as to whether the decision is broad enough to cover irregular jitney operators as well as those having fixed termini and fares. Counsel for the railways assert that even the wildcat jitneys must under the decision secure certificates before operating, but such jitneys are running in defiance of the commission's order and the commission has not yet acted upon the numerous complaints filed with it. Upon the warrantable assumption that the opinion of the commission covers all jitney competition, for the justice of protecting electric railway investment is the same whether the unfair competitor is regular or irregular, it becomes evident that the Pennsylvania railways are face to face with the serious problem of how to put the commission's ruling into practical enforcement. The commission has no police powers, and the punitive provisions of the regulatory act provide for only the long and expensive process of certification of complaints to the attorney general for prosecutions. When it is considered that the Scranton Railway has entered about 50 complaints and the Wilkes-Barre Railway about 250 complaints against jitneys operating without authority, the practical importance of the point is apparent.

SUGGESTION FOR CO-OPERATION Jitney competition was unknown when the Pennsylvania regulatory law was passed, and it is not strange that the commission should go slow in laying down precedents along new lines, but ultimately, we believe, the commission will be obliged to treat the question in a broad-minded manner and assume the proper supervisory power. The burden should not be placed on the railways to discover violations of commission regulations; the commission should ascertain such facts through its own inspectors, and then devise some simple means of rapidly and effectively enforcing its rules. We are of the opinion that a plan of co-operation with the State Highway Department, mentioned by Mr. Fairchild, would probably offer the simplest solution. The Public Service Commission has just taken a praiseworthy step in issuing a general rule stating that its certificates of public convenience for auto-buses or jitneys will be limited "to the route and number of cars and particularly to each automobile or auto-bus designated in the certificate," and that cars authorized to be common carriers must have painted on each side the name of the person to whom the certificate is issued, the word "auto-bus" and the number of the certificate. With rules thus specified, it should be a comparatively easy matter for a commission inspector to determine cases of violation, and if these are persisted in, an attempt should be made to secure a revocation of the state auto license through the State Highway Department. It does not seem as if this body would countenance continued violations of regulatory rules, and the removal of the auto licenses would put the matter under State law right up to the city police. The Pennsylvania association has now authorized a committee of three to stand ready to co-operate with regulatory bodies in any way possible, and we believe that along the line of explaining the present contempt of jitney drivers for the public service commission's orders and of bringing this commission, the State Highway Department and the railways to a simple working plan, lies an opportunity for real constructive work by such a committee.

STANDARDS MUST REDUCE PRICE OR HASTEN DELIVERY

General apathy appears to pervade the industry in so far as the advantages of using standards is concerned. Whether this condition is the result of what may be termed professional jealousy, a lack of information, or because the specifications and standards are unsatisfactory is what the campaign launched by the standards committee of the American Electric Railway Engineering Association should determine. At the March meeting of the Illinois Electric Railways Association, H. H. Adams, chairman of the committee on standards, upon invitation called this association's attention to this condition as regards the standards, and urged their more general use. It is our understanding that this message will be "carried to Garcia" throughout the country with a view of determining the cause of the lack of interest. Doubtless a campaign of this kind will produce some results, and we are inclined to believe that there are other ways which should also be pursued which would enable the standards committee to present a more compelling argument to the industry than simply that of duty.

No one questions the advisability of using standards, particularly in the electric railway industry, where so many small companies are involved and numerous small orders for materials are constantly being placed. On the other hand, there arises in the minds of those responsible for specifying material the question of what particular advantage is it to them to adopt a new standard, particularly if the results obtained from manufacturers' products have been entirely satisfactory. This form of reasoning, doubtless, more than any other cause, is responsible for the limited use of association standards. It is this argument that a standards committee must overcome if it desires to make its campaign for the more general use of standards productive of results. We are of the opinion that the most forceful way to meet this contention is to determine what reduction in price manufacturers would give if a certain per cent of the entire industry adhered to the association standards. In other words, the principle of collective buying may be applied, and competition among the manufacturers of standard materials is certain to obtain reductions in price.

It is perfectly natural that the electric railway industry, as all other industries, should judge value by price and quality. It cannot be claimed that standard dimensions will materially prolong the service life of a certain product so that a reduction in price, perhaps, accompanied by prompter delivery, are the inducements that must be offered to influence the more general use of standards. In order to bring this subject to an issue at the coming convention we would, therefore, suggest that the standards committee circularize the electric railways of the country to determine how many of them would adopt the association standards and what reduction in price, if any, the manufacturers could make with a wider adoption of standards. With this information, some idea of the total annual requirements for any standard would be obtainable, and upon that basis, doubtless, some price concessions could be obtained from manufacturers. It would at least be possible for an estimate to be made of the reductions which would be possible from such standardization. This would afford a starting point for a real movement in favor of standardization.

DEFINING THIRD-PARTY LIABILITY

An important decision in the matter of third-party liability under workmen's compensation laws was recently rendered by the Appellate Division, Third Department, New York. In the case in point (157 N. Y. Supp. 948), an industrial workman, injured in the course of his work while driving across electric railway tracks, executed a release to the railway, without compensation or any consideration whatever, and then elected to take compensation under the act from his own employer. He filed a claim according to law with the State Industrial Commission, and an award was made against the casualty company in which the employer was insured. The employer and the insurance company then appealed to the court from the commission's decision, the sole question involved being the effect of the release on the injured man's right to the award made against the insurance company.

The New York statute provides that a workman injured through the negligence of a third party shall elect whether to take compensation under the act or to pursue his remedy at common law against the third party. In the present case it does not appear that the electric railway was guilty of negligence, but the court holds that independent of this fact or whether the claimant received any consideration for the release, the statute does not permit the execution of a release to be construed as an election of suit against the third party rather than the taking of compensation. The claimant was justified in seeking a compensation award, and his cause of action, if any, against the railway was transferred to his employer's insurer. Moreover, according to the statute, any compromise or release by the injured man with the third party for less than the compensation provided by the act would be ineffectual against the insurer without the written approval of the latter.

In other words, the court avers, the purpose of the statute is to make the third party ultimately liable for the consequences of his negligence if such liability exists, and the employer or his insurer is to have the benefit of such liability to the extent of the compensation award. On the other hand, the statute provides that the third party shall receive credit in case of ultimate liability for any amount paid to the claimant for the release. If he has compromised for less than the actual liability, he then remains liable to the employer or his insurer for the difference up to the amount allowed under the statute. Although the present case concerns only the election of the compensation award, the court completes its argument with a portrayal of the other side, namely, when the claimant really elects his common-law action against the third party. In such event even the obtaining of judgment against the third party might not, under the statute, discharge the insurer. If the recovery were less than the amount for which the statute provides, the insurer would still be liable for making up the deficiency.

The case is mentioned here because of its effect on releases or settlements with injured persons. It is obvious that if the liability still holds, a railway company will gain little or nothing by rushing through a release from the workman of another employer unless the release has received the consent of the employer concerned. The general adoption of the compensation idea by state legislatures has enforced changes in the law of negligence which cannot be overlooked. The effect, as in this case, often extends beyond the actual employer, and the legal procedure of the claim departments should take this fact into consideration.

STRAPHANGERS DO NOT PAY DIVIDENDS

Service during the rush hour is always costly. In many cases it may actually be conducted at a loss. Manifestly, such conditions prohibit belief that "the dividends are in the straps"—an ancient fallacy, which may have been put forward originally by a railroad man, but which has caused more trouble to the industry than almost any of the other ill-advised catch-phrases of public utility history. That idea has been definitely proved false a number of times, but it might be well here to cite an example to show that if the electric railways could dispense with the rush hour and its inevitable straphangers, the alleged enormous profits of the business might be much nearer realization. Last week we pointed out that the cost of rush-hour service could be more than double that normally existing, but no consideration was given to the influence of the increased rush-hour receipts. This phase of the question will now be discussed.

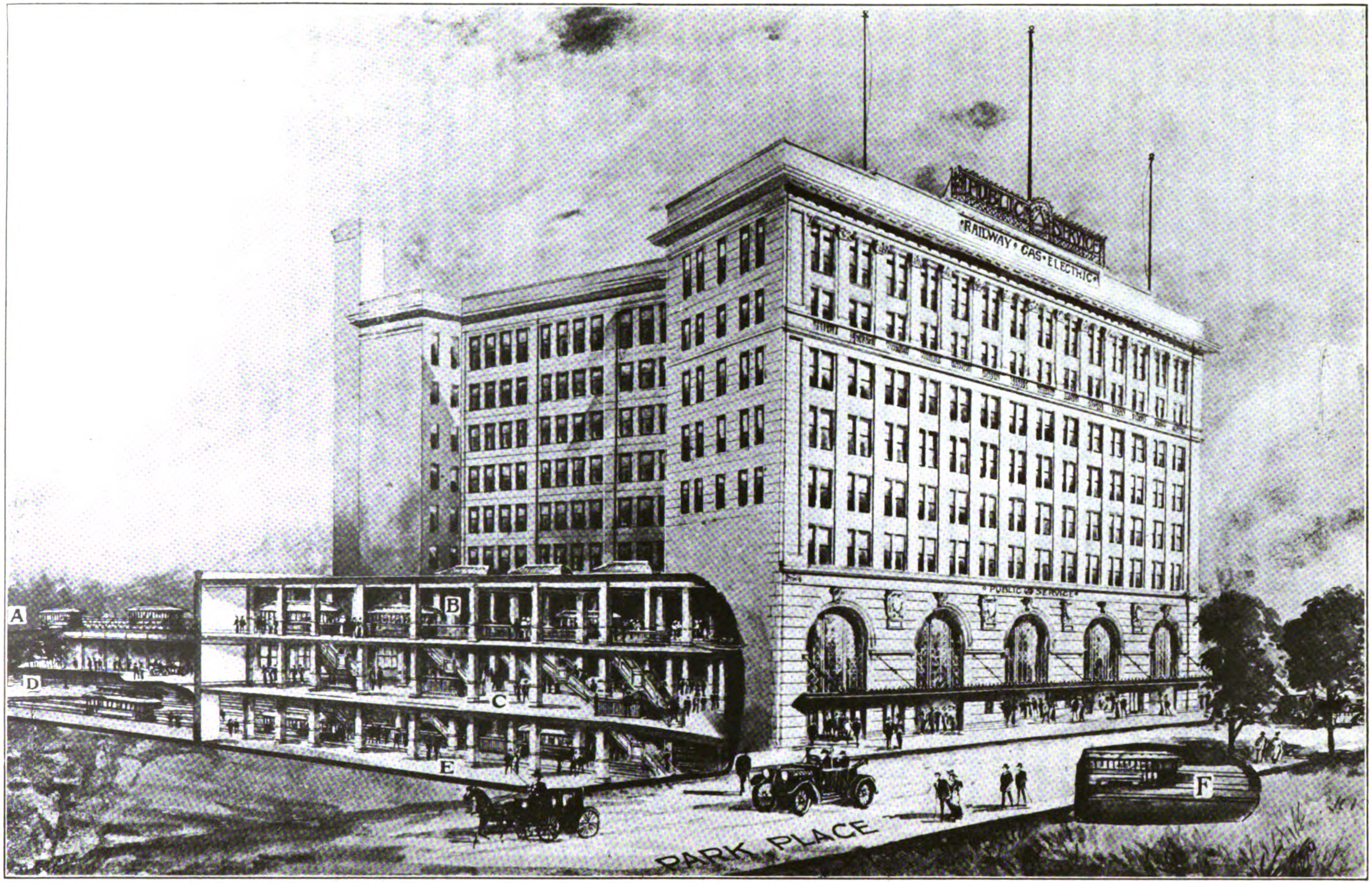
For a typical case there may be taken the circumstances assumed in our last issue. Here a 14-mile round trip was considered, the schedule time being one and one-half hours, equal approximately to the duration of the rush period. By using the average figures displayed in the last electric railway census as a basis, a figure of 40 cents per car-mile was derived as the operating cost for the tripper cars, or those used only to handle the peak of the load. Since the duration of the peak here coincides with the assumed round-trip time for the run, most of the trippers would make only 14 miles daily, and this mileage, at 40 cents per car-mile, would make the daily cost per car $5.60.

In this total there have been included both indirect and direct operating costs without taking into consideration any of the overhead charges involved by the existence of the tripper cars themselves. Each of these cars would be worth presumably $5,000, and interest, depreciation and obsolescence at 12 per cent of this sum amounts to $600 per car per year, or $2 per day, if the car is in actual service 300 days out of each year. In addition, provision for carhouse and shop space must be made for every car that is owned, and the investment thus made is also productive of overhead expense. The latter has been estimated by B. F. Wood in a recent article in the ELECTRIC RAILWAY JOURNAL to be $108 per car per year, or 36 cents per day, making a total for the two items of $2.36. When this sum is added to the operating expense of $5.60, the total cost of providing the car and making the daily trip during the rush hour becomes $7.96 per car.

To balance this expenditure there are only the straphangers and, say, fifty other passengers who are able to secure seats. As the case herein assumed is an actual one, there are definite figures of loading to show the earnings of the individual car. These show that the seating capacity at the point of maximum loading is exceeded by 60 per cent, giving a load of about eighty, and that enough short-haul fares are picked up in addition to raise the register reading normally to 125 at the end of the out-bound trip. These conditions are, admittedly, unusually favorable for large gross earnings, but nevertheless, the receipts from the trip come only to $6.25, against an expense of $7.96, thus involving a clear loss of $1.71 to the company for putting on each rush-hour car.

Of course, the receipts given above cover only the out-bound trip, although the car might accept passengers on its return in the other direction. The reason is that the in-bound traffic during the evening rush is almost invariably insufficient to load even the cars operated in the normal hours, conditions in the particular line in question providing no more than thirty in-bound passengers at the point of maximum load. So far as over-all receipts are considered, therefore, the in-bound tripper might just as well be run closed to the carhouse, except for the psychological effect, as the fares that are thus collected are merely taken from one of the regular cars.

Here, then, is a case where the provision of cars to carry the peak load leaves the company out of pocket on the operation. The straphanger, instead of paying dividends, has really cost the company money. If he could, by some miracle, be eliminated, or if the company could be absolved from the responsibility of carrying him, it would be greatly to the benefit of the railway's earnings. At the same time, perhaps, all the railways would escape the hounding to which they are now subject on the grounds of making money by hanging their patrons on straps.


PUBLIC SERVICE
RAILWAY · GAS · ELECTRIC
PUBLIC SERVICE
A
B
C
D
E
F
PARK PLACE

Key: *A*, Elevated Structure over Pine Street; *B*, Elevated Train Floor; *C*, Concourse; *D*, Loop on Lower Level; *E*, Lower Level Train Floor; *F*, Subway.

Sectional Drawing of Public Service Terminal, Newark, N. J., Opened on April 29, 1916

Signaling in the Public Service Terminal

To Secure the Greatest Safety and Rapidity of Car Movement, an Interlocking Signal System Was Adopted—Comprehensive Instructions, Explaining the System and Its Operation, Are Issued to Trainmen

By J. W. BROWN
Assistant Superintendent Public Service Railway, Newark, N. J.

WHEN cars began using the Public Service terminal, Newark, N. J., on April 30, 1916, a familiar figure in street railway work was absent. No switch boy, with his clanking iron, ran from point to point, directing cars into their proper tracks; instead the exhaust of compressed air and the flashing of red, yellow and green lights proclaimed the passing of the "switch-iron brigade." The determination to use centralized control of car movements in and out of the terminal was in keeping with the dominant thought, which governed the entire terminal plan, that only the best in modern construction and methods would enter into its erection and operation.

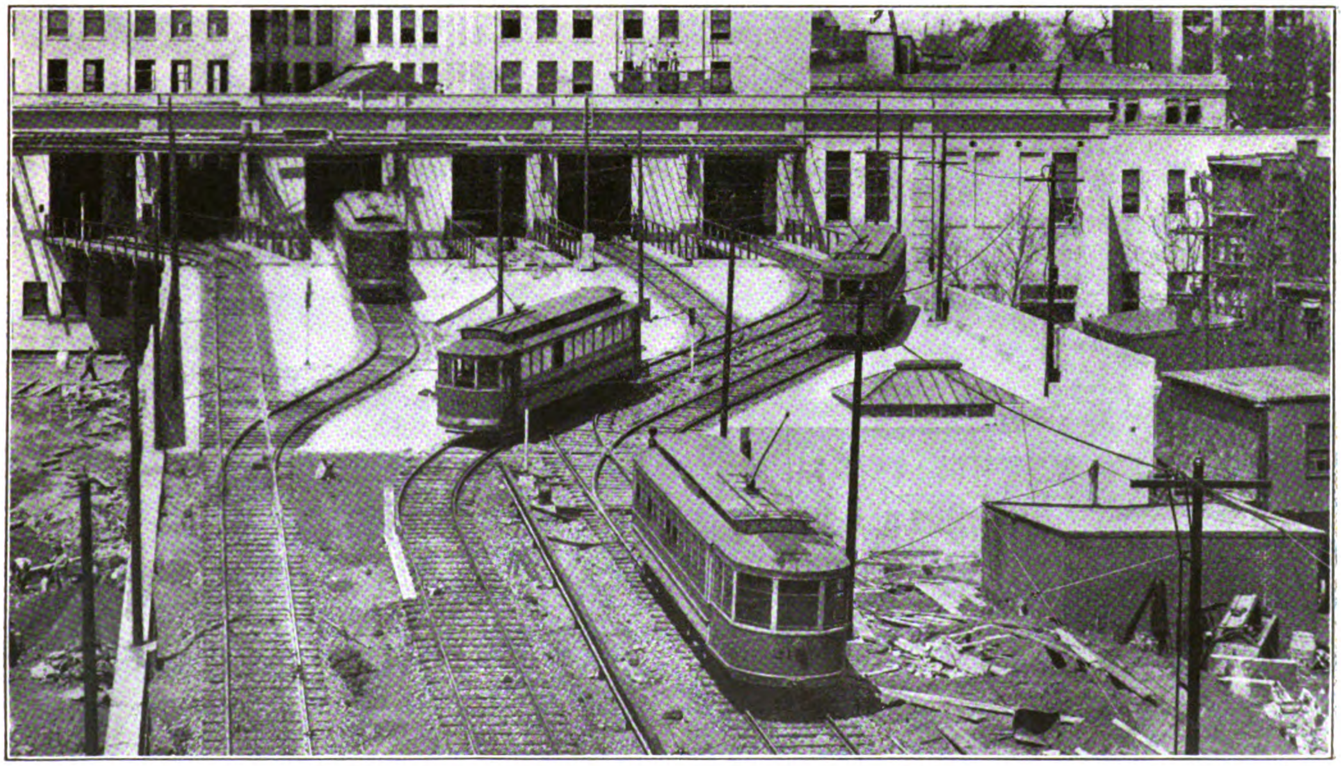
The general plan of the operating levels provided for a subway approaching from the west, the tracks entering the building on the lower level, forming a loop within it, and returning to the surface at Washington Street, some blocks distant from the loop. The concourse floor at the street level provides space for ticket offices and the usual station appointments, while on the second floor, or upper level, tracks were laid to accommodate all cars coming into the building from the east. The diagram on page 892 shows the track layouts in the building on both lower and upper levels, together with their approaches.

THE TERMINAL'S UNIQUENESS IMPOSED NEW PROBLEMS

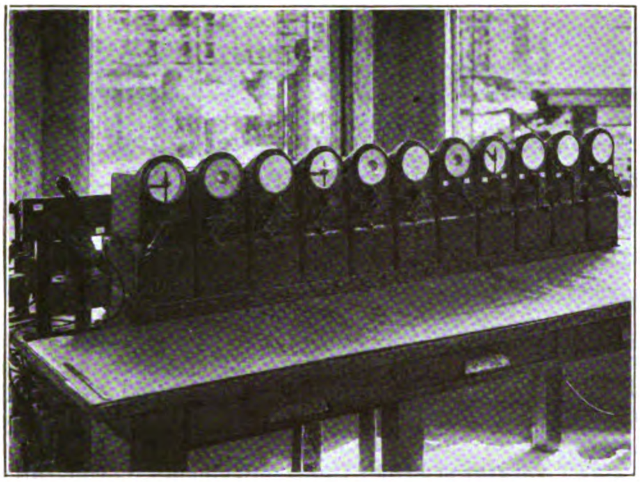
The entire absence of any similar terminals in surface line operation made necessary the solution of many problems without the aid of previous experience by other street railway companies. The selection of the signaling system to be installed was based jointly on present steam railroad practice and the peculiar requirements of the problem at hand.

After careful study of the requirements, power interlocking was decided upon on account of its safety and rapidity of operation. Further study of the relative merits of electric interlocking and electro-pneumatic interlocking indicated that the latter system appeared to be best adapted for the work. On account of the necessity for operating on different levels and for rapid handling of cars at the Mulberry Street entrance to the upper level it was necessary to install three operating towers. Tower No. 1 was located on the lower level loop, tower No. 2 on the upper level loop and tower No. 3 at the entrance to the terminal yard.

From tower No. 1 are operated the signals and switches controlling the use of the two unloading tracks and the three loading tracks, Nos. 1, 2 and 3, on the lower level. The impossibility of viewing the entire territory controlled from this tower made it necessary to install therein a track model which indicates to the operator the passage of all incoming cars over the controlled sections of the unloading tracks, and makes possible the maximum use of these tracks without causing congestion. From tower No. 2 are operated the signals and switches which distribute the cars over loading tracks Nos. 4, 5 and 6 on the upper level. Ten lines of



P. S. TERMINAL SIGNALING—TERMINAL YARD, SHOWING UPPER TRAIN FLOOR ENTRANCES AND EXITS



P. S. TERMINAL SIGNALING—MACHINE LAYOUT, MULBERRY STREET TOWER

cars make use of these three tracks, and cars of the same line are sent over the same track, as passengers cannot pass from one platform to another except by returning to the concourse floor and re-ascending to the appropriate platform.

Tower No. 3 is located at the entrance to the terminal yard at Mulberry Street, and from this plant twelve lines of cars are handled. On the second day of operation the plant was called upon to take care of twenty-one lines of cars on account of a diversion of lines during a large parade incident to Newark's 250th anniversary celebration. This called for the handling of 250 cars per hour. The daily maximum number of cars handled per hour from tower No. 3 is 216. The total number of levers is thirteen, and they control five switches and eight signals.

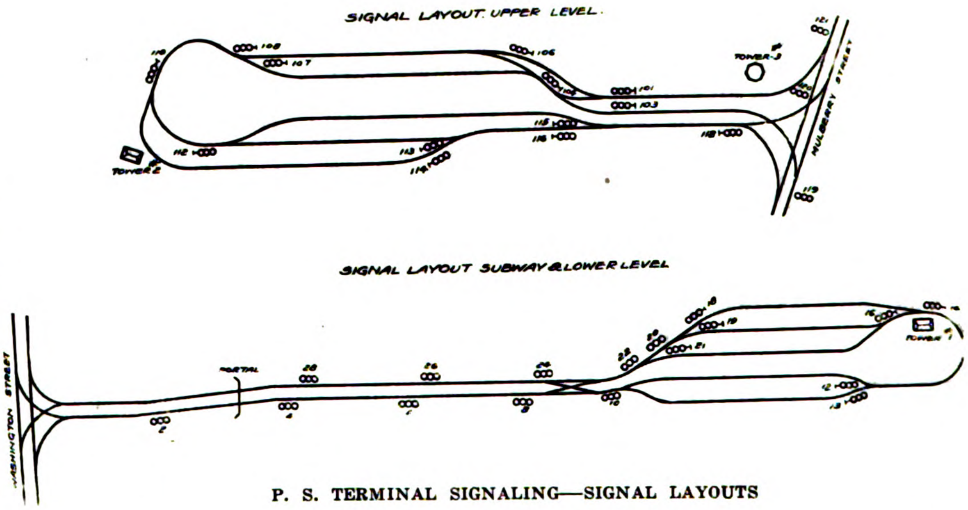
The interlocking machines in all towers are similar and are of the unit type, facilitating the making of additions in the future. The upper cut on this page shows the interior of tower No. 3 and the machine layout. Another shows the general track and signal layout in the terminal yard.

All signals are of the light type, using 5-in. lenses, with all exposed signals hooded to intensify indications. With the exception of signals Nos. 119, 120 and 121 in Mulberry Street, and the space blocking signals in the subway, all signals employ two colors: red indicating "Stop," and yellow, "Proceed with caution."

Signals Nos. 119, 120 and 121 are suspended in a horizontal position from span wires in the street, red indicating "Stop," green indicating "Proceed—Right-hand route," and yellow indicating "Proceed—Left-hand route."

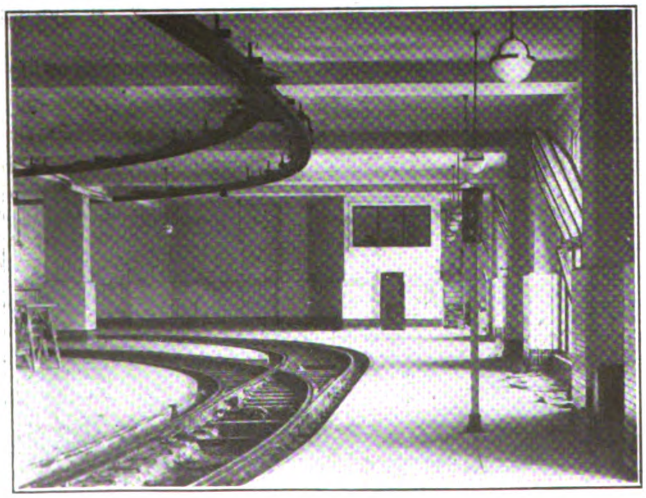
Solenoid control was selected for the switches leading from Mulberry Street to the terminal yard, as the installation of air cylinders in the street paving presented some difficulties. These switches are similar to the electric switches installed at many points on the Public Service lines.

At points of track convergence where trailing point switches are used automatic signals, controlled by track circuits, have been installed. These signals in common with interlocking signals have "Stop" as their normal indication and, upon a car entering the controlled section, the signal gives a "Proceed" indication, providing a car on the converging track has not already obtained a similar indication.



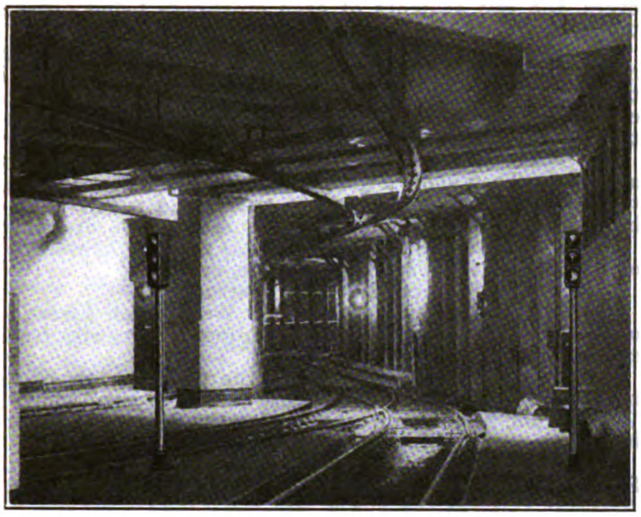
P. S. TERMINAL SIGNALING—SIGNAL LAYOUTS

In the subway, three-position light signals, spaced 200 ft. apart, afford spacing protection. These signals are controlled by track circuits and are overlapped, giving indications as follows: Red, "Stop—Block occupied";



P. S. TERMINAL SIGNALING—TOWER NO. 2, UPPER LEVEL

P. S. TERMINAL SIGNALING—MULBERRY STREET TOWER



P. S. TERMINAL SIGNALING—SUBWAY TRACK LEADING FROM LOWER LEVEL

P. S. TERMINAL SIGNALING—PARK PLACE FRONT OF TERMINAL ON OPENING DAY

yellow, "Proceed with caution—Prepare to stop before passing next signal"; green, "Proceed."

A double cross-over installed in the subway at the entrance to the lower level provides a means for operation in case of obstruction of one of the tracks. The switches are equipped with switch-circuit controllers which operate in conjunction with the signal system to give "Stop" indications when the switches are open.

Electric current for the operation of signals is supplied by a motor-generator set using 600 volts on the d.c. side. This generates alternating current at 220 volts which, by means of the three-wire system, is transmitted to the signals at the proper voltage. Emergency connections with the a.c. mains supplying the terminal are also maintained. Compressed air for switch operation is obtained from the compressors which furnish air for other purposes in the building.

SIGNAL INSTRUCTIONS TO TRAINMEN

The following is an extract from the general instructions issued to trainmen concerning the operation of the signal system:

GENERAL NOTICE

The rules and instructions herein set forth apply to the use of signals installed to safeguard and govern movements of cars and trains into and out of Public Service terminal. These rules supersede all previous rules and instructions inconsistent therewith. In addition to these rules, special orders may be issued from time to time. Such orders, when issued by proper authority, whether in conflict with these rules or not, must be obeyed while in force. It shall be the duty of all trainmen to familiarize themselves with the following definitions and rules, as well as the location of the different signals, the meaning of the different indications and the extent of the protection afforded.

DEFINITIONS

Fixed Signal.—A signal of fixed location indicating a condition affecting the movement of a car or train.

Interlocking or Interlocking Plant.—A system of switch, lock and signal appliances so connected as to prevent conflicting signal indications and to insure the proper position of the track layout to be passed over, thus protecting movements in the interlocking territory.

Interlocking Station or Tower.—A place from which an interlocking plant is operated.

Light Signal.—A fixed signal in which the indications are given by the color of a light.

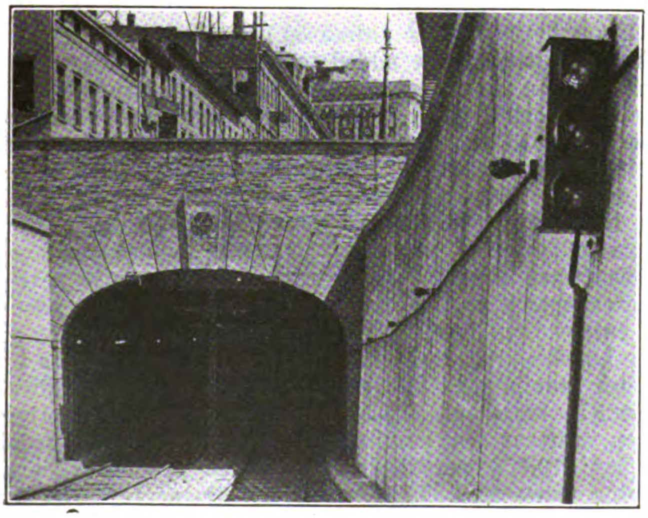
GENERAL RULES

1. Signals are provided to give authority for car movements and to protect such movements, but the use of signals does not relieve the motorman in any way from the responsibility of operating his car with caution with regard to obstructions on the track, clearance of other cars and position of switches.

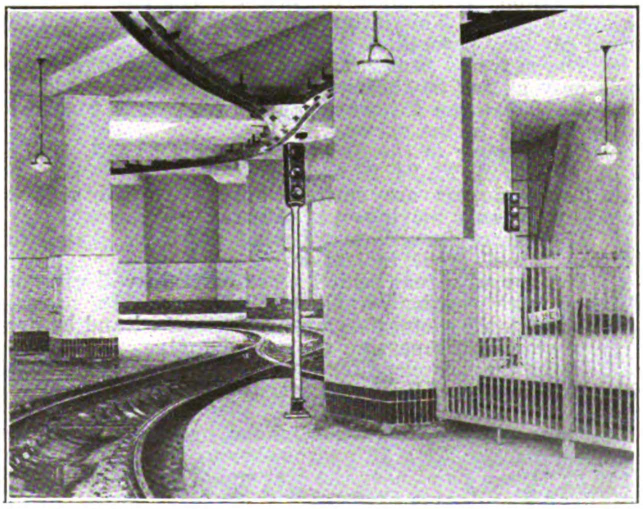
2. The movement of cars and trains will be governed by signals at the right-hand side of the track.

3. The signal indications are: Red light, "Stop"; yellow light, "Proceed with caution"; green light, "Proceed at normal speed."

Note: In the horizontal signals on Mulberry Street a green light is used to indicate "Proceed—right-hand route,"



P. S. TERMINAL SIGNALING—THREE-POSITION SIGNAL AT SUBWAY PORTAL



P. S. TERMINAL SIGNALING—AUTOMATIC SIGNALS AT CONVERGING TRACKS and a yellow light to indicate "Proceed—left-hand route." All movements over switches in street are to be made with caution.

4. The motormen must observe the indication of fixed signals until passing them.

5. When a signal indicates "Stop" (red) the motorman must stop his car far enough back from the signal so that the indication can be clearly seen. A signal indicating "Stop" must not be passed except as provided in the rules.

6. A signal giving an improper indication (two colors at once or a white light) or a dark signal (except signals Nos. 119, 120 and 121, on Mulberry Street—see below) must be regarded as a stop signal, and the fact must be reported to a signalman, starter or inspector.

7. When a car or train is stopped by a signal that is evidently out of order, the motorman will proceed with caution upon receiving a hand signal from a signalman, starter or other authorized person.

8. All signals are distinguished by numbers which must be used in reporting signals.

9. Reverse movements past signals must not be made except under direction of starter, signalman or other authorized person. Cars must not under any circumstances be backed through operated switches unless the switches are properly set. Serious damage may result from a violation of this rule.

Signals at Facing Point Switches in Terminal.—Signals Nos. 10, 14 and 16 are on the lower level. Signals Nos. 101, 104, 110, 112 and 118 are on the upper level.

10. These signals and the facing point switches adjacent to them are operated from the interlocking towers.

11. Each of these signals will give the "Stop" (red) indication after the passage of each car or train until the route is set up for the next one, when the "Proceed with caution" (yellow) indication will be given.

12. The protection afforded by these signals extends only as far as the insulated rail joints just beyond the switches. Cars must clear these joints to permit another movement of the switch.

13. Signals Nos. 103 and 106 are operated from tower No. 3 in conjunction with the facing switches of the cross-overs, and will give the "Stop" (red) indication when these switches are set for movements from one track to the other.

Signals Governing Movements over Trailing Switches.—Signals Nos. 12, 13, 18, 19, 20 and 21 are on the lower level. Signals Nos. 107, 108, 113, 114, 115 and 116 are on the upper level.

14. These signals are entirely automatic and are operated by the cars moving over the track sections.

15. A broad stripe painted across the track (or a sign reading "Signal control limit") about a car length from the signal, indicates the point where the control of the signal begins. Cars must not pass beyond this point until ready to proceed after receiving or discharging passengers.

16. These signals will normally give the "Stop" (red) indication. As a car passes over the signal control limit, the signal will change to the "Proceed with caution" (yellow) indication if it is safe to proceed. (Signals Nos. 20 and 21 will give a green indication if signal No. 22 is green or yellow.) (See signals in subway.)

17. If two cars on adjacent tracks move toward the signals at the same time, one signal will change to the "Proceed" indication while the other signal will continue to indicate "Stop" (red) until the first car has passed beyond the switch point. This latter signal will then clear and the second car may proceed.

18. The rear-end protection afforded by these signals extends only as far as the switch, except in case of signals Nos. 18, 19, 20 and 21, where the protection is continued by the signals in the subway.

Spacing Signals in the Subway.—Signals Nos. 2, 4, 6, 8, 10, 18, 19, 20, 21, 22, 24, 26 and 28.

19. These signals are entirely automatic, and are operated by the cars moving over the track sections.

20. The signal immediately behind a car or train will give the "Stop" (red) indication.

21. The second signal behind a car or train will give the "Proceed with caution" (yellow) indication. In passing such a signal, the motorman must reduce speed and be prepared to stop before passing the next signal.

22. If the track is clear for two sections ahead the signal will show a green light indicating "Proceed at normal speed."

23. These signals afford continuous protection in-bound from signals Nos. 2 to 10 and out-bound from signal Nos. 18, 19 or 21 to a point near the east end of the waiting platform near Washington Street.

Cross-overs in Subway.

24. The two cross-overs in the subway are operated by levers located between the tracks just east of the cross-overs, the two switches of each cross-over being operated together by one lever.

25. When the cross-over is used, the switch lever must not be thrown back to its normal position until the car or train has passed out onto the main track. Under no circumstances must a car be run through the switches unless they are properly set.

26. Dwarf switch lights are placed opposite each of these switches. They show a green light in both directions when the switch is set for the main track, and a red light in both directions when the switch is set for the cross-over.

27. Signals Nos. 8 and 22 will show a red light when any of the switches are set for the cross-over.

Switches at Washington Street Entrance.

28. The facing point switches at Washington Street are operated by standard electric switch mechanism with trolley contactors.

29. In operating the switch on the private right-of-way in front of the waiting room, use power to turn south on Washington Street and coast under the contactor if turning north on Washington Street.

30. The switch on the south-bound track on Washington Street is operated according to standard practice. Use power if turning the curve into the subway, coast under the contactor if continuing south on Washington Street.

Signals and Switches at Mulberry Street Entrance.—Signals 119, 120 and 121.

31. The facing point switches on Mulberry Street are ordinarily operated from tower No. 3, and movements over them are governed by signals Nos. 119, 120 and 121.

32. These signals are suspended horizontally over the street and give the following indications: Red light (in center), "Stop"; green light (right end), "Proceed—Right-hand route"; yellow light (left end), "Proceed—Left-hand route."

33. Motormen must approach these signals with their cars under full control, and before proceeding must see that both the switch and the signal are set for their proper route.

34. While the signals are designed to give right-of-way and to protect against conflicting car movements, it must be borne constantly in mind that vehicular and pedestrian traffic is not regulated by the signals, and the usual care must be exercised to avoid accident. Neither does the use of signals relieve the motorman of the necessity of exercising due care to avoid collision with other cars in case signals should be improperly given or accepted.

The entire signal and interlocking equipment described above was furnished and installed by the Union Switch & Signal Company. The solenoid-controlled electric switches in Mulberry Street were furnished by the United States Electric Signal Company. The plans and specifications for the Public Service terminal signaling were drawn by the company's engineers under the supervision of the signal department. The Union Switch & Signal Company's engineers ably assisted in the working out of the many problems involved.

War Effect on Accident Increase in England

The extent to which decreased lighting and other war-time conditions have added to street traffic dangers is indicated in the recent report of accidents issued by the British Home Office. During the twelve months ending Dec. 31, 1915, there were 3014 persons killed and 60,189 injured by vehicles on public highways in the United Kingdom. These figures, the highest yet recorded, give an average of more than eight deaths and nearly 165 cases of injuries per day. Mechanically propelled vehicles were almost entirely responsible for last year's increase, causing 614 more deaths and 4597 more cases of injury than in 1914. Of the deaths in the whole of the London area, including the city, 156 were caused by motor omnibuses, 439 by other motor vehicles, eighty-seven by tramcars, 172 by horse-drawn vehicles (other than tramcars or omnibuses), and thirteen by pedal cycles; 10,158 persons were injured by motor cars, motor vans, etc., 4020 by electric tramcars, 2786 by motor omnibuses, 5482 by horse-drawn vehicles, and 4423 by bicycles.

Iowa Association Meets

Utility Franchises and Regulation Discussed at the General Meeting—At the Technical Session on Wednesday the Topics Considered Were Rail Joints, Training of Trainmen and One-Man Cars

UTILITY franchises and regulation were the principal topics discussed at the joint session of the Iowa Gas, Electric Light, Street & Interurban Railway Association held at Dubuque, Iowa, on May 10. E. M. Walker, president Iowa section National Electric Light Association, presided, and Hon. J. S. Saul, Mayor of Dubuque, made the address of welcome. H. C. Blackwell, Davenport, responded fittingly, and among other things emphasized the importance of harmony and co-operation between the public utilities and the communities they served. If harmony is lacking, he said, it was because some one was unfaithful to his trust.

George McLean, president Key City Gas Company, Dubuque, then delivered an address entitled "Theory of Public Utility Franchises." An abstract of this address appears on another page of this issue.

Austin Burt, Waterloo, opened the discussion with the statement that a franchise was the same as any other private contract except that it contained an element of public trust. Unfortunately, in its execution the public was too frequently represented by men who only strived to further selfish interests. He was of the opinion that the twenty-five year limit was inspired by the thought that it eliminated the disadvantages of the perpetual franchise. Mr. Burt was opposed to the profit-sharing plan between the municipality and the company, mentioned by Mr. McLean, but did favor an indeterminate franchise. Other points brought out in this discussion were that the public, as a whole, is not so familiar with business affairs and with contracts as are the utility operators. Owing to this fact, the public would be apt to look with suspicion on any contract or profit-sharing plan, no matter how favorable to the city, and it would be very difficult to explain any such plan in detail to the public.

R. A. Leussler, Omaha & Council Bluffs Street Railway, was also opposed to a profit-sharing plan which did not share the profits with the utilities' patrons rather than with the public. W. H. Abbott, vice-president Red Oak Electric Company, urged that the public should be impressed with the importance of the rates of interest paid for new capital. He said that the public looked upon a utility as a necessity rather than a luxury, just as it considered roads, streets and other public improvements. Municipalities can borrow money for these at 4 or 5 per cent, yet they are no more vital to the public's needs than the service of the utilities. If the public could be brought to understand that it could make it possible for utility companies to borrow money at the same rate, a solution would be afforded. It would permit reductions in rates and improvements in service. Ample capital at low rates of interest would permit a higher standard of construction and thus reduce the rate of depreciation. Another point made was that any burden imposed upon the service of a public utility represented simply a surtax to the consumer.

ELECTRIC RAILWAY SESSION

Following this general meeting a session was held of the Iowa Street & Interurban Railway Association, at which the two subjects discussed were the schooling of trainmen and rail joints. Both aroused a lively discussion. R. A. Leussler presided and opened the session with a few remarks concerning developments in the electric railway industry during the year. He said that at the last meeting the jitney situation was alarming, but that it had practically solved itself and very few jitney buses were now operating in the State. This year the high prices of materials and the demands for increased wages were the subjects of greatest importance confronting the railways. In closing, he said that the executive committee of the association now had before it the question of admitting manufacturers' representatives to full membership in the association.

R. H. Findley, superintendent of track and roadway Omaha & Council Bluffs Street Railway, then read his paper on rail joints, published in abstract elsewhere, and F. V. Skelly, assistant superintendent Tri-City Railway, Davenport, opened the discussion. He told of the experience of his company with electrically welded rail joints and the number and character of failures. J. M. Bramlette, vice-president and general manager Lincoln (Neb.) Traction Company, said that his company had installed 967 Lorain welded joints in 1914, and there had been only eleven failures with these joints. In most of these failures, the web of the rail had cracked.

H. Mann, Goldschmidt Thermit Company, explained the difference between his company's old type and the new insert type of welded joint. He was of the opinion that the rail should be welded at the head to make a successful joint. He said that out of 700 welded joints placed in Chicago in 1915, only one failure had occurred. Mr. Mann said that thirty-two thermit joints had been installed in 9 hr. in San Antonio, Tex. Concerning the increase in price from $6.50 to $7.50 he said that this was due to the 300 per cent increase in the price of aluminum.

O. S. Lamb, superintendent Waterloo, Cedar Falls & Northern Railway, then read a paper on the selection and training of trainmen. This paper is published in abstract elsewhere in this issue.

C. E. Fahrney, general manager Ottumwa Railway & Light Company, agreed that frequently the men who were difficult to train made the best trainmen. He said it was the practice of his company to re-employ trainmen who had left the service while in good standing. Mr. Leussler said his company had adopted the same policy, but had limited the number of times a man would be re-employed.

Mr. Lamb stated in response to an inquiry that he examined his interurban trainmen on the standard code, but the men in the city service received a written examination on a set of questions relating to their particular duties. He was of the opinion that the men could not be too good for the service. If they showed special talent they were appointed to better positions. President Leussler said that he had found it particularly advantageous to keep the written examinations of trainmen on file. When one claimed never to have heard of a certain rule, these examination papers often proved that the employee had forgotten. He also said that in some instances the men who looked too high-class for the service did not stay. In reply to an inquiry from W. H. Evans, Tool Steel Gear & Pinion Company, it was stated that generally the sons of trainmen were unsatisfactory. When they were intelligent their fathers had higher ambitions for their sons' futures.

J. P. Ingle, general superintendent Keokuk Electric Company, did not believe in the generally adopted method of schooling trainmen after the preliminary instruction. His company continued the instruction at monthly meetings. At these the trainmen are informed of their records in detail and the effect on the operation of the company. The men in town questioned the superintendent concerning orders and instruction, and frequently made good suggestions. In this way every trainman knew the results which were being obtained by the company and took an active interest in improving the results. When men are employed for motormen or conductors, they are told that any position in the company's organization is open to them. Motormen and conductors have been transferred to other departments, and the plan has proved advantageous, particularly in emergencies. If extra crews are needed they are available.

Mr. Bramlette, Lincoln Traction Company, said that his company had employed men between the ages of nineteen and forty-five, but that he had changed the age limits to twenty-five and thirty-five. He said that he had recently tested a plan for rewarding men for reducing accidents, but he believed that it tended to make them dishonest in reporting accidents. Mr. Bramlette also said that last Christmas his company gave each employee a savings bank book with a small amount of money credited to his account. A recent inquiry at the bank showed that more than $15,000 had been credited to the accounts of employees.

Mr. Lamb, Waterloo, explained that his company used the Brown system of merits and demerits, and that sixty-five demerits discharged a man. He said that this system had been a great incentive to trainmen to make good records. Regarding one-man cars, Mr. Lamb said that they had been so successful in Waterloo that the public did not want to change to two-men operation, and although the men objected to them at first they were no longer opposed to them.

Charles Munsen, manager at Marshalltown of Iowa Railway & Light Company, said that one-man cars had been in operation on that property for more than two years. When service was inaugurated, he told the business men of Marshalltown that it was impossible to give them the service they should have except by changing to one-man cars. He also convinced the City Council and the Mayor of this fact, and consequently there was no complaint from them. When the one-man cars were substituted for the two-men cars, all trainmen were retained and given shorter hours and an increase of 5 per cent per hour in pay. At the present time the trainmen object to two-men operation, even at fair time when the traffic is heavy. He also said that as a result of one-man operation accidents had decreased, better men were obtainable and the public now considers one-man cars both safe and satisfactory.

Just before the session adjourned, Mr. Skelly called the attention of the association to the work of the American Railway Association, which is endeavoring to standardize the color scheme and aspects of highway crossing signs and signals. He recommended that a resolution be sent to the proper committee of the American Electric Railway Association, recommending that it co-operate with the American Railway Association committee because this subject was of importance to interurban railways. The association approved his suggestion.

The meeting scheduled on May 11 was to be a general meeting with the Iowa Gas Association and the Iowa section of the National Electric Light Association. Another technical railway session was scheduled for May 12. At this John Sutherland, master mechanic Tri-City Railway, was to present a paper on "Inspection and Maintenance of Rolling Stock" and an illustrated lecture on steel poles was to be given by A. H. Bates of the Bates Expanded Steel Truss Company. An abstract of Mr. Sutherland's paper is published in this issue.

Rail Joints

BY R. H. FINDLEY
Superintendent of Track and Roadway Omaha & Council Bluffs Street Railway

The problem of splicing rails in such a way that practically a continuous rail will result has been attempted for many years with varying degrees of success. The perfect joint for uniform service is yet to be found. If it is being used it has not yet demonstrated its mechanical efficiency to the satisfaction of street railway engineers in general, and the result is that numerous types of joints are constantly being developed.

In providing proper splices for rails we are bucking up against a construction problem quite different from almost any other connected with the electric railway industry. That enormous temperature strains take place is certain. In our city we have had welded rails break in a number of places which no doubt required a strain of from 15,000 lb. to 40,000 lb. per square inch, making the total tensile strain somewhere between 108,000 lb. and 290,000 lb. It might be very true, however, that a portion of this was due to shrinkage strains concentrated at the rail weld. However, it has been said that for each 7-deg. change in temperature a strain of 1000 lb. per square inch results in the rail, this unit strain depending, of course, on the type of track construction. Bolts have snapped off from shrinkage strains in open track during winter months, and in remote cases smaller rails on open track have broken because of contraction in extreme weather, this occurring where no welds were applied.

Experiments have been made to determine the approximate differences in temperature between the base of a high rail in a paved street and the ball of the rail. Some have shown that the rail, when the air temperature is climbing from normal up to 90 deg. Fahr., will develop a difference of 12 deg. between the base and the ball, the rail finally assuming an even degree of heat, hotter than the air by several degrees. This variation in temperature results in longitudinal shearing stresses in the rail which must be transmitted through the joints or decimated in the roadbed.

During the hot weather enormous compressive forces resulting from temperature rises are at work in the rail. Rails being confined are thereby prevented from jumping all over the street, resulting in compressive stresses in the steel, which no doubt in time affect a change in the molecular condition of the rail.

Failure of bolted joints to resist forces in the past has been due generally to imperfect mechanical fit between rail and plates, improper bolting, the use of inferior bolts, poor workmanship, and failure to realize the necessity for grinding or smoothing up the surfaces of the rail after applying joint plates. Few have failed from not being able to resist bending moments, if foundation is properly constructed.

Foremost among refined methods of splicing rails for modern service to-day, stands the necessity for grinding off the surfaces of the rails after applying the joint.

Rails cannot be rolled with precise cross-section, and slight differences in the surfaces of the rails at joints usually exist when laid new.

If these differences at the joint are allowed to remain a constant hammering is going on. The load not supported on springs, as nearly as can be determined, is delivering blows which in some cases vary directly as the square of the velocity of the car, and inversely as the diameter of the wheel. A portion of this variable force is taken up and the energy wasted through the resiliency of the rail and wheels. In addition to this blow we have the impact at a joint delivered by the load supported on springs, which for ordinary differences in rail heights remains approximately constant.

If plates and rails are not resilient enough to provide for these differences in height, and if joint construction cannot take care of all the dissipated energy the remainder will be transmitted to the tie and substructure of the track and wasted there. If the wooden ties are laid on a rigid base, the tie will become badly damaged. If the tie is a steel one laid on concrete, the concrete will eventually disintegrate.

Differences in height of rails at joints must be removed immediately to conserve the life of the joint. Practice has demonstrated this very forcibly within the last eight years, and I will mention one particular instance out of many where the issue was brought to my attention. Two pairs of compromise splices were installed of the Atlas type where 70-lb. A. S. C. E. rails were connected to 97-lb. 424 grooved section. At the time of installation in 1913 a very slight difference in the surface of the rails was noticed, and we neglected to grind the rails to a smooth surface. This was a single track over which 26-ton cars operated on from a headway of from three to four minutes. Inside of eight months these joints were a wreck, including paving and rail ends. In order to repair them, new Atlas plates were installed, new pieces of rails were cut in, and the joints were then ground to a true surface. After more than two years these joints are apparently as perfect as on the day they were installed. We find this to be particularly true on compromise joints at special work.

If we use bolted joints we must draw the rail ends together as tightly as possible, when applying plates. If this is not done a depression will soon result. It has even been demonstrated under heavy traffic that a rail will eventually cup out at the point where a saw cut is made through the ball of the rail.

In general, mechanically applied joints fail as a result of impactive forces, rather than from bending moments. If bolted joints are to be adhered to, the maintenance-of-way engineer will, perhaps, not look with favor on the use of rolling stock equipped with wheels of small diameter, as there is a slight tendency at the present time to do, unless he can be assured that there is a corresponding decrease in the "no spring" load. He also would appreciate car equipment design involving the very lightest of truck construction obtained by the use of alloy steel, if this is practicable.

VARIOUS TYPES OF JOINT

We are all familiar with the plain bolted fish-plate joint. In years past this served the purpose admirably, due to the lighter equipment and comparatively infrequent service. On our system we have a number of miles of track constructed of 73-16 steel, Lorain section No. 291, on which bolted fish-plates were installed from ten to sixteen years ago. The joints were pulled very tight when the track was laid, but were not ground. Over this track, at the time it was constructed, single-truck cars weighing from 10 tons to 12 tons were operated with infrequent headway, probably from twelve to fifteen minutes. Some of this track had this light service for several years, during which time, due partially to the use of salt in heavy winter snowstorms, there was a great amount of oxidation between bolts, plates and rails. We have some of this track upon which 90 per cent of the joints are perfect to-day, upon which 20-ton cars are operating under headways varying from four to seven minutes.

We have reconstructed some track of this type because of repaving operations, and after cutting off the bolts a large amount of sledging was necessary to remove the plates. Such experiences show that under some local conditions practically a continuous rail can be developed at little expense, without resorting to more expensive types of joints and welds if car service is light enough.

On bolted joints which have failed we find the underside of the ball of the rail cut, and the plates cut, to such an extent that a new pair of plates will not fish to the rail. If the plates are renewed there will still be movement of the rail and pounding. In making repairs on such types of joints we have resorted to the use of shims made of soft sheet iron bent in such a manner that they cannot work out. These are fitted between rail and plates. By then grinding the surfaces of the rails to remove the cups, considerable life may be added to the track, pending street improvements.

The ordinary fish-plates for Section L. S. 97-lb.-424, can be bought and installed on our system for $2.80 per joint without bond with ordinary wrought-iron bolts. However, for present-day city service with frequent headway this installation is not adequate, although improvements are constantly being made to the old fish-plate type of joints. In some cases the holes through the plates are reamed to the size of hole in the rail, after the rail ends are drawn tight; then high-tension bolts are inserted with a drive fit. For a 7-in. rail from six to ten bolts of 1⅛-in. diameter are used. In some places hot rivets have been used instead of the bolts.

For all mechanical splices, too much stress cannot be put upon the use of alloy steel, or heat-treated steel bolts, giving us a higher elastic limit and greater ultimate strength. The ordinary wrought-iron bolts have an elastic limit of about 30,000 lb. per square inch and an ultimate strength of approximately 50,000 lb. With the chrome steel bolt or heat-treated carbon steel, strengths of double this amount are possible. The greater elastic limit will allow for slight movements of the plates in adjusting themselves to the rail when first applied and are not so liable to be stretched beyond their elastic limit with a 36-in. wrench. A longer wrench should not be used on 1-in. bolts. These improved bolts cost approximately twice as much as do those of wrought iron.

Together with the use of higher tension bolts the lateral strength of the plates must be sufficient to develop the strength of the bolts without buckling. Plates which will bend under a bolt will develop a "line" contact instead of a "plane surface" contact at "fishing" surfaces which should be prevented.

The Clark joint, which is extensively used in Cleveland of late years, involves the use of standard, heavy, twelve-hole fish-plates, with reamed holes through plates and rail, and drive fit bolts. A chunk of thermit at the base is used for conductivity, also adding strength to the base of the rails at the joint. It is said this joint costs approximately $6 on 7-in. rail.

In Baltimore a riveted, ten-hole fish-plate joint with the thermit, similar to the Clark joint, has been used with holes reamed before driving rivets, costing them, I understand, about $6.70 each on 7-in. rail.

A form of fish-plate joint has been developed and patented, providing for preheating the plates, and using drive fits bolts. By reaming the holes when plates are hot and bolting up the joint, the shrinkage of the plates will draw the rail ends very tightly together.

As opposed to the fish-plate there are other types of splices which attempt to obtain three planes of contact. Foremost of these types, all developed from the angle bar, we find the Continuous, Atlas, Webber, Wolhaupter and One Hundred Per Cent joints.

The Continuous joint has been used very extensively all over the country in both steam and electric railways. It costs us, installed exclusive of bond, approximately $5.25 per joint including grinding on 7-in., 97-16 grooved rail. The use of high-tension bolts brings the cost without bond to $5.55 and with brazed bonds at present prices $6.25.

The Atlas joint, which is of similar type with provision for two truss bolts in the bottom, below base of rail, is of the malleable cast type. It is claimed that three planes of contact result by the use of the truss bolts, at the base of the joint. This bolted splice appears very good with high-tension bolts in the base. The concensus of opinion among track men seems to favor a rolled joint as against a cast type for general use, as so much depends upon the workmanship in making up patterns and finishing malleable castings.

In order to provide three perfect planes of contact, a composite joint has been developed by Mr. Nichols, formerly connected with the Philadelphia Rapid Transit Company. This embodies the use of zinc spelter between the rail and the joint plates and in spaces left under the head, tram and base of the rail. At the present prices of spelter this joint is very expensive.

Coming now to the different attempts to develop a welded splice and to provide a continuous rail, it may be said that all engineers have attempted to do away with as many splices as possible and to reach, as nearly as it is practicable, a rail of continuous length. In using 62-ft. rail we have almost reached the limit of handling, although we could handle 10-ft. longer lengths, and a number of the types of joint already mentioned furnish, in so far as some traffic is concerned, a splice which provides a practically continuous rail throughout the life of the steel.

There are a number of different methods of welding rail joints. Perhaps the electric welding process, by the use of heavy current and low voltage through which steel plates are welded to the web of the rail, is the most widely known. This process, it is understood, is controlled by the Lorain Steel Company and is installed through contract with them or their lessees. A large amount of special equipment is necessary to make the installation. Plates are welded at spots to the rail. A weld through plates is made at the rail ends, and one on each end of the plates. It is claimed that the method has been perfected in late years, until the percentage of breakage the first year after installation has been cut in Chicago from 5 per cent in 1907 to 0.25 per cent in 1910.

The cast-weld process by which molten iron is poured into a mold inclosing the rail ends has been used extensively in many cities. About 100 lb. of metal is used to splice a 7-in. rail, the iron flowing through the holes in the rail ends thereby binding itself together. The effect is quite similar to the iron-bound construction used in the manufacture of manganese-steel, hard-center special frogs and switches. This type of splice has been abandoned by many companies, although it is still used by a number—notably in St. Paul and Minneapolis. Much depends upon the care used in performing the work and the final finishing of the rails. Water jackets have been used in attempting to prevent the heating of the ball of the rail, thereby preventing to some extent the softening of the rail ends.

The Goldschmidt Thermit Company joint requires considerable grinding and we estimate it to cost on our system $8.50 per joint complete in addition to an investment in the necessary apparatus. We used 500 of this type in 1909-1910 on old steel rails. These joints were of the old type of weld and they gave us a considerable percentage of breakage the first year. The new type, however, is a great improvement over the old design.

There are types of joints of recent development through which plates are arc welded to the web or base of the rail. One of these, called the Apex joint, supporting the ball of the rail, is put out by the Indianapolis Switch & Frog Company. It consists of plates with angled ends, arc welded to the web and base of the rail. We have installed some of these joints on repair work only, the cost on new 7-in. steel approximating $5 per joint.

In Columbus, Ohio, a joint involving the use of association standard eight-hole fish-plates, with the arc welds, has been used. It is claimed that this joint can be put on for $4.50 in Columbus. This figure, however, would be low for our city on account of the higher cost of materials and would be about $6.50 per joint.

Arc-welded fish-plates are particularly serviceable for making repairs. We have some track, laid before we made a practice of using expansion joints during the construction period, in which a number of joints opened slightly. We found it impracticable under the conditions to go back over the track and draw the rail ends together, and we were also pressed by the city to hurry the work along. These conditions, coupled with the fact that we had no facilities for grinding the joints after the track was completed, caused an early pounding at the joints, damaging both plates and rail ends to such an extent that new plates did not fit. Recently we have been removing the old joints, installing Apex joints, and welding with the arc welder, building up the ball of the rail with the same welder and grinding to a smooth surface. Very good results have been obtained. This track has had service of twenty-seven double-truck cars per hour in each direction during the lean hours of the day, and about twice this number during the rush hours, cars weighing from 18 tons to 20 tons empty. The cost of replacing with the Apex joint is approximately $6.50 each, including tearing up and replacing the paving and 50 cents for current consumption.

We are trying another method of making joint repairs to some of our old track where Continuous joints have become badly damaged by the joints cupping. We remove the plates, and using the outside plate, we have the base cut off in a planer in such a way that, on inverting the plate, there will be a space outside of the head of the rail upon which a ribbon of steel can be laid with the arc welder. Another ribbon is laid at the base. Holes are repunched so that bolts can be installed and tightened, using a home made plate on the inside of the rail, quite similar to the inside bar of the Apex joint. A little difficulty is experienced with the arc welder in laying ribbons of steel on this work, due to the rather uneven surfaces of the rusted rails. We have decided that on this work it saves time to grind the old rust completely off before welding, using a small electric portable grinder having a flexible shaft.

Now as to the selection of a type of joint to satisfy the needs of any particular electric railway system. This is to a great extent a local problem. The life of the rail is not always the life of the joint. We have removed rails upon which the base had entirely rusted away, while at the same time the joints were very good—plates being rusted on perfectly and it being necessary to rebuild the track on account of the repaving of the street. It would have been folly to have welded such joints originally. On the other hand, we have had sections of track upon which much maintenance has been necessary at the joints. Pounding has broken the rail ends, necessitating the cutting in of pieces; however, it has never been necessary to rebuild any one section of our track due to poor joints alone. With maintenance on our older and heavier traveled track we have been able to nurse it along pending repaving of the street. In only one instance have we found the cost of repairing excessive, and that was on an exceptionally heavily traveled section of track.

On sections of modern city track lightly traveled, with no immediate prospect of an increase in service, with service no more frequent than seven minutes, and equipment weighing from 18 tons to 20 tons, the use of a good type of bolted joint, such as the Continuous type, carefully applied with high-tension bolts, surface ground will, perhaps, give proper satisfaction throughout the life of the track.

On other sections of heavily-traveled track, with headway less than seven minutes, it is the opinion of the writer that the application of a bolted joint is not the best of construction. A properly applied pair of heavy fish-plates involving the use of welded lines of steel should give satisfaction. In such a case, driven fit bolts of high strength should be used to help resist temperature strains. On the more heavily-traveled sections of track, perhaps the use of an entirely welded joint would be economy.

On any section of rail which has been in service fifteen to twenty years we can expect some maintenance whether joints are welded or bolted. We have nothing to prove to us locally that welded joints on such lines will not, after a number of years, show up large numbers of breaks due to crystallization or granulation of the steel and to temperature and shrinkage strains at welds. Whether this maintenance will be greater than joint maintenance is a matter for local anticipation. However, the adoption of a type of joint depends somewhat upon the track construction. If steel ties are used, embedded in solid concrete construction, providing a non-resilient roadbed, it would seem advisable to abandon altogether the purely bolted type of joint and to adopt either a combination welded and bolted joint, or else to weld the rails.

At the present time we are making a trial of an improved fish-plate joint on some of our heavier-traveled track which we will rebuild this year. This joint combines the use of six 1¼-in. drive-fit ordinary wrought-iron bolts with the arc-welding process. The fish-plates are of an exceptionally heavy six-hole section with no space for concealed bond. After drawing the rail ends hairtight we will ream the holes to 1¼-in. and drive through 1¼-in. machine bolts. On account of the condition of the steel market we will use the 1¼-in. wrought-iron bolts at present. However, our plan is to use 1⅛-in. heat-treated steel bolts later on. After the plates are thoroughly tightened we will arc weld and lay a ribbon of steel along the base of the plates connecting them to the base of the rail. In addition to this a 6½-in. x 12-in. x ½-in. plate will be welded below the joint by two lines of weld. This joint will cost us slightly more than the Continuous joint we are now using.

Theory of Public Utility Franchises

BY GEORGE MCLEAN
President Key City Gas Company, Dubuque, Iowa

Mutuality should govern the conditions of all public service franchises for the reason that whosoever operates a public utility under authority of a charter acts in the place of the municipality which has elected not to perform the service directly. If this fact were duly and constantly regarded by both parties to the negotiations, there would be no franchise question. If the return of the public service company were limited by law or contract to a fixed and guaranteed rate on the investment, any excess going into the public treasury, all could understand that the exactions imposed upon it should be such only as would be considered wise and just if the property were operated by the city directly, and that the burden of all further exactions and restrictions must ultimately fall upon the patrons of the service in the form of higher charges for the same than would otherwise be necessary. When these burdens are such as to arouse the apprehensions of investors in the securities of the company, the effect is equivalent to an advance in the cost of raw materials. For among the materials the public service company must use in its business, capital is chief. The terms upon which the company can secure this capital depend upon its credit, which may be impaired by legislation, or even by the threat of legislation, of no compensating value, nor of any value whatever, to its patrons.

It is not feasible for the municipality to guarantee the public service company a fixed return on its investment, as, even if there were no legal obstacles in the way, this would destroy the company's motive for the exercise of those virtues upon which private ownership of any class of property depends for its justification. Nor does mutuality require that the contract guarantee a fixed return. What it demands on the one hand is that the public authorities prescribe for the government of the company only such regulations, burdens and restrictions as an enlightened government would impose if the utility were administered by the municipality directly. The contract lacks mutuality, and hence justice, unless the public authority, for each burden or restriction it imposes, recognizes a balancing obligation of its own. Thus the law limiting franchises to twenty-five years is unsocial, inequitable and lacking in mutuality because it does not provide for amortization of the investment within the company's corporate life. Mutuality requires correspondence between the franchise and amortization periods. This restriction upon the life of franchises originated in the experimental years of regulation and under conditions which no longer exist. The minor regulations contained in franchises, or often proposed in the city council or the legislature, should also in any fair consideration of this topic be submitted to the test of mutuality. The model franchise, like the ideal constitution, contains few specifications and seeks to preserve the rights of the people through powers reserved rather than through legislation detailed.

The ordinary franchise prescribes a maximum rate which the company is free to reduce on its own motion and without awaiting the action of the public authorities. This liberty has been freely exercised. In many instances rates have been reduced voluntarily, not upon warrant of increased volume of business, but merely upon expectation that this result would follow. However, mutuality must be automatic in operation if it is to be reliable and permanent and is to command the confidence of the public. Speaking for myself, I favor profit sharing as a guarantee of mutuality and a means of assuring the company's patrons of their interest in its fair treatment, its economical, efficient and just management and its prosperity.

This profit-sharing plan contemplates a standard rate and a standard dividend, which dividend is not to be guaranteed by the city but is to be retained by the company if it succeeds in earning it. This standard dividend should be cumulative, should correspond to the rate the banks of the community charge on loans carrying hazards equal to those borne by the public service company and should be based on the value of the property devoted by the company to the public service. Further net earnings, if any, should go to a reserve fund until the latter reaches a certain proportion of the capitalization based on the inventory value of the company's property.

The reserve should be used when necessary to maintain the property, or meet a deficit in the standard dividend, and should be available for no other purpose. Any surplus which might be accumulated after meeting the requirements of the reserve or emergency fund should be divided between the company and its patrons on a sliding scale. Any dividend above the standard allowed the company out of this surplus should be proportioned to and dependent upon its rebates to consumers. Thus a particular concession in the rate should give the right to a particular increase in the dividend, and a further concession in the rate should authorize a further increase in the dividend.

Under this plan rates would be automatically adjusted to the worth of the service to the consumer. His rebate, or dividend, would rise or fall with the prosperity of the company, and the company's right of participation in the earnings above the standard dividend would be its sufficient motive for endeavoring to operate the property with the utmost economy and to increase the profitable business from year to year. Its success in these particulars would measure not only the consumer's return but its own.

Excepting the class which condemns all rent, interest and profit in any industry as unjust, may we not safely assume the willingness of the public to concede a reasonable profit to the useful and legitimate industry which may be able to attain it, and its further willingness to concede to the management a fair degree of participation in the benefits of progress in the industry? Profit sharing is proposed in the belief that such assumption is safe and that it would dispel those misunderstandings and suspicions which often in the past, and frequently to their mutual disadvantage, have disturbed relations between the public service companies and the people.

Selection and Training of Trainmen

BY O. S. LAMB

Superintendent Waterloo, Cedar Falls & Northern Railway

We all have our pet methods of selecting men for the various duties devolving upon them. But either consciously or unconsciously, I believe, most of us, in choosing an employee, have in mind an ideal candidate and in that way select the applicant whose qualifications, mentally, morally and physically, most nearly approach this ideal.

By the very nature of the case, it is impossible to adopt a scientific formula and apply it to the selection of men for the many places that have to be filled. A hard-and-fast rule might be workable if we were permitted to make our selections from raw material of a high grade. Obviously, this is impossible and every man who is charged with the selection of trainmen must be content to make his selection from average and often from inferior material. Fortunate, indeed, is he who can see in the awkward, embarrassed candidate the making of an efficient employee. There is no more important function of the hiring officer than this power of discernment, unless it be the ability to develop the raw recruit into the capable trainman.

There is a great deal of literature on efficiency in all lines of industry and in all departments of transportation. Scientists tell us that psychology should be employed by the man whose duty it is to select employees in a given occupation and develop them along the lines of efficiency. This is the theoretical side of the matter and, of course, it cannot be wholly ignored. Yet I believe that most of the hiring officers, as a general thing, are committed to the idea that the only way to develop competent trainmen is in the school of experience. We will all agree that the school of hard knocks either puts the polish on a trainman and makes a competent, reliable man out of him, or else puts him in the discard.

On the Waterloo, Cedar Falls & Northern Railway our system of handling an applicant for a position as trainman after he passes the customary examination is to put him to work in the shops to familiarize him with the different classes of equipment. Here he receives instructions on the control stand, is taught how properly to work up power and to manipulate the hand brakes. During the time he is serving in the shops or on the cars as a student his references are being investigated, and if these are satisfactory he is then permitted to take a car, if the seasoned trainman who has been breaking him in recommends such a course. An applicant's references are of great value and no employee is permitted to remain in the service unless his previous record has been good.

We promote our men from city service to interurban service, and we do not hire direct to the interurban service unless we have no one in the city service who is capable of passing the examination. We operate about 100 miles of electric railway, doing passenger and freight business, and the class of service requires as keen and bright trainmen as any railroad operating with steam. We require all motormen, conductors and brakemen to pass an examination on the standard code of train rules for single-track operation, and we are just as technical and thorough in this examination as the steam lines. We follow up this examination with a series of surprise tests, our trainmaster being required to pull off four such tests a month on the interurban lines. A careful record is made of these tests and if a trainman fails to follow out the rules he is disciplined.

We hold semi-monthly meetings for our trainmen and the discussions are in charge of an officer. The legal department is represented occasionally, giving the men talks from the standpoint of the law and its application to the operation of cars and trains, and the relative rights of the cars and trains to the other traffic upon the streets and highways. The claim department gives them talks on personal injuries and how to avoid accidents and the master mechanic speaks to the men on shop practice, construction of cars and the handling of equipment. The electrical engineer gives a lecture now and then on the electrical appliances and construction of motors, and the trainmaster takes up with them every-day questions of operation, while the writer endeavors to prepare something for every meeting that will be interesting and instructive. The men join in these discussions, ask questions and tell their experiences. It has a good effect, and our older men, to whom is given the breaking in of the students, receive a great deal of benefit from the practical lessons of these meetings.

On account of the extremely varied class of our equipment, motormen, when passing from the city service to the interurban service, spend a great deal of time in our shops. We have several different types of control, but our latest and heaviest equipment is provided with HL control, and as our heavy freight equipment differs considerably from passenger equipment and the men are required to pass an examination, they remain in the shops from two weeks to thirty days. The knowledge a motorman gains from actual experience with the equipment and its troubles is worth more to him than the advice obtained from an instructor and is worth a great deal more to him than any instruction he can obtain in any other way.

Such an elaborate course of instruction is really necessary. Unless we provide the means for imparting adequate instructions to our trainmen, we are not doing them full justice—and our work does not even end there. Every man should be given a fair chance to demonstrate his ability and he should be treated with leniency, until he has had time to become familiar with the duties assigned him. When we have done our part in the matter, by giving our men a fair opportunity to render competent service, there will be less occasion for taking snap judgment upon the men who have made a mistake or who have overstepped the line of duty because of insufficient instruction. So thorough should this preliminary training be that the statement "I didn't know that was against the rules" ought never to be heard. I need not say to you that fair dealing and patience in the treatment of men who are derelict is good policy. We should never discharge a man hastily, for a full and fair investigation of the case may reveal mitigating circumstances. It is a poor rule that has no exceptions. Where you find a good bunch of men, contented, well versed in their duty, courteous to passengers, prompt and attentive to business, and men who have the interest of the road at heart and work with a will with no grumbling and no discontent, you are bound to find competent, well-trained officers.

Inspection and Maintenance

BY JOHN SUTHERLAND
Master Mechanic Tri-City Railway, Davenport, Iowa

It is a universally accepted principle that accidents to work people are to be prevented, not so much by legislation as by voluntary effort through the co-operation of employees and employer in the interest of safety. The motto for all street railway men should be "Safety First," and for all maintenance and inspection men "Is It Safe?" Safety is a business question because it is a losing proposition to have a skilled workman incapacitated. It costs money to compensate him or his relatives, and it takes time and money to train another man in his place.

"Is it safe?" This is a question which every inspector should put to himself where any risk might be involved, and, having cultivated the habit, he is likely to minimize the number of accidents and pull-ins that arise from taking a chance with badly-worn parts of equipment.

The subject of inspection and maintenance has received its full share of publicity. The electrical journals have a special department for the voicing of opinions of all maintenance men. These articles are very instructive and helpful, and it appears to me that there is very little left unsaid on the subject, but anyone familiar with this work as well as with the training of men has learned that it requires more than systematic inspection to get the best results.

The hub of inspection and maintenance is the repair shop. In this department you must have skilled mechanics in their various lines. If the railway managers would listen attentively when we want high-grade men for this class of work they would soon get results, as these men, being conscientious, would not allow any parts of equipment that are defective to leave their department.

There is nothing that makes an inspector lose interest in his work more quickly than an armature which throws solder from a badly-soldered commutator immediately after installation. Right here I take issue with some articles that have been written regarding the method of testing armatures before placing them in service. The high-voltage test gives you information on nothing but insulation, and a motor on a 600-volt circuit does not require any test in excess of the line voltage. When an armature is wound, it should be tested for insulation with the line voltage, and for short-circuits and faulty soldering by the low-voltage transformer yoke test, each segment of the commutator being short-circuited to discover faulty soldering. As a further precaution, the motor, after being mounted in the truck and ready for service, should be made to move the car with the three other motors (on a four-motor equipment) disconnected. This test is more severe than it can possibly get in service and gives assurance that it is perfect in every way.

We have kept a careful record of motor failures and armature removals, and find seven-tenths to be due to mechanical trouble, principally bearings becoming low, and these are discovered by the inspector, with his gages, on regular inspection trips every fifteen days, or 2000 miles. It is a significant fact that we only rewound one armature for being low in 25,187,200 motor-miles; this record covers sixty-eight quadruple equipments of the modern type. Seven of the equipments mentioned have run, up to March 1, 3,794,200 motor-miles, without having an armature removed or a bearing installed, and they show very little wear.

Credit for this showing must be given to the modern methods adopted by motor manufacturers in the design of the bearings, which have the waste packed against the shaft on the low-pressure side, a column of waste over it (the oil being fed from below) and with an oil pocket for gaging the depth of oil. The waste used is elastic and lively, and the oil is especially adapted for this class of work. One armature winder takes care of 951 motors, which average 4000 miles per month.

Our bearing practice is a very novel one, as we plane all axle and motor caps so that one diameter is slightly scant. After this is done the bearings are set in the cap, the halves of which are drawn tightly together with a large wrench. The bearings are thus clamped securely in position, and a uniform grip is assured over the entire surface. This manner of fastening eliminates all surface wear, and the dowel pins are only used as a guide for the proper position of the bearing. All our bearings for each type of motor are interchangeable. If an armature shaft is worn we turn it down, shrink on a steel sleeve and turn it down to gage. When we turn down the shafts we leave a good fillet, but never turn a square shoulder, and we have never experienced any broken shafts at this point. When finished, these sleeves are about 7/64 in. thick, and none of them has ever loosened up in service. They are put on at a dull red heat and allowed to cool slowly.

One tool used in modern practice is indispensable—the acetylene welder. We have put this tool to many varied uses, a few of the most important being as follows: When a small crack in an axle is discovered it is cut out "V" shape and welded up, then turned off smooth in a lathe, and the results obtained have been very satisfactory. We weld our keys in the axles and find this plan to be a big money saver. We also build up our broken motor cases, worn journal boxes, truck frames, etc., but have never attempted its use in repairing broken wheel flanges, as I don't think that in the interest of safety it is the proper thing to do.

Inspection is for the purpose of preventing any delays to service by making repairs in time instead of repairing after trouble has occurred. This is extremely important in order to maintain a perfect schedule for the transportation department. A good inspection system, well established and properly conducted, is bound to bring results. The work is different from repair-shop work, it being an art in itself. This class of work should only be allotted to men who can be relied on to know whether a partly-worn piece of equipment will be safe until the next inspection. It is unreasonable to expect the best results unless due consideration is given, not only to the selection of the men but also to the surroundings and facilities connected with their work. Good work cannot be expected under disagreeable working conditions.

The inspection of equipment in this enlightened age is comparatively simple, on account of the steel car and the interpole motor. The inspectors find it an easy task to give the different parts a thorough inspection, as flash-overs are a thing of the past, and with this trouble eliminated one disagreeable task has been done away with.

Two years ago, on one of our interurban lines, we had a great deal of armature trouble which could not be accounted for. The armature insulation would be roasted, and then the motor would ground. We kept a careful watch for this trouble and found it occurred only on certain motors. The fields were tested and found in good condition, and we came to the conclusion it was the different diameters of wheels that caused the trouble. The wheels were taken out and turned until they were of uniform size, and no further trouble of this kind has since been experienced. Since the wheels were made uniform our maintenance records show a very marked decrease in armature troubles. That there can be a relation between uniform wheels and motor maintenance is disputed theoretically by eminent professors, but their knowledge is not infinite, and results obtained in practice are what count with us.

There are many features that enter into low maintenance costs, one of which is a well-run storeroom. It is not a paying proposition to keep a car costing $5,700 out of service any length of time waiting for material to repair it. All companies should have a first-class man in their storeroom, one who must be held responsible for all repair parts, and who must also keep his stock up to the minute. His one problem to contend with is the cost of investment for the supply of repair parts, and with this in view he never overstocks on anything, although it is always more economical to have the repair parts in the storeroom than hold the cars out of service. Another feature is to keep records of the different parts of the equipments. By this method one can soon detect any faulty inspection and catch it in time, and the blame can be put where it belongs. You cannot be too careful with records, as this is the only means you have in devising a way for more economical maintenance. There never was a time like the present for practising economy, as material has doubled in price. Wages have increased by leaps and bounds, and the jitneys are cutting into the receipts, but the value of the nickel received has not increased proportionately, and we are giving better service every day.

There is nothing more discouraging to a master mechanic than to have the manager say: "Look at these figures; their road is about the size of ours, but their maintenance is 15 per cent lower. Investigate this and find the reason why they can make such a showing." Maintenance comparisons look well on paper, but no two cities have the same conditions to contend with. The city with the low maintenance cost has the following advantages: The line voltage is good, the feeders are adequate for the service, the track is in first-class condition and well bonded, the equipment is of the most modern type, the cars are light and properly selected for the service, while the city with the high maintenance has the track in poor shape, low voltage, heavy equipment with obsolete motors not designed for the service. From these diverse conditions you cannot get similar results.

With the development of the light-weight, modern motors it pays to scrap obsolete equipment, not only from a maintenance point of view, but also from the saving in weight and power consumption. Where the cost of motors per 1000 miles is 90 cents per motor, and the cost of light-weight, modern motors is 20 cents per 1000 miles, you can readily see it is a good investment to get rid of your older types. With modern motors your cars can give 25 per cent more mileage, as such frequent inspection is not required, and there is considerably less liability of breakdowns. The points just mentioned do not include the loss of time and revenue from failure of cars, which necessitates their being taken out of service for repairs. This is a big item when you have but a few spare cars to keep your schedule up to the mark.

Maintenance and inspection work varies in every city, and no hard or fast set of rules would apply to all properties, as the different kinds of equipment have their own specific peculiarities and a schedule of inspection made to suit their requirements.

Psychology of Signal Observance

At a recent meeting of the newly-organized Economic Psychology Association at Columbia University, New York City, a paper on the causes of railroad wrecks was presented by O. V. Fry. In this it was stated that information had been collected on seventy-two wrecks which were caused by failures of engine men to recognize signal indications. Contrary to common belief, the greatest number of such man-failures appeared to take place during the middle of the day when the natural light was at its best. In forty-two cases out of the total of seventy-two wrecks investigated the weather was clear, the fact that fewer accidents occurred during fog being attributed to the extra attention to signals which was given under bad weather conditions. Twenty-nine of the wrecks were due to misinterpretation of fixed color signals and the remainder to failures of recognition or observance of the position of semaphores. The author considered that during the daytime color signals had been proved to be more easily read than semaphores. This was explained because the eye and the mind caught the appearance of a color more quickly than the position of an arm. The author urged the use of psychotechnical tests in connection with the employment of trainmen, and stated that these gave a method of comparison even better than the indication of ability displayed by an employee's accident record.

The Northampton (England) Corporation Tramways have recently constructed a home-made tower wagon by mounting a tower apparatus on the chassis of a 16-24 hp. Fiat automobile which was chanced upon in the yard of a certain London dealer. During the six months the machine has been operated it has traveled many hundreds of miles without any trouble.

Tests on 30,000-Kw. Turbine

The Most Recent Units for the Interborough Rapid Transit Company, Reaching a Thermal Efficiency of 25 Per Cent, Have Made the Gas Engine Obsolete in Large Stations

AT a meeting of the American Society of Mechanical Engineers in New York on May 9 a paper was presented by H. G. Stott and W. S. Finlay, Jr., in which were given the results of a series of elaborate efficiency tests on one of the 30,000-kw. cross-compound steam turbines recently installed in the Seventy-fourth Street power station of the Interborough Rapid Transit Company of New York. Before the paper was read Mr. Stott made some preliminary remarks on the development of prime movers since the year 1900, when the Seventy-fourth Street station was installed.

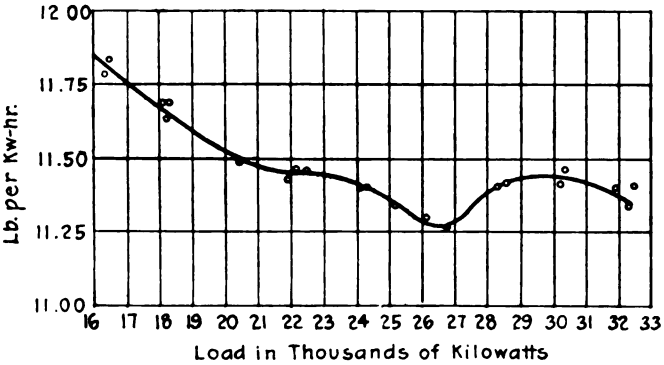
At that time the plant was equipped with reciprocating engines of 5000-kw. rating and a maximum capacity of 50 per cent overload. The water rate was 17½ lb. per kilowatt-hour, and the cost of the engine, generator and condenser approximated $40 per kilowatt of rated capacity. The plant was of the unit-type arangement, and 4000 hp. of boilers were furnished for each 5000-kw. turbine. When the new turbines were installed, each one occupied the same floor space as one of the original reciprocating engines, although the turbines was of six times greater capacity. The new machine had a water rate of 11½ lb. and cost about $9 per kilowatt, including generator and condenser, being operated by the same eight boilers that had originally supplied steam for the 5000-kw. reciprocating unit.

This extraordinary development of the turbine, Mr. Stott said, had caused it absolutely to have displaced the gas engine for power station work. The thermal efficiency of the turbine now approximated 25 per cent, as good a figure as could be obtained from the gas engine, while the latter involved very much higher overhead charges and maintenance costs. For the same reason, hydroelectric power, which looked like a gold mine fifteen years ago, even when the cost of development ranged between $200 and $300 per kilowatt, was to-day not a good investment. Even at Niagara Falls, where the development charge is at a minimum, and where the supply of water is practically unlimited, hydroelectric power cannot compete with that obtained from a modern steam-turbine station when the load factor is less than 50 per cent.

The paper of the evening was then presented by Mr. Finlay. This gave a brief description of the installation and presented in detail the results of the tests. From the figures, it appeared that the maximum efficiency was attained with a load approximating 90-per cent capacity, the water rate at this point being 11.25 lb. per kilowatt-hour. Throughout all of the tests, the operating conditions were approximately the same, the figures for the test giving the lowest water rate being as follows: Absolute steam pressure at throttle, 224 lb.; steam temperature at throttle, 500 deg. Fahr.; superheat, 108.5 deg. Fahr.; absolute steam pressure at primary inlet, 215 lb.; absolute steam pressure at low-temperature inlet, 15 lb. Vacuum referred to 30-in. barometer, 28.86; average load, 26,740 kw.; water per hour, 301,035 lb. The water rate for this test was 11.258 lb. per kilowatt-hour, this figure being corrected to meet standard conditions involving 215 lb. absolute primary-inlet pressure, 120 deg. superheat and 29. in. of vacuum. The Rankine-cycle efficiency under these same conditions was 75.84 per cent and the thermal efficiency was 24.81 per cent.

The load under which the turbine was tested took the swings as normally produced by the railway substations which were being supplied with power, but a number of tests were also made under throttle control to show the influence of the swings upon the economy. The latter results, however, did not differ from the former, showing that swings even amounting to more than 30 per cent of the average load made no appreciable difference in the performance.

In the discussion which followed F. Hodgkinson, of the Westinghouse Electric & Manufacturing Company, who had designed the turbine, discussed the irregularity that appears in the water rate curve above loads of 22,000 kw., this having been found definitely to be due to some other cause than errors in the readings. He ascribed it in part to the action of the separator that was installed between the high-pressure and low-pressure elements for the purpose of removing the water that otherwise would be carried over into the low-pressure blading. This separator was of the centrifugal type, and it was found at times to be inefficient, the removal of the collector plates actually reducing the amount of water carried over at certain loads. R. J. S. Piggott also commented upon this phenomenon, stating that it is impossible to remove the last few per cent of moisture in steam with baffles. It is best to slow down the velocity of the steam below 3000 ft. per minute, at which point the "fog" coalesces into drops which will separate themselves from the flow of steam.



INTERBOROUGH TURBINE TESTS—WATER-RATE CURVE

In answer to a number of questions that were raised during the course of the discussion, Mr. Stott stated that the maximum capacity of the turbine was between 33,000 kw. and 34,000 kw., it being rated at 30,000 kw. and guaranteed for a load of 32,000 kw. Beyond this point, the turbine lost speed, so that an addition of 25 per cent overload would produce a slowing down of about 15 per cent from normal speed. The monthly average coal consumption of the plant approximated 1.5 lb. per kw.-hr. With the original reciprocating engine displaced by the turbines, the coal consumption had been 2.5 lb. The thermal efficiency of the station as a whole averaged 17 per cent throughout the month at the present time.

Employees of the Bridgeport division of the Connecticut Company have a family gathering known as the Order of the Black Bow. On Monday evening, April 24, the order gave its annual banquet, entertainment and dance in the Masonic Temple, Bridgeport. There were 175 in attendance, including employees, their families and a few guests from other divisions of the company. The first part of the program was an amusing and clever rendering of the playlet "The Yankee Peddler." A banquet was served and was followed by dancing. The Order of the Black Bow has been organized about two years, and two or three of these get-together meetings are held each year.

P. S. R. A. Discusses Railway Problems

Chief Topic Was Enforcement of Commission Orders for Regulation of Jitneys—Papers on Labor, the Engineering Manual, and Physical Examination for Employees Are Published This Week

THE spring meeting of the Pennsylvania Street Railway Association was held at the Hotel Brunswick, Lancaster, Pa., on May 9 and 10. The first session, on the afternoon of May 9, was devoted to addresses on the labor situation, the general needs of electric railways and physical examination for employees, while the concluding session on the morning of May 10 was largely taken up with the presentation and discussion of miscellaneous topics concerning the operation of electric railways.

FIRST SESSION

The first meeting was called to order at 2 p. m. by President Thomas A. Wright, vice-president and general manager Wilkes-Barre (Pa.) Railway, who in his president's address criticised the theory of labor leaders that an employee by reason of his employment acquires a vested interest in his employer's property. An abstract of Mr. Wright's address is published elsewhere in this issue. After the reading of the treasurer's report President Wright introduced Charles L. Henry, president American Electric Railway Association, as the first speaker on the program.

REMARKS BY PRESIDENT HENRY

In his opening remarks President Henry complimented President Wright upon the sentiments expressed by him and went on to say that the relation of labor and capital is perhaps the most serious problem confronting the American people to-day. The subject has been of increasing importance in the last few years, but the special conditions now surrounding the nation make the problem worse than before. Provided the employer does what is right, he would, in President Henry's opinion, have no trouble in getting along with his labor if the agitators did not interfere. These are abroad in the land, fomenting trouble and preying on the public mind, which is led to suppose that labor receives good from their actions.

President Henry then discussed the relative scope of activity of the American Electric Railway Association and the state bodies, and said that owing to the local problems arising in various sections of the country nothing at all would be gained by making the state associations a more intimate part of the national body, which deals only with questions so nearly universal in scope that all companies can work together therein to aid one another. There is no conflict between the two classes of associations, for they are both working for the good of the same industry although on different questions.

Turning from this point, President Henry observed that there is a present tendency on the part of many people toward government and municipal ownership, but he averred that enterprises under such a plan could not be conducted as economically, as efficiently or as much for the benefit of the community as would be the case if they were privately owned. The present high state of development in this country has not been brought about through government ownership but through individual initiative, and even though with expansion there has come a greater use of the more impersonal corporate form of ownership, this in its final essence means simply ownership and management by the same American brain and bravery that have made this country what it is. No governmentally owned institution has reached the perfection in business organization attained by such companies as the Pennsylvania Railroad, the Bell Telephone Company and many others, and any adoption of government ownership propaganda would mean a suspension of progress and a general crippling of the country.

In regard to government and state control, however, President Henry felt that such a plan was right, necessary and not at all experimental. He traced the development of the regulation idea and showed how under the present plan the power of the government and the states is exercised in delegated form by the commissions instead of being applied directly through legislative channels as formerly. The only trouble with the idea is that in many states the commissioners are selected with almost a total disregard of their fitness for the work to be done. If commissions are made up of men qualified by education and experience to serve, regulation will work out all right, but with inefficient men on the boards only inefficient regulation can result. President Henry cited, as an example of wise regulatory practice, the act of the British government whereby in taking over the railroads for war purposes it chose for the commission in charge not politicians, but the general managers of the lines.

In closing his remarks President Henry reviewed briefly the increased burdens in labor costs, paving improvements and taxes, and said that the time has come when the condition in the electric railway field must be thoroughly explained to the public. The public, he stated, has had reason to complain of some things, but the present railways should not inherit the punishment that should have gone with the blame. At present there is a deplorable public sentiment against railways that does not exist in the case of enterprises owned by individuals, and there is a great need for railways to force the public to see the necessity for a fair deal. President Henry believed that much progress toward removing public ill-feeling could be made through the more extensive use of common courtesy, and he urged that all employees, from the lowest to the highest, be more imbued with the idea that the railways are asking the public for patronage and that the public must be so treated that its patronage will be gladly given and its good-will maintained.

OTHER PROCEEDINGS

At the conclusion of President Henry's address President Wright urged the Pennsylvania Association to show more frank, vigorous and concerted effort in the discussion of the operating problems concerned in public relations, and he emphasized the fact that more unified effort should be made to disseminate information regarding the needs of electric railways.

Owing to the inability of the men to be present, the scheduled papers by J. A. Keppelman, on "Current Street Railway Problems," and by D. I. McCahill, on "Court Trials in Damage Suits," were omitted, and then Francis

D. Patterson, M.D., chief of the division of industrial hygiene and engineering, Department of Labor and Industry, Harrisburg, Pa., read a paper on "Physical Examination for Employees." This is abstracted elsewhere.

President Wright stated that his company had examinations made by a regular physician and an oculist and believed that records should be made periodically once a year. Out of 500 applicants recently examined only three were found defective. President Wright said that some antagonism was displayed by the old employees on account of fear that examinations would result in their being pushed aside, but he felt that the paramount duty in this regard was to take the necessary steps to insure the public safety.

A resolution presented at the last meeting in Scranton to the effect that the winter meeting of the association should be held on the third Tuesday and Wednesday in November and the spring meeting on the third Tuesday and Wednesday in May was then taken up and passed, and the meeting adjourned. Through the courtesy of the Conestoga Traction Company the delegates then made a very interesting sightseeing trip through the residential and business sections of Lancaster. In the evening an informal dinner to association members and guests was given at the Hotel Brunswick.

FINAL SESSION

Owing to the recent death of W. B. Rockwell, manager Eastern Pennsylvania Railways, Pottsville, Pa., the scheduled paper on "Jitneys—Their Effect on Street Railways" was not presented at the opening of the final session. President Wright stated that Secretary Stine was preparing a letter of condolence to be sent to the widow.

Discussion on Jitneys

The first address was by E. H. Davis, manager Williamsport (Pa.) Passenger Railways, on "Legal Points in the Operation of Jitneys." Mr. Davis stated that the legal question in Pennsylvania had been cleared up by the recent decision in the Scranton cases making jitneys common carriers. Although the decision on its face covered cars with fixed termini and fixed fares, Mr. Davis thought that it was applicable to both regular and irregular jitney operators. In his mind, however, there was a real question of how to get protection under the decision. Counsel were gravely in doubt as to whether jitneys could be required to operate every day, for they were not like corporations with charters, and apparently the only way to proceed against them for non-operation would be by action of the Commonwealth against the drivers, for the lack of service would be a matter of purely public interest.

Mr. Davis then read part of a general ruling just issued by the Pennsylvania Public Service Commission to the effect that certificates of public convenience would be limited "to the route and number of cars and particularly to each automobile or auto-bus designated in the certificate," that certificates would be non-transferable and that automobiles or auto-buses authorized to be common carriers must have painted on each side three lines containing the name of the person to whom the certificate is issued, the word "auto-bus" and the number of the certificate. Mr. Davis thought that the Scranton decision would solve the problem in a majority of cases, and he did not think that certificates would be issued for summer operation only. He considered it hardly possible in many municipalities to get satisfactory ordinances, and on the basis of a broad view of the question it would be better to meet jitney competition through commission regulation.

W. A. Heindle, general superintendent Southern Pennsylvania Traction Company, Wilmington, Del., then described the experiences of his company in Delaware County. In this busy industrial center the jitneys started about a year ago with speedy service. There was no regulation, and at first thought it seemed that they cut into the returns of the railway $75 per day. Mr. Heindle said that besides the small automobiles there were trucks, used industrially during the day, which carried passengers morning and night. One special delivery wagon for Gimbel Brothers was thus operated. Mr. Heindle doubted whether such trucks could be classified as common carriers. It was also found that there were a large number of pleasure riders in the jitneys, particularly at night. On May 1 the Council passed a jitney ordinance providing for $50 license fee and $2,500 bond, and this did a great deal toward cutting out jitney competition in Chester. The company doubled its service to take care of the extra traffic and the proposition is paying. Seven jitneys have taken out certificates but the competition is not serious.

W. E. Boileau, general manager Scranton (Pa.) Railway, said that all the jitney lines stopped running in winter, but that this spring one man began to operate an auto-bus line without a certificate and that later he with another man filed a petition for a certificate. This case is being argued now before the commission. Last year in Scranton there were at one time 105 jitneys, and fifty-two are in operation again this year without certificates. The company doubled the service on the lines concerned, but could not combat the jitneys on account of the foreign riders who wanted a 5-cent automobile ride. Mr. Boileau remarked that he had seen eleven passengers riding in one Ford car. As a result of a check made a few days ago it was found that on the Providence line the jitneys were earning about 10 cents per bus-mile and on the South Side 8 cents per bus-mile. The auto-bus line previously mentioned runs 100 miles on $12, and it will probably cost the owner more than $20 a day to operate. Mr. Boileu said that the Scranton Railway has filed or is filing complaints against the fifty-two jitney owners to compel them to seek certificates of convenience. Up to the present time the commission has not acted. The jitneys are cutting into the railway receipts about $200 a day.

C. B. Fairchild, Jr., executive assistant Philadelphia (Pa.) Rapid Transit Company, felt that the Public Service Commission would have to discover through its own inspectors the violations of law, and certainly the burden should not be put on the street railways. To his mind there was a question whether the decision in the Scranton cases covered wild-cat jitneys, although there was no doubt about its reaching real bus lines. Mr. Fairchild told how difficult it was to secure enforcement of municipal regulation of jitney service in Philadelphia, and stated that the only way thus far devised was to secure an attachment on the car, and even here the $300 exemption limit allowed the drivers to evade punishment by claiming they did not have $300 or did not own the cars. Some cases, however, have been placed by the city solicitor in the hands of the sheriff and the cars are now bearing public auction notices. Mr. Fairchild suggested that the record of persistent violators might be cited to the State Highway Department with a petition for the revocation of the auto licenses concerned. This body, he understood, would not countenance continuous violations of city rules, and he would like to see several companies take up the question in this way.

George P. Wilson, chief bureau of rates and tariffs, Pennsylvania Public Service Commission, stated that he did not feel authorized to speak for the commission in regard to jitney regulation, but he reminded the delegates that the subject of jitneys was one not considered when the regulatory law was passed and that time was needed to work out a program of regulation for such vehicles. In reply to a question, Mr. Boileau said that it cost 6.5 cents a mile to operate a Ford car, and President Wright stated that the cost in Wilkes-Barre was from 7.5 cents to 9 cents, the average being about 8 cents. President Wright also criticized the punitive part of the public service commission act for being weak as regards enforcement of fines and too long legal procedure. It was explained that a deliberate violation of an order of the commission subjects the party to criminal proceedings, and the commission will certify complaints to the attorney general to prosecute in the name of the Commonwealth. President Wright believed, however, that the proper procedure against jitney operators was through complaints to the commission, and that this would finally bring some fair action. The process might be hastened if the association were to request a hearing on the rules to be promulgated.

MISCELLANEOUS PAPERS

After the foregoing discussion a paper on "One-Man Car Operations," by W. E. Moore, president W. E. Moore & Company, Pittsburgh, Pa., was read in his absence by Mr. Fairchild. This paper will be abstracted in a later issue. Mr. Boileau said that one-man cars were a good device in many places and that in Houston they seemed to be working out very successfully. In Scranton, however, where there were fifty-six railroad crossings, the proposition was entirely different. Labor is opposed to one-man car operation, but the greatest difficulty is the flagging of crossings. President Wright said that in Wilkes-Barre there were eighty-five railroad crossings, but that his company had not taken up one-man car operation because such cars could not handle the peak loads, and multiplicity of equipment was not desired. If one-man cars were to be used, he would consider the placing of flagmen on the crossings. He mentioned the fact that sudden illness of the motorman was a very serious matter to be considered in connection with one-man cars.

J. E. Wayne, superintendent York (Pa.) Railways, then read a paper on "Street Railway Freight and Express Service and Mail Rates," to be abstracted later. The next paper was on "The Engineering Manual" by F. R. Phillips, superintendent of equipment Pittsburgh (Pa.) Railways. This paper is abstracted elsewhere.

In discussing the latter paper, M. Balluss, general manager Westchester, Kennett & Wilmington Electric Railway, Kennett Square, Pa., said that, although there was considerable talk about electric railway standards, he did not think all of the talk was put into practice. He mentioned the fact that some articles are used alike by both steam and electric railways, and in such cases he thought it would be advisable to consider steam railroad standards in use rather than to waste time and money trying to devise new standards. He thought that the greater purchasing power of the steam railroads was worth taking advantage of in such cases. Albert L. Allen, assistant manager State Workmen's Insurance Fund, Harrisburg, was then called upon for some general explanatory remarks in regard to workmen's compensation insurance in Pennsylvania, with particular reference to state-fund insurance.

The next paper was on "Rush-Hour Traffic" by P. T. Reilly, superintendent of transportation Scranton (Pa.) Railway, which was followed by a paper on "Handling Accident Reserves" by H. D. Anderson, assistant comptroller American Railways, Philadelphia, who took on the program the place of F. J. Pryor, Jr., assistant secretary and comptroller of the same company. In replying to a question, Mr. Anderson said that the statistics for the various companies controlled by the American Railways varied, but in 1915 the lowest cost per accident was $6.52 and the highest cost per accident was $47.80, while the accidents to passengers per 1,000,000 passengers carried varied from 6.85 to 20.69. President Wright said that the average cost per suit was found by his company over a series of years to be about $600, and Mr. Fairchild stated that the cost per claim for his company was calculated at $390. The last paper on the program was by Mr. Heindle on "Training of Platform Men." The three papers mentioned in this paragraph will be published later.

Under new business it was moved that a committee of three be appointed to stand ready to co-operate with the Public Service Commission in matters affecting the association and the appointment of such a committee was authorized. Announcement was made that the Conestoga Traction Company had arranged for a trip to Engleside for the delegates who remained over, and the meeting was then adjourned.

President's Address

BY THOMAS A. WRIGHT

Vice-President and General Manager Wilkes-Barre (Pa.) Railway

One of the most serious industrial problems of the day is the theory being advanced by labor leaders and men under the socialistic influence that one individual working for another individual comes, at a certain time in the course of that employment, to have a vested interest in the property of his employer. In the last fifty years there has been a developing sentiment that the under man, or the man at the foot of the ladder, has been unduly oppressed and it is the responsibility of the men in charge to look to the welfare of the most insignificant employee, even where that employee is not inclined to look after his own welfare.

The criticism against capital and the employer formerly was that the old laws favored them against the workingman and labor in general. During the last twenty years, however, in response to the demands of labor, a great change has been made in the law, and now it is capital and the employer that complain against the law as favoring the laboring man. Has labor, however, shown any indication of being satisfied or even reasonable? Instead of being satisfied with the law, as it has been changed to its advantage, labor has become more and more dissatisfied, until now its dissatisfaction has practically taken the form of contempt for all law.

Just as disturbing as labor's dissatisfaction with its gains is the inclination of certain philanthropists to lose track of the fundamental law of the land. Seth Low, in a recent article on "Industrial Peace," assumes that because property is owned by thousands of stockholders, it is less their property than if it were owned by a single individual, and he goes on to argue that the workman who works for a corporation should receive greater consideration than a workman who works for an individual. Mr. Low voices these theories as a "growing conviction," without stating any basis of right for such a conviction. The class of laboring men who believe in this "theory" are laboring men who have no property or, if they have property, it has been acquired in dispensing this theory to those who would be anxious to hear it.

In the theory that a man acquires property rights in addition to his wages when he works for an enterprise, there is the elimination of all right of a man to his property. If that theory should be accepted, it would mean that not only would a man lose the right as to the ultimate disposal of his property, but if one carries the thought to its logical conclusion the laboring man must lose the right as to the disposal of his labor. In other words, if a man acquires a property right in addition to his wages when he works for an enterprise, he is not able to sever himself from that enterprise at will, for the theory of property is responsibility as well as ownership. If, therefore, the enterprise should be a financial failure, he has no more right to abandon the enterprise because it is not paying him what he expected than he would have the right to disown any other taxable property when he found the taxes burdensome.

Mr. Low further states that the "feeling" of the men who believe in this theory and with whom it is a "growing conviction" is restricted to placing it in operation in a "railroad system or any other vast industrial plant." Such a statement shows how chaotic this theory of property is and how contrary to all human conceptions of reason and justice. Apparently this property right is acquired by the laboring man only when the plant is of a gigantic nature, or only when it is owned by a corporation and not by an individual. In other words, laboring men will be empowered to take part of the property of a corporation, but would acquire no property right in the plant that was owned by an individual. Following this theory to the *reductio ad absurdum,* the formation of a corporation will practically mean that the men putting in their capital and their money lose control of their property at the same time. If such a theory should ever come into operation, which, of course, it will not, every civilized country would be obliged to return to primitive and archaic methods of doing business.

An illustration will show the unsoundness and impossibility of such an economic theory and how it would work against the interest of industrial peace. A frugal and capable laboring man works twenty years and at the end of that time establishes himself in business with his savings. He employs some of his former fellow-workmen, who were less frugal and capable or, perhaps, less fortunate. After a few years in business these employees inform the new capitalist that they have acquired a property right in his business to the extent that he must pay them salaries that he does not consider justifiable and that he must continue to employ them and not hire cheaper help without their sanction. The acceptance of such a condition of affairs would mean that B, C and D, the non-frugal employees, had received during the twenty years they were fellow employees of A, their full wages, but, having spent and enjoyed the wages of those twenty years, they were now practically the beneficiaries of A because he had been more industrious, more capable and more frugal. In other words, all that A had accumulated by his industry and frugality was the burden of taking B, C and D in as partners.

The foundation of all civil law is the law of contract as it has come down from the Roman law. The march of progress has been not to destroy the power of contract, but to strengthen it and to broaden it. Hence, to strike at this law of contract, as the theory that a man has a vested right in his job does strike, is to strike at the fundamentals of civilization.

The law of the land, as it stands to-day, is clear. It is not permissible for a body of capitalists to enter into any combination that may be in restraint of trade. If a body of labor men, however, enter into a combination and decide that because of their demands they can paralyze the business of a community and terrorize the inhabitants, the community is supposed to offer no protest. The only excuse one hears for these conditions is that the unions are in a position to ruin the political future of any public officer who goes counter to the sentiment of the union and its sympathizers. The union, therefore, becomes an extra-constitutional and extra-legal kind of government, setting at naught the law and the constitution and the rights of all citizens who oppose its will.

There may be those who say that this is an extreme statement, but I have seen it existing under my own eyes for the last fifteen months in Wilkes-Barre, where local laws, State laws and the criminal laws of the land have been absolutely defied. What does this mean to the nation at large if these feelings grow, and what bearing has it on those fundamental ideas of law and order and of internal peace and security on which this government rests? The right of men to organize, the right of men to organize for collective bargaining, the right of men to strike—these are admitted without question, but I cannot believe that any argument will ever be advanced that will justify men who claim the right to organize for the purpose of forcing another man to quit work against his wishes.

I believe in the dignity of labor. I believe in the future of labor, but no progress was ever made on this earth that was not made in accordance with law. I believe that, fundamentally, the laboring men of the country are a law-abiding body of men and that they wish for nothing more than the right to earn a decent living in a lawful and legal way, but the evils of the present day are bad leadership and loose thinking. With right-thinking men as leaders, there will come true industrial peace founded on law and order and justice.

The Engineering Manual

BY F. R. PHILLIPS

Superintendent of Equipment Pittsburgh (Pa.) Railways

There are few, if any, words or phrases in the engineering vocabulary which have been subjected to so much abuse and are so little understood in general as the word "standard," which, we are told, is interpreted as being "a fixed or accepted rule or model."

We have been beset upon all sides and from every angle with standard this and standard that, until finally it has been said, and with no small degree of justification, that standardization is stagnation. When an art is in its formative state or when structures and apparatus are undergoing the process of development it is true that standardization has no place. Indeed, the solution of any problem requires that past theories and practices be cast aside, at least for a time, and that even the so-called fundamental laws should be subjected to the closest scrutiny, in order that true success may be obtained. However, in many cases, it is because of the very essentialism and need of a "fixed rule or model" that abuses have crept in, and many false and inferior methods and devices have been cloaked with respectability under the broad mantle of standard.

On the other hand, standard rules, standard methods, standard practices considered from the proper viewpoint have their usefulness and are of incalculable value. To those of us who have to do with the upkeep, performance and renewal of physical property, the certainty of this statement is without question. Without standardization, maximum efficiency is not possible, and without maximum efficiency, we have not secured the ultimate in economy.

We are all familiar with the reductions in manufacturing costs that are gained through quantity production, and we need dwell no further upon this phase of the subject other than to repeat the well-known fact that the greater the quantity, the lower the unit cost.

Nothing will produce that greater quantity except standardization.

The street railway industry is in its incipiency, and there is, perhaps, no other industry which has undergone so rapid development and experienced so many changes in construction details during its short life. It is expected that radical changes in construction and operating details will continue to be made. Nevertheless, there are many methods and parts of apparatus that are proper subjects for standardization, and it is these methods and practices which have emerged from the period of incubation and have been received and accepted as complete by the majority of those most intimately associated with their uses that have received the sanction of the American Electric Railway Engineering Association, and have been presented in a convenient form in its engineering manual.

In this compilation "standard articles, standard designs, standard specifications, standard units, standard terminology, standard measurements adopted shall be those which are applicable to general use and represent the best practice." These various items are graded into three groups, and it is not until a recommendation has received the final sanction of the association that the method or practice is given the prefix of "standard." However, to assist the members of the association and to direct their attention to growing practices, the manual carries a second grading known as a "recommendation." This covers articles, designs, specifications, units, etc., which represent the best existing practice but which, because of the formative state of the art, have not as yet reached the point where they may receive the full sanction of the association as finished products or "standards." The manual carries still another grading known as "miscellaneous methods and practices," which covers matters that are not proper subjects for standardization but represent general practice along their particular lines.

The general purpose of a standard as adopted by the association is to provide specific information particularly for the smaller-member companies of the association who have not the facilities and advantages which would be found in large corporations.

The amount of detail in connection with the working up of one of these standards is simply amazing. I believe I can say without fear of successful contradiction that not a standard found on the pages of the manual has not been subjected to investigation and close study for years before being brought down to its final shape. When we consider the time, and study, and expense, and experimentation applied to the finished product, we may feel safe in saying, and most emphatically, that the standards represent the last word and best practice in the present state of the art. One can have no hesitancy in commending them to your closest scrutiny, adoption and use.

In conclusion, let me repeat that standardization has its place and has a definite function to perform. This necessity is thoroughly understood and appreciated by the members of the American Electric Railway Engineering Association, who also realize to the fullest extent the necessity for uniform care in the compilation of these standards for their use. You may be assured that, when any proposition has passed the censorship of the various committees, and finally the committee on standards, and still later, the scrutiny of the members of the association at large, you will be safe in its use. Finally, bear in mind the fact that production costs may be materially reduced through uniform requirements and quantity production, and that standardization is the greatest contributing factor toward this advantage.

Physical Examination for Employees

BY FRANCIS D. PATTERSON, M.D.
Chief Division of Industrial Hygiene and Engineering, Department of Labor and Industry, Harrisburg, Pa.

Inefficiency due to poor health is a burden distributed upon many shoulders. The corporation which has physically substandard employees suffers from decreased quantity and often quality of work performed. The commonwealth bears its share, for often the man or woman becomes the recipient of medical care in a hospital which is at least partially supported by state funds. Finally, the illness may be such as to cause the unfortunate to lose time, and his loss of wages falls as a heavy blow upon those dependent upon his or her earnings for support.

It is unfortunate that reliable statistics upon the subject of loss of time, as a result of illness, are not available in America, but it has been calculated, from German statistics, that every wage earner in this country loses at least eight or nine days a year by reason of illness. If we stop to consider the millions of workers in America, the sum of the total loss in wages alone amounts to more than $360,000,000 each year, and this takes no account of the losses in profits to the employer by reason of a slowing up of his output, or of the loss to the state at large owing to a premature old age, the result of disease.

WORK OF TRACTION PHYSICIAN

If the physician is to assume the place in the industrial life of this country for which his training fits him, he should be the guide, philosopher and friend of employer and employee, maintaining a health supervision over the industry and its employees which will increase efficiency and profits. The competent physician is a real dividend-maker for every corporation.

In the case of a traction company the general work of the physician should be as follows:

He should emphasize to the management the value of proper lighting as a means of increasing efficiency and preventing accidents to the employees, to the passengers and to the public at large.

He should suggest that car cleaning may be efficiently, cheaply and healthily performed by vacuum cleaning or other dustless methods.

He should indicate how rest rooms, with sanitary toilet facilities, individual wash basins, shower baths and cooled pure water increase efficiency and decrease accidents. For employees to discharge their duties with the utmost efficiency it is necessary that their hours of work be followed by mental and physical rest.

He should suggest, when indicated, that motormen be given protective glasses with lenses of Crooks or Feuzal glass to obviate the intensely harmful infra-red and ultra-voilet rays from either the sun or the present high candle-power gas tungsten electric automobile headlight.

He should actively assist the management in its educational campaign for the prevention of accidents and the conservation of the health of all employees.

He should promptly render competent first aid and make the necessary redressings of all the accident cases that occur.

He should prescribe proper medical treatment for the acute or chronic illnesses of all employees, thereby assuring their return to health at the earliest possible moment.

He should physically examine all applicants for employment, re-examine all employees at a yearly interval and again make a re-examination before the employee resumes work after an absence due to either sickness or injury.

The physical examination of applicants for employment and their re-examination at stated intervals and after disabling accidents or sickness bears a very important relation to the accident problem of the American railroads. The failure to take proper care and the taking of chances are the cause of innumerable accidents, and it should be the duty of the employer to determine accurately through a physical examination by a competent physician that the employee is physically and mentally competent to take this proper care.

The value to be placed on any physical examination depends on the thoroughness with which it is performed. I do not consider a trainmaster or an air-brake inspector competent to determine the physical or mental qualifications of an applicant for employment in the operating or any other department of the railroad service. I am convinced that the examination of the heart, the lungs, the nervous system, the urine, and the determination of the blood pressure are equally as important as the examination of the eyes and the ears, and this presumes that the non-medical examiner has had the training to make the latter examination properly.

"Safety appliances require safe men to operate them" is an axiom too often disregarded by the management of American railroads. The most modern form of block-signal system is of no possible protection to any car at night when a color-blind motorman is at the controller, or at any time, if the motorman is lifeless from some disease, the presence of which would have been determined by a thorough physical examination. The employment of any man in the operating department of a railroad, without submitting him to an examination by a physician prior to his appointment, and the failure to re-examine him at frequent intervals, is courting a disaster which may be titanic in size, if not in name.

No company need hesitate over the question of expense, for the medical department can be made self-sustaining by charging the applicant a fee for the examination. In the electric roads, in nearly every instance, the cost of the examinations is placed on the applicant, the fee varying from 50 cents to $2.50, but the average charge is $1.

VALUE OF EXAMINATIONS

The value to the employer of physical examinations of his employees may be summarized as follows:

It can be stated as an axiom that the industrial efficiency of every employee is in direct proportion to the employee's physical and mental health. Physical examination detects concealed foci of disease and determines the presence of disease in the incipient stage when medical treatment has the best prospect of effecting a prompt cure with the minimum loss of time. A physical examination prevents the prospective employee from being placed at work which, by reason of physical defect, he is not able to perform in a competent or safe manner.

It places the employee who has physical defects into departments where his defect will not prevent him from being efficient and where he may work without physical injury to himself.

It either prevents, or assures an adequate defence against fradulent claims by employees for personal injuries under the compensation act.

It is, when used at a yearly interval at least, a factor of material importance in the maintenance of all employees in a continuous state of physical and mental efficiency.

It prevents the employment of a person with defective color perception or vision as a motorman or in any other position that requires him to interpret signals.

The advantages of a physical examination to employees are:

It assures them a healthy fellow employee and prevents their being exposed to the danger of contracting syphilis, tuberculosis, smallpox, trachoma or other communicable disease from another employee.

It detects disease in its incipiency and by its prompt treatment prevents or decreases the time lost through illness.

It assures the employee the prompt correction of physical defects, such as poor eyesight, hernia, etc., thereby increasing his efficiency and consequently his earning power.

It assures to the employee labor for which he is physically competent. The employment of a man with heart disease at a vocation requiring violent physical exertion might result in a fatality, etc.

It points out to the employee the value of fresh air, of securing proper rest, and of eating slowly and regularly as a means of conserving his health, and it also indicates the poisonous effects of alcohol.

It assures prompt and competent first aid and redressing of injuries, thereby facilitating healing and preventing infection.

It gives the employee knowledge of to whom to apply when either injured or sick.

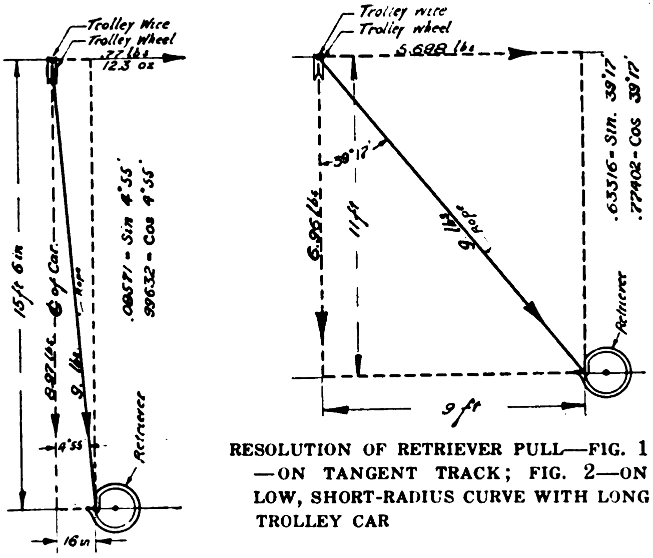
COMMUNICATION

Why Trolley Wire Wears Out

UNITED RAILROADS OF SAN FRANCISCO
SAN FRANCISCO, CAL., Apr. 29, 1916.

To the Editors:

Replying to the article of C. I. Earll appearing on page 734 of the April 15 issue of the ELECTRIC RAILWAY JOURNAL, in which he disagrees with the claim that unsymmetrical trolley wire wear is caused in part by retrievers and attempts the unpromising task of proving that the side-pulling rope does not pull sideways, which his rather vague statement that "an inclined rope does not pull the trolley wheel against the flange" apparently means, it would seem unnecessary to more than refer to Mr. Earll's task to see the impossibility of his succeeding.



RESOLUTION OF RETRIEVER PULL—FIG. 1—ON TANGENT TRACK; FIG. 2—ON LOW, SHORT-RADIUS CURVE WITH LONG TROLLEY CAR

By means of a parallelogram of forces (Figs. 1 and 2) the pull of an off-center retriever applied to the trolley wheel by the inclined trolley rope can be resolved into two components. One is a vertically downward force opposing the upward pressure of the trolley pole, equal to the total pull from the retriever multiplied by the cosine of the angle between the rope and the perpendicular. The other is a horizontal force tending to pull the farther trolley wheel flange against the wire, equal to the product of the total retriever pull multiplied by the sine of the same angle.

These forces may not produce serious results in either direction but the tendencies always exist to do both. The horizontal component may be only a few ounces, as on straight track (see Fig. 1), but whether the trolley base pushes the wheel vertically upward with a force of 20 lb. or one of 20 tons those few ounces of horizontal force are certainly always present. This is absolutely proved by the fact that it pulls the trolley wire out of line between span-wire supports.

With a trolley pole pressing upward with a force of 20 lb. from a roller-bearing base, the 20-ft. high trolley wire was drawn 1⅞ in. out of line by a 5-lb. 16-in. off-center retriever pull in the middle of a span. The wire returned nearly to its original central position when the retriever pull was released.

With a 9-lb. retriever pull (Fig. 1) the wire was drawn 2⅝ in. out of line and returned when the retriever pull was removed. In this latter case the rope angle was 4 deg. 55 min., the horizontal component of the retriever pull was 12.3 oz. or 8½ per cent of the total 9-lb. pull, and the actual horizontal tension applied at right angles to the wire and required to draw the wire back to center against the retriever pull was between ¾ lb. and ⅞ lb.

This simple experiment avoids the mathematics and at once puts beyond argument the question of whether the side-pulling trolley rope from an off-center retriever pulls sideways or not.

The impression evidently sought to be conveyed by Mr. Earll's drawings that, because the effect or the tendency or the limits of the resultant of the base pressure and the off-center retriever pull can be expressed in ten-thousandths of some unit, it is therefore by inference negligible, is like the plea of Marryat's unmarried young lady who did not see why they made such a fuss about her baby seeing that it was such a very small one.

Such a plea might pass when considering the wear on straight-line trolley wire because it would be difficult to prove that unsymmetrical trolley wire wear is synonymous with increased wear. Relative to wear on straight-line ears this plea has much less weight, for when one-half of a clinch ear is worn off that ear is all worn out as a support for the wire and unsymmetrical ear-wear certainly tends to cause more frequent reearing.

The retriever side pull is most prominent and destructive on sharp curves where the retriever on the end of the car may overhang the outside rail 2¼ ft., the trolley wire may overhang the inside rail 2¼ ft., the distance between the retriever and a point directly below the trolley wire may be over 9 ft., the rope angle may be 39 deg. and the horizontal component of the retriever pull may be 63 per cent of the total pull or, in the case of a 9-lb. pulling retriever, up to 5 2-3 lb. (Fig. 2). The linemen complain that the trolley wire wears out faster and the ears have to be replaced oftener than formerly there, while the conductors are occasionally seen to forestall the accident of the wheel leaving the wire by pulling several feet of slack out of the retriever when approaching these curves. Both classes of men refuse to be convinced or even interested in diagrammatic or symbolic mathematics claiming to prove that the side-pulling retriever is not mainly responsible, or that their troubles are all imaginary.

It was also found that when a trolley wheel had become worn to the limit of safety on one side of the central groove, the carhouse men were accustomed to turn the wheel in the harp in order to allow it to wear out on the other side. Possibly some of the wheels examined by Mr. Earll by day had been recently turned by the night carhouse men. A study of the wear on the trolley wire and ears that cannot so readily be reversed over night might have been less encouraging to Mr. Earll than inspection of trolley wheels, which really only cost about one-seventh as much per car-mile as trolley wire and are relatively unimportant.

Personally, all overhead men prefer the presence of retrievers on the cars to their absence if these devices are kept in order. The company pays for the trolley wire, not the men. There certainly are fewer broken span and pull-off wires now than in the old days. Span wire, however, costs only 5½ cents per pound, whereas trolley wire costs 32 cents, and there is more trolley wire used locally per car-mile now than before the retrievers appeared. Further, I am not sure whether the reduction in span-wire breakage is due to the retrievers or to our recent practice of increasing the size from ¼ in. to ⅜ in. and the pull-offs to 5/16 in. I rather think the increase in size should have most of the credit for this reduced breakage.

As to Mr. Earll's final paragraph—"It is, so far as I have been able to ascertain, the universal experience that the maintenance cost of overhead wires is greatly reduced by the use of catchers or retrievers"—I can only report that the cost per car-mile for maintenance of overhead wires in San Francisco is considerably higher now than in most pre-retriever years. There is little glory for the retriever to be found in a comparison of San Francisco annual average overhead costs for the past thirteen years.

Mr. Earll's admission, "There are still many systems, especially in the cities, where neither retrievers nor catchers are used," is significant and may be interpreted as indicating that there are railway men in the East who anxiously feel that in buying retrievers what you pay is not all you pay.

That wire is found worn on both sides on curves is no acquittal of retrievers of side pulling. This double-sided wear is usually due mainly to one of two causes. Either the wire is not located accurately for the single type of car using it or there are several types of cars passing so that the wire is too far in for some and too far out for others, presenting the conditions that cause the excessive scraping that prevails between wire and wheel in advance of a frog when a car is turning off the main line or as Mr. Earll's right-hand diagram portrays.

With a properly located curve wire and a single type of car using it, the wear on the wire will be a minimum. With a 4-lb. or 5-lb. retriever side pull added, there will be side wear added to the wire, or there is no such thing as logic or value in the testimony of men engaged in renewing curve trolley wire.

The side pressure involved in the use of the retriever is not to be viewed as an unpardonable objection to its use, but rather as a partial compensation for its good qualities and as an abrasive action on the trolley wire and ears that should be minimized where possible. Judging by the general practice most railway men feel that good retrievers on the whole are well worth all they cost. S. L. FOSTER, Chief Electrician.

The Railroad Commission of California, San Francisco, Cal., has just published Volume 7 of its opinions and orders, this covering the period from June 1, 1915, to Aug. 31, 1915.

ASSOCIATION NEWS

Attention of Milwaukee Section at Last Meeting Directed Toward Track Construction, Operating Rules and Schedules—Connecticut Section Hears Addresses on Power Generation and Other Topics—Correspondence Course Graduates

MILWAUKEE SECTION

The regular monthly meeting of the Milwaukee Section (company section No. 1) was held on the evening of April 27. The regular order of business was followed by a limited quiz period, after which the meeting proceeded to the reading of committee papers.

C. L. Smith of the way and structures civil engineering department presented the report of the committee on roadway, taking up first the matter of "Roadway—Open Track Construction." In his treatment of this subject he considered the location of roadway, purchase of right-of-way, procurement of franchises, construction of lines, drainage, ballast, ties, rail fastenings and joints, crossings, cattle guards, etc., and offered the committee's recommendations, as follows:

1. That wider subgrades be constructed for both cuts and fills.
2. That all subgrades should be sloped for drainage purposes.
3. That sod strips be placed along the subgrade shoulder.
4. That all slopes be covered with vegetation wherever washing of the surface occurs, if possible.
5. That 5-in. 80-lb. T-rail be used as a standard interurban rail.
6. That the standard tie for interurban track be a 6-in. x 8-in. x 8-ft. white oak.
7. That 10-in. of gravel ballast be placed beneath the ties, and if crushed stone is used the stone should be carried to a depth not less than 8-in. beneath the ties.
8. That continuous joints be used and that the blocks employed be creosoted.
9. That a cast-iron pipe be used in place of tile for drain.
10. That the gravel insert type of roadway crossing as shown be adopted as standard.

The matter of "Roadway—Paved Streets" was next taken up, and in this connection the factors having an influence upon the design were enumerated as follows:

1. Character, bearing power and drainage of sub-soil.
2. Effect of electrolysis.
3. Live load to be carried.
4. Form of substructure necessary to distribute the load over the subsoil.
5. Form of superstructure to be carried by the substructure.
6. The question of street improvement with respect to line, grade, paving and subsurface structures.
7. Street and car traffic condition under which the work is to be executed.

From the conclusions reached in the discussion of this subject the committee had the following recommendations to offer:

1. That the question of drainage receive most careful consideration and wherever present practice is inadequate a drain should be installed in the dummy.
2. Two types of foundation construction, as shown, be adopted as standard, the condition of the subsoil and other factors to control and govern in the selection of the type to be used.
3. That crusher-run crushed stone, varying in size from ½-in. to 3-in. be adopted as the standard ballast material and that a depth of 8 in. below the tie be adopted.
4. That the standard tie for tangent track construction in the city streets be a 6-in. x 8-in. x 7-ft. long-leaf yellow pine tie.
5. That the 7-in. 95-lb. and 6-in. 72-lb. T-rails be adopted as standards, depending upon the degree of rail service required.
6. In fastening the rail to the tie ¾-in. x 5-in. screw spikes be used in place of the hook head track spike.
7. That surface drains be installed at all low places to assist in carrying off the surface water.

Following the presentation of this report, C. H. Cross, chief safety inspector, reported on behalf of the committee on rules and regulations, stating what had been done along the line of formulating definite rules and regulations. He said that the practices prevailing in the several divisions of the company were being assembled with a view of providing:

1. General rules.
2. Rules for emergency duties.
3. Standardization of specifications for employment.
4. Definitions defining tools and various devices in use.
5. Specifications for materials.
6. Accident reports.
7. General inspection, etc.

The third paper of the evening was one presented by Fred W. Yeo, superintendent of schedules, on behalf of the committee on construction of time-tables. Mr. Yeo outlined the requirements imposed upon the railway in the way of service standards, and described the method employed for securing the data necessary to the construction of time-tables to meet the prescribed service.

CONNECTICUT COMPANY SECTION

The sixth regular meeting of this section was held in New Haven on May 2. It was the largest meeting yet held, the membership having now passed the 200 mark with the goal set at 250 members by the date of the June meeting.

Henry G. Stott, superintendent of motive power Interborough Rapid Transit Company, gave an address on "The Development of Power Generation Systems as Applied to Electric Railways." Short papers were also read by C. H. Chapman, manager Bridgeport division, on "The Greater Responsibility of Railway Labor;" by H. L. Wales, superintendent Waterbury division, on "Transportation and Traffic Problems on the Waterbury Lines," and by W. P. Bristol, manager Hartford division, on "The Transportation Problems of the Hartford Division."

For the committee on snow-fighting equipment, P. Ney Wilson reported that three sub-committees had been formed to report on equipment, disposal of snow, and organization, respectively. The reports of these will be consolidated into a general report. The president, W. J. Flickinger, announced that the section bowling team had been successful in a contest with the team of the New Haven Railroad.

GRADUATES OF THE CORRESPONDENCE COURSES

In announcing the names of the latest graduates in the American Association correspondence courses the word "first" was inadvertently used in the caption in place of "latest." The record department of the International Correspondence Schools reports the following as having completed their courses to date: J. H. McWhorter, Atlanta, Ga.; L. E. Green, Columbus, Ga.; Georges Trottier, Montreal, Province of Quebec; W. A. Wallace, Fort Worth, Tex.; H. R. Briggs, New York; B. H. Hall, South Connellsville, Pa.; George Doucette, Waltham, Mass.; Karl Shaver, Exchange, W. Va.; W. C. Bush, Fruita, Col.; Andre Harduck, New York; F. B. Sebastiana, New York, and Clement Gordon, Lemoyne, Pa. To Mr. McWhorter belongs the honor of first completing one of the courses.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

The Automatic Substation

That the recent development of automatic control for substations bids fair to revolutionize existing practice in power distribution can hardly be denied when once the innovation's far-reaching influence is considered. Automatic control is not, as might be supposed, merely a means for reducing the labor charges involved by the presence of substation attendants. On the contrary, it serves as an economical substitute for excessive feeder copper, provides an opportunity to reduce electrolysis and, when intermittent car service has to be furnished, saves material amounts of energy by reducing light-load and line losses. Its application to electric railway service has, in fact, enormously increased the field of usefulness for 600-volt power in both interurban and suburban service and it has even furnished a possible alternative to the excessive concentration of high-capacity units in a few monster substations that has become common in large cities.

The possibility of use in the latter class of service, perhaps, brings out better than any other example the real meaning of the automatic substation to the electric railway industry. In cities where the stations are of really great capacity the cost of attendance becomes almost negligible, and automatic operation, if it was introduced, would have to depend altogether upon other features to warrant even superficial consideration. Yet some at least of the engineers who have had to do with the first installation of the kind to be made—that on the Elgin & Belvidere Electric Railway, described in the ELECTRIC RAILWAY JOURNAL for Sept. 18, 1915—feel that it is a reasonable possibility. The major reason is the chance to reduce the complication and extreme costliness of feeder and return facilities required when the distribution of excessively large amounts of power is effected from only a few points, and it is conceivable that it would be cheaper to install smaller substations and more of them than to carry the tendency of concentration to its logical conclusion. In addition, automatic control brings with it the elimination of possible labor troubles and also improved efficiency of operation because of ability to work each rotary converter only when its services are actually needed, and not in accordance with the fixed schedule demanded when the control is subject to human limitations.

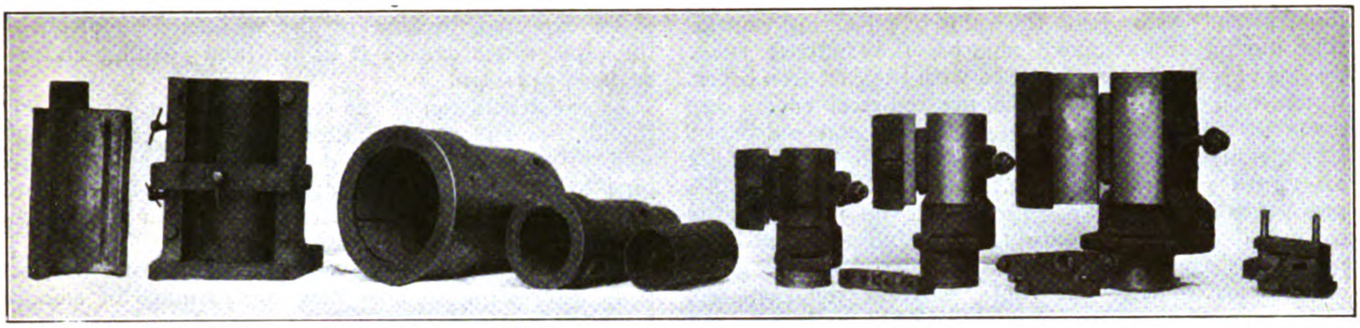
For the immediate future, of course, the possibility of automatic substations in city service is hampered by the fact that converters of 1000-kw. capacity seem to be about the maximum size that may be operated in this manner. There is a lack, at the present time, of fully-developed devices, such as circuit breakers, to handle the heavy amperages involved with 600-volt converters of greater size. Automatic substation control thus far has made use of devices that are strictly standard in all respects, and any extension of the principle to rotaries of unusually large size would necessitate the production of control equipment of corresponding current-handling ability, although such equipment is perfectly susceptible of development when a demand for it takes form.

To-day, therefore, the important field is in interurban and suburban service, including also operation on city lines where traffic is intermittent. Under such circumstances the item of labor is a material one in substation operating costs, and it accounts for the present tendency to group converters or to install units of large size at infrequent intervals along the route. This in turn necessitates either heavy expenditures for feeder copper or else poor line-voltage conditions and heavy line losses at outlying sections, the latter alternative being most common in interurban practice.

Where a substation equipment consisted of two or more units it is manifest that almost invariably it would be preferable to separate them, using automatic control, and thus to reduce the feeding distance for low-tension energy. This would cut down the line losses and at the same time would improve schedule speed. Opposed to these direct economies would be the expense involved by the automatic control equipment and by having to house the converter that would be moved to a new location. However, in the case of small units at least, the capitalized labor saving would more than offset this expenditure. In addition there is an indirect economy which accompanies automatic control and more frequent substations, because the size of each converter can be selected with less margin to provide for unusual overload. On a line where several automatic substations are working, it is impossible for any one of them to be overloaded, because the resistance circuit breaker that forms a part of every equipment takes care of sudden peaks, reducing the effective voltage on the line when an overload takes place, and causing the substations on either side of the overloaded section to start feeding into it. Thus, when the substations are spaced at sufficiently short intervals and the car service is intermittent, the condition is approached whereby the peaks in the load do not have to be carried by extra machines installed at each substation. Instead, the peaks are carried by drawing upon converters in adjoining substations which would otherwise be idle, and although the power thus furnished involves a considerable line loss, there is no doubt but that in many cases the loss would be more than offset by the improvement in load factor of the rotaries.

This automatic adjustment to load conditions by starting up the machines only when needed may be made dependent upon practically any one of the factors involved in operation. Rotaries may be cut in on the line by a change in current, voltage or power factor. They may be brought in by means of a clock mechanism or by pilot wires from any desired remote point. For the substation itself the best procedure, and the one that has been adopted on the Elgin & Belvidere Railway, is to place gratings over the windows and lock the door, leaving the place absolutely untenanted except during a short inspection period that may be made each day. For such inspections an intelligent attendant is required, and the amount of work that he can cover depends simply upon the distance between substations and the facilities provided for transportation between them. The actual inspection of any one substation requires less than one-half hour, it being necessary only to look over the lubrication, examine the brushes and collector rings, feel the bearings, and inspect two small relays and an interlock on the cutting-in contactor.

In so far as accidents need be considered, it is felt



JIGS AND PARTS USED IN THE SHOPS OF THE WILKES-BARRE & HAZLETON RAILWAY

that this whole phase of substation operation is but little changed by the presence or absence of an attendant. In case of a runaway machine, if it is shunt-wound and if the shunt field is lost, the most common cause of such accidents, the machine will run away in the normal direction of rotation and the time interval will be too short to permit the attendant to do more than to jump through a window. The machine is going to be destroyed in any event. In the case of a compound-wound machine, the loss of the shunt field will cause the converter to slow down, stop and start up in the opposite direction, running away if not cut out immediately. In this case, there is an element of time between the failure of the field and the arrival at a disastrous speed in the reverse direction, and it is thus possible for an attendant to save it, although experience has shown that this is not always done. With regard to fires, there is so little for an operator to do in case of the establishment of a conflagration in a modern substation that the hazard is not appreciably changed by his presence or absence. In the case of flashovers, which are generally brought about by short-circuits or abnormal loads outside of the station, it has been found that the current builds up gradually enough so that the resistance circuit breaker will take care of the difficulty. In fact, the time interval before the flash actually takes place is believed in general to be long enough to prevent the machine from being damaged in any respect because, the resistance that is automatically introduced into the circuit definitely limits the flow of current.

Jig Practice at Hazleton, Pa.

BY JAMES W. BROWN

Superintendent of Shops Wilkes-Barre & Hazleton Railway, Hazleton, Pa.

The accompanying illustrations show a number of jigs which we have found valuable in our repair work.

Beginning at the left of the illustration is shown a main journal bearing, *A*, which is used on our 60-ton locomotives. This bearing is babbitt-lined, weighs 60 lb. and is 6 in. in diameter. The jig for holding this bearing while it is being rebabbitted is shown at *B*.

The next two figures show barrel chucks, the larger of which, *C*, is used in boring and facing GE-69-C motor-axle bearings. *D* is used in boring and facing GE-66-B pinion-end armature bearings, and the sleeve shown at *E* is used in *D* in boring commutator-end bearings. It is also used in boring GE-69-C commutator-end armature bearings, and Westinghouse 101-B2 pinion and commutator-end armature bearings.

The other three large figures are split chucks. *F*, which has been in use for several years, takes both pinion and commutator ends of Westinghouse No. 3 and No. 12 armature bearings. *H* takes GE-90 armature bearings, and *J* takes GE-90, GE-66-B and GE-254 motor-axle bearings for boring and facing.

The small jig shown at *K* is used in drilling and reaming holes that have been badly worn in the operating levers of Type M multiple-unit control contractors, preparatory to bushing them to the original diameter.

The small jig shown at *I* is for use with worn tops of the GE Type M master controllers. The jig is clamped to the face-plate of a lathe by the two bolts shown on the end of the jig. Then the controller is clamped on the jig by the two ⅜-in. bolts shown, and made to run true. After this jig is once set it is ready to take as many tops as may have to be renewed. All that is necessary is to clamp the controller on the jig by the two stud bolts as shown.

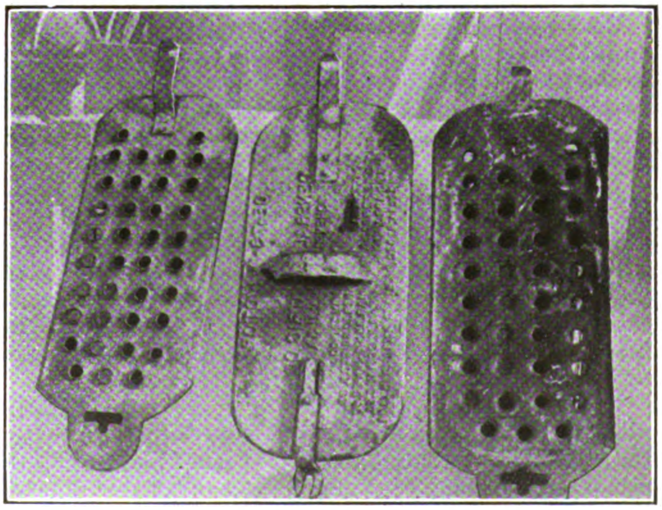
The small, narrow jig at *G* is used for holding third-rail terminals while drilling.

Winter and Summer Motor Covers Effect Economy

BY M. F. FLATLEY

Master Mechanic Terre Haute, Indianapolis & Eastern Traction Company, Lebanon, Ind.

The substitution of perforated, pressed-steel covers for the cast covers of unventilated railway motors during the summer months reduces the motor temperatures from 18 deg. to 20 deg. Fahr. and eliminates troubles arising from high temperatures. This practice has been followed by the mechanical department of the Terre Haute, Indianapolis & Eastern Traction Company, Lebanon, Ind., with very satisfactory results. The older type motor covers, as furnished by the manufacturers, provide practically no ventilation, which is unnecessary during periods of low temperatures, but lack of ventilation is largely responsible for many motor difficulties during the summer months. The perforated pressed-steel cover and the standard cast-steel cover which are used on a GE-73 motor, are shown in an accompanying



VENTILATED COVERS FOR SUMMER USE ON GE-73 MOTORS illustration. Aside from the value of obtaining ventilation during the summer months, the summer cover weighs only 5½ lb. as compared with the cast-iron cover, which weighs 15½ lb. The pressed-steel covers are made in the railway company's shops, and consist of 12-gage sheet steel drilled with 9/16-in. holes which are afterward punched to ¾-in. tapering holes. By this process raised flanges are formed on the outside of the cover and serve to prevent dust from falling on the commutator. The pressed-steel ventilated summer cover costs approximately 65 cents, whereas the cast-steel cover costs $1.51. The net saving in weight is 9 lb. and the saving in cost is 86 cents. In like manner the lower handhole plates are also removed from the motors and replaced with sheet-steel covers.

Hydrostatic Tests of Corrugated Culverts[*]

BY GEORGE L. FOWLER
Consulting Engineer, New York City.

An extensive investigation has recently been completed looking to the determination of the collapsing strength of corrugated culverts as made of Armco (American ingot) iron. For the hydrostatic tests the pipe tested was placed in a closed cylinder and subjected to an external hydrostatic pressure until it collapsed.

The pipe investigated was of three internal diameters, namely, 12 in., 24 in. and 48 in. The pipe was further formed of two depths of corrugation, to-wit, ½ in. and ¾ in., with a uniform pitch of 2 2/3 in. The pipes were double riveted on the longitudinal and single riveted on the circumferential seams, with a longitudinal pitch of 2 2/3 in. and a circumferential pitch of about 8 in. The sheets and rivets of all pipe were galvanized.

For each diameter of pipe the strength with two depths of corrugation was tested and, for each depth of corrugation, the work was done with four thicknesses of metal, namely, No. 16 gage (0.0625 in.), No. 14 gage (0.078 in.), No. 12 gage (0.109 in.) and No. 10 gage (0.141 in.).

As no data were available upon which to proceed, the first tests were made with pipe 12 in. in diameter and 8 ft. long. This length was selected because D. K. Clark had found in earlier experiments in the determination of the crushing strength of plain cylindrical furnaces that the influence of end support or bracing did not extend inward more than 2 diameters. Hence it was assumed that a total length of 8 diameters would be sufficient to avoid all influence of end bracing and support, and this was found to be the case.

Each piece of pipe tested was fitted at each end with an internally projecting flange made of angle and riveted to the inside of the pipe. These flanges were faced off parallel to each other and at a distance of 8 ft. They were further drilled for ½-in. bolts to match the head of the casing in which they were tested.

A caliper was provided by which any diameter could be measured to within 0.02 in., and at the start, before the application of any pressure, the vertical and horizontal diameters at each internal corrugation were measured. The same measurements were made at the application of each increment of pressure, these increments being varied with the diameter of pipe, thickness of metal and depth of corrugation.

It was characteristic of all of these pipes that, in yielding, they collapsed suddenly upon the attainment of the maximum pressure, and that, when following up the collapse by working the pump, it was invariably impossible to attain the maximum pressure again. This was to be expected, because of the weakened condition of the pipe, which caused it to continue yielding under a reduced pressure.

At the conclusion of the tests with 12-in. pipe, it was found that the support afforded by the casing which was to form the basis for deciding upon the lengths of pipe to be used in the hydrostatic tests of 24-in. and 48-in. diameters did not extend inward, on an average, for more than 2 diameters from the end.

The pipe probably collapsed at its weakest point, but it is interesting to note how the distance of collapse from the end decreased with the increase of the natural stiffness of the pipe. This may, however, have been a mere coincidence, as there are not sufficient data to establish a conclusion that the influence of end support is greater with a weak pipe than with a stiff pipe, although there were other instances in the tests that tend to support such a conclusion.

As it was understood that the end support does not influence the strength of the pipe for more than 1¾ diameters on an average, it was considered safe to adopt a length of 12 ft. of pipe of 24-in. and 48-in. diameter that were to be tested.

Tests were also made of a set of smooth pipes 12 in. in diameter, made up in the same way and of the same thickness of metal as the corrugated pipe. The object of this was not so much to secure data for the development of a formula by which the collapsing strength of smooth pipe could be calculated as it was to obtain a rough comparison between the collapsing strength of corrugated culvert pipe and a smooth pipe of the same material made in essentially the same manner.

TABLE I—HYDROSTATIC COLLAPSING PRESSURE OF CORRUGATED CULVERT PIPE

Diameter of Pipe, Inches	Gage of Metal	Depth of Corrugation, Inch	Collapsing Pressure, Pounds per Square Inch
12	16	½	225
12	14	½	275
12	12	½	420
12	10	½	450
12	16	¾	360
12	14	¾	380
12	12	¾	490
12	10	¾	630
24	16	½	52
24	14	½	75
24	12	½	130
24	10	½	160
24	16	¾	100
24	14	¾	100 (125)
24	12	¾	180
24	10	¾	320
48	16	½	15
48	14	½	20
48	12	½	33
48	10	½	58
48	16	¾	29
48	14	¾	39
48	12	¾	45
48	10	¾	70

On tabulating the collapsing pressures of all of the pipe tested it was found that a ½-in. depth of corrugation increased the strength about three and one-half times with No. 10 gage metal, five and one-fourth times with No. 12 gage, seven times with No. 14 gage and six times with No. 16 gage. These ratios must be increased by 50 per cent if a comparison is to be made with pipe having a ¾-in. depth of corrugation.

As the object of the tests was to develop a formula by which the probable strength of other diameters of pipe made of various thicknesses of metal could be calculated, that phase of the subject will now be considered. Such a formula can, however, only be considered on the basis of a probability, and not as having been demonstrated as proved. The data obtained are insufficient for a complete demonstration, although they are of such a character as to indicate the probability of reliability.

There were three diameters tested for each depth of corrugation and thickness of metal to supply three points on the curve developed from a formula. The results are, of course, open to the objection that the three points may not represent true averages, as the pipe was made up in the ordinary course of manufacture and was subject to all of the variations due to that method of treatment. With this statement of the limitations imposed, however, the matter will be discussed.

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[*] Copyrighted, 1916, by George L. Fowler.

First, it will be well to review the results obtained by tabulating the collapsing pressures of the several pipes tested. The results were as given in Table I on page 915.

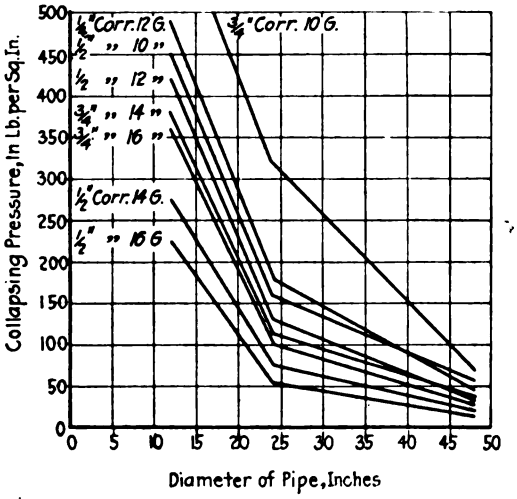
The results are plotted in an accompanying diagram. The lines connecting the several points of failure show that the pressures do not vary inversely as the diameters, as might have been expected and as they are formulated in the rules of Lloyds and the United States for the working pressures allowed on corrugated furnaces. This point will be discussed later.

As between the 12-in. and 24-in. diameters of pipe, this ratio holds for the heaviest metal (No. 10 gage) and the smallest pipe. As the thickness of metal decreases the ratio of the collapsing pressure of the 24-in. pipe to that of the 12-in. pipe increases, until with No. 16 gage and ½-in. depth of corrugation the ratio becomes about 4½ to 1, while the ratio between the 48-in. pipe and 24-in. pipe is never less than 1.75, and runs from that to 4½.

There are three variables to be considered in the development of this formula, namely, the diameter of the pipe, the thickness of the metal and the depth of the corrugations. From the table of collapsing pressures above it will be seen that the average collapsing pressures of pipe having ½-in. depth of corrugation was almost exactly two-thirds of that having a depth of ¾ in., so that for this pipe it is assumed that the strength varies with the depth of corrugation.

It must be borne in mind, however, that this law might not hold if other depths of corrugation were introduced. But with only two points of the curve known it is impossible to consider the connecting line between them other than as straight.

Grouping the several thicknesses of metal used on the same ratio, considering the No. 16 gage as 1, we have:



COLLAPSING STRENGTH OF CORRUGATED IRON CULVERT PIPE

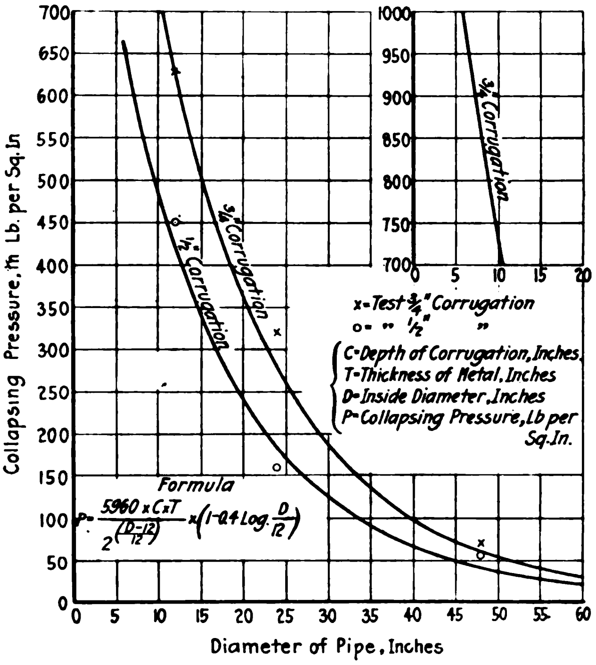
No. 16 gage, 1.00; No. 14 gage, 1.25; No. 12 gage, 1.75; No. 10 gage, 2.25.

Then grouping the collapsing pressures of each gage of metal for all diameters we have the results shown in Table II. Here the maximum variation of calculated from actual collapsing pressure was about 6.6 per cent.

So, again, in the development of the formula it was assumed that the strength of the pipe varied with the thickness of the metal, and in this it checks with both the Lloyds and the United States formulas for corrugated furnaces. The effect of diameter then remained the only variable to be analyzed for its effect on the strength.

Taking the No. 10 gage pipe having ¾-in. corrugation for the 12-in. and 24-in. pipe as a basis, we find the strength to be as 2 to 1 approximately. While the corresponding ratios between the 24-in. and 48-in. pipe are approximately as 4 to 1. It was merely a matter to divide the product of the thickness and the depth of corrugation by 2 with an exponent of 0 for a 12-in. pipe, 1 for a 24-in. pipe and 2 for a 48-in. pipe. Such an exponent is to be found in the expression:

$$\varphi = \frac{D - 12}{12}$$



CALCULATED COLLAPSING STRENGTH OF NO. 10 GAGE CORRUGATED IRON CULVERT PIPE

As both the depth of corrugation and the thickness of metal were less than 1 in., it was necessary to provide a constant that, used as a coefficient, should place the calculated pressure for the 12-in., No. 10 gage pipe approximately at the actual collapsing pressure. This pressure was 630 lb. for the pipe with ¾ in. depth of corrugation. Then 630 ÷ (0.75 × 0.141) = 5960. Hence 5960 was taken as the coefficient. The formula thus developed is as given:

$$P = \frac{5960 \times C \times T}{2^{\left(\frac{D-12}{12}\right)}}$$

In which

P = collapsing pressure in pounds per square inch.

C = depth of corrugation in inches.

T = thickness of metal in inches.

D = inside diameter in inches.

But this formula gave results that were too high for the 24-in. and 48-in. pipe, so that another factor which was a function of the diameter was required, a factor

TABLE II.—COLLAPSING PRESSURE AND GAGE OF METAL

Gage of Metal	Calculated Collapsing Pressures on Basis of Ratios, Lb. per Sq. In.	Average Actual Collapsing Pressure, Lb. per Sq. In.
16	130	130
14	162	152
12	227	219
10	291	281

that should be unity when the diameter was 12 in., and which should increase with the diameter.

Such a factor was found in the expression

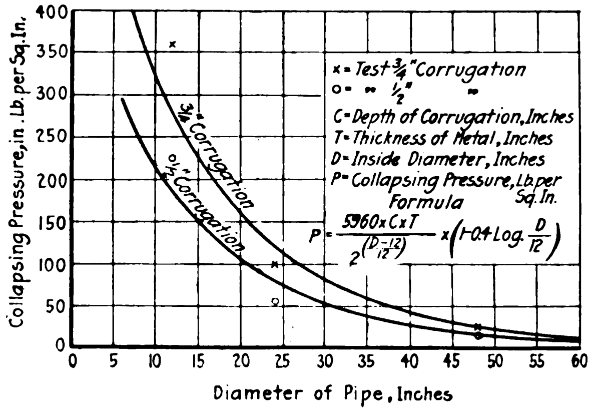
$$\left(1 - 0.4 \log \frac{D}{12}\right)$$

from which the final formula becomes

$$P = \frac{5960 \times C \times T}{2^{\left(\frac{D-12}{12}\right)}} \times \left(1 - 0.4 \log \frac{D}{12}\right)$$

In the accompanying diagrams of collapsing strength the actual collapsing strength of pipes of the several diameters and for the two thicknesses of No. 10 and No. 16 gage is plotted and lines are drawn based on the formula as developed. These show the value for the extreme thicknesses, and they will be seen to be a little high for the 24-in. pipe, a little low for the 12-in. pipe, and closely accurate for the 48-in. pipe. It may be considered that for working purposes these tables are reliable and that it will be safe to subject culverts to a working pressure up to 60 per cent of the values given.

The United States rule for determining the allowable working pressures of corrugated furnaces is to multiply the thickness of the sheet by a constant and divide by the diameter, with a thickness of sheet limited to 5/16 in. as a minimum. The formula makes the allowable working pressure vary inversely as the diameter, but an examination of the tests made by the government shows that the collapsing pressure does not vary inversely as the diameter. If we divide the thickness of sheet by the diameter the quotient should represent the collapsing pressures of different furnaces. On the basis of such a ratio there is marked variation therefrom in the actual collapsing strength of the different furnaces tested. Then if the allowable working pressures as determined by the formula are compared with the actual collapsing strength of the furnaces, it will be found that the factor of safety varies from 6.76 to 8.16 in the range of furnaces tested.



CALCULATED COLLAPSING STRENGTH OF NO. 16 GAGE CORRUGATED IRON CULVERT PIPE

If, now, we take the same liberty with the data obtained for the collapsing pressures of corrugated culverts and the formula that has been developed therefrom, it becomes possible to evolve a simple formula for the allowable working pressures to which such culverts might safely be subjected. If we assume a factor of safety of 2 for the working pressure, and allow the same flexibility in the development of the formula that was taken in the development of that for corrugated furnaces, we find at once an unexpected latitude. The formula for the collapsing pressure of corrugated culvert pipe was developed to cover all diameters of pipe, and we have seen that the results do not vary inversely as the diameter. In like manner the collapsing pressures of corrugated furnaces do not vary inversely as their diameters, but through the narrow range of diameters covered by such furnaces in practice, from 30 in. to 56 in. or thereabouts, this variation from the true inverse ratio is disregarded in the formula for the working pressures of such furnaces.

If, now, we consider corrugated culvert pipe through the same narrow range and work on the same ratios of thickness of metal to diameter of pipe, it is possible to construct a formula similar to that used for the working pressures of furnaces that will express the allowable working pressure for corrugated pipe. For example, the range of diameters for corrugated furnaces runs from 30 to 60 in. and the thickness of metal from ½ in. to ⅝ in. That is to say, the ratio of the thickness to diameter runs from about 70 to 170 to 1. On this basis we should take the corrugated culvert pipe of diameter from about 10 in. to 24 in., as the thickness of metal of the tested pipe ran from 0.0625 in. to 0.141 in.

If, then, we work within this narrow range of sizes, and for a working pressure that bears a ratio of 1 to 2 of the collapsing pressure, the calculation for such a working pressure may be expressed by the formula

$$WP = \frac{34.000 \times C \times T}{D}$$

In this the symbols have the same meaning as before. We thus have a formula identical with that used for calculating the pressure of corrugated furnaces and equally as accurate. Should it be desired to work to a larger factor of safety, it is merely necessary to make a corresponding reduction in the constant factor of the formula.

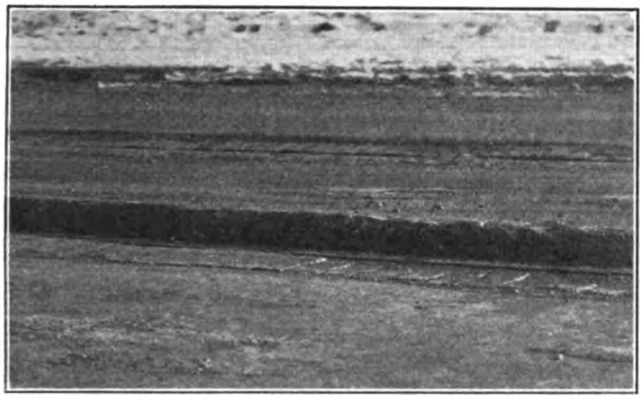
The foregoing tests were undertaken with a view to securing information preliminary to the planning of tests under sand beds in which conditions of culvert installations in railway practice should be duplicated just as closely as possible.

Effects of Low Temperature on Paving in the Track Allowance

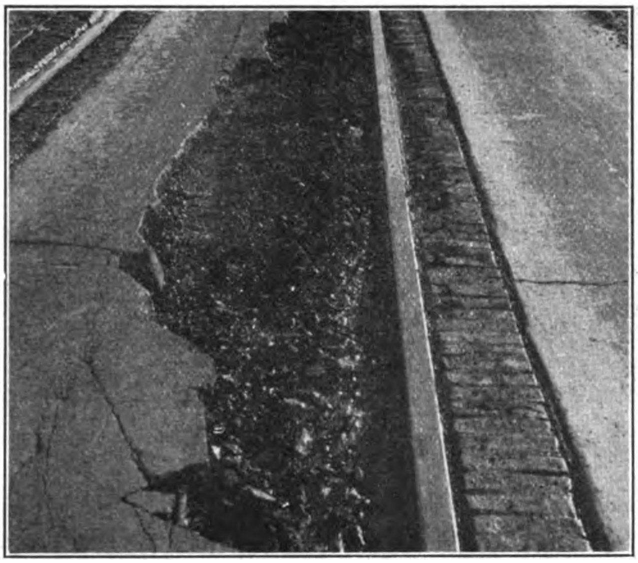
The accompanying illustrations show the damage produced by severe frost in Seattle, Wash., and elsewhere during the protracted cold weather of last January. They are typical of the conditions existing in other cities in the North Pacific States. No particular type of pavement appeared to be immune from the effects of cold, and only those streets containing railway tracks were affected.

The average winter temperatures of the North Pacific Coast cities are comparatively high and very equable, that of Seattle for the months of November, December, January and February for the past five years being 42.35 deg. Fahr. For the past ten years the average for the same months was 42.33 deg., the maximum range of average monthly temperature for these months during the entire ten years being only 15 deg. The lowest temperature recorded during the last ten years was on Jan. 15, 1907, when the mercury reached 11 deg. above zero. The greatest duration of low temperature, with the exception of January, 1915, was in the same month of the same year when there were twenty days whose minimum temperature was under 30 deg. These days, however, were not of consecutive duration.

Between the dates of Dec. 29, 1915, and Feb. 1, 1916, there were twenty-seven days on which the minimum temperature was less than 30 deg., the average mean temperature being 31 deg., so that this is the longest duration of low temperature that has visited Seattle during the past ten years. Corresponding conditions were felt in other coast cities. There was a light snowfall at intervals during the month of January which had



ASPHALT PAVING HEAVED 2½ IN. BY FROST



DAMAGE TO ASPHALT PAVING DUE TO FROST

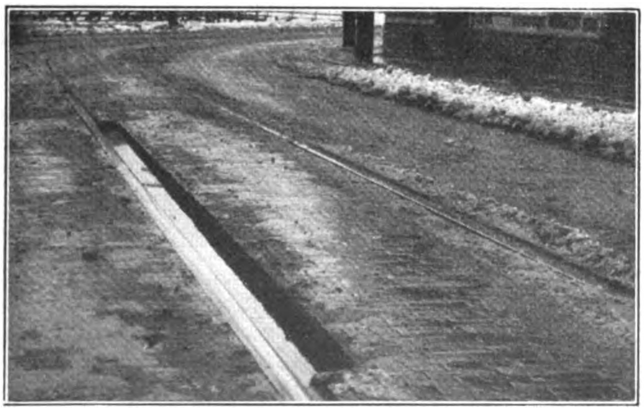
the effect of continuing the refrigeration during the few days when the minimum temperature was above freezing, but there was never at any time during that month more than a few inches of snow on the ground at one time.

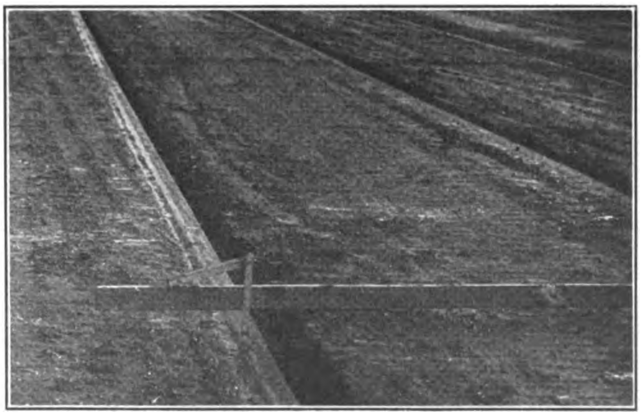
The first illustration shows the general condition of heave of the paving brick along an asphalt section. The brick in all cases were originally laid so that their tops were coincident in elevation with the top of the rail. As shown, the top of the brick is approximately 2½ in. above the top of the rail, and this condition existed at this location for a distance of about 100 ft. in each case, the brick gradually receding to an elevation of about ¼ in. above the normal for the remainder of the block. The brick next to the track is of a bull-nosed pattern, as may be seen in the adjoining view, which shows the brick removed on the same street a few blocks away. This street is in a residence district and supports a medium residence traffic of light vehicles, principally automobiles, and has been in service since 1908 and 1909. The bricks were originally laid on a sand cushion with cement grout. A filler of the same material was run between the brick and the track, but this has long since been broken away by the street car and other traffic and has left practically no filler between the brick and the rail. The second illustration shows the frost action upon the brick and asphalt between the tracks. It will be noted that the bricks here shown have been raised both on the outside and inside (on the left-hand track) of the rail. The breaking of the asphalt continued at intervals over a number of blocks in more or less degree. This part of the street was paved in 1908, the roadway being 40 ft. in width. The gradient is less than 1 per cent.

The two illustrations below show a street paved entirely with vitrified paving brick, 8½ in. x 4 in. x 2¾ in., the exposed edges of which are rounded to a radius of ¼ in. The paving was laid in 1909 and sustains a heavier traffic than the previous street noted, but could not be termed a heavy traffic thoroughfare. The width of roadway is 60 ft. and the gradients vary from 5 to 0.05 per cent. This street showed a consistent raising of the brick on both the inside and outside of the car tracks and only at intervals were large heaves noted. In one case shown about 55 lineal feet of brick between the tracks had been removed, as the rise of the brick in that portion had been high enough to interfere with street car traffic. Numerous instances, particularly at cross streets, showed the effect of the impact of traffic on the paving material that had been forced above the grade of the tracks. In more cases of this kind the material was either forced out or reduced to small pieces, as shown in the fourth view. The gradient at this point is 2 per cent and the width of roadway 44 ft.

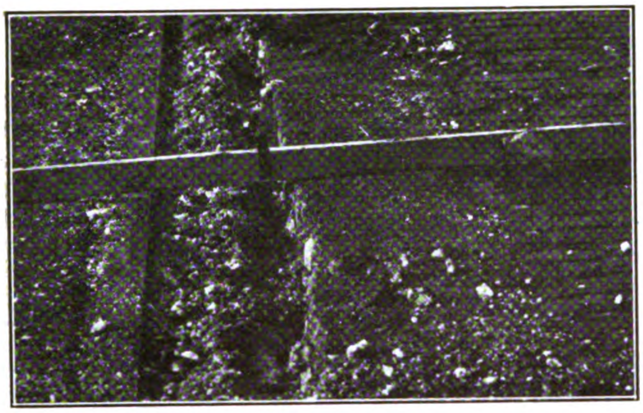
On page 918 are shown pictures of other effects on brick paving. One is from a pavement laid five years ago, where the brick along the car tracks has been removed because of its interference with traffic. The grades on these streets are light and the traffic of medium character. The tracks shown had in most cases been cleaned and been kept clear of snow by the car traffic. The other shows a track in a small town in northern Oregon which had not had the advantage of constant traffic and cleaning. Here the brick, laid in 1912, raised a full 5 in. above the rail and temporarily precluded the use of the track for car service.

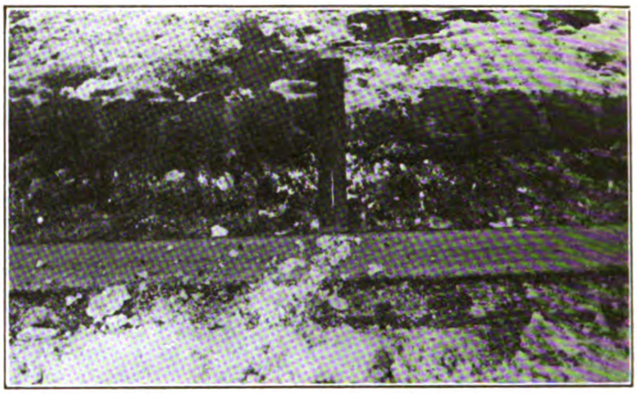
All of the brick paving illustrated was of practically the same construction and showed that either cement





FROST-HEAVED BRICK PAVEMENT WITH BRICK REMOVED TO PERMIT TRAFFIC TO PASS—ANOTHER VIEW OF THE SAME PAVEMENT SHOWING FORCING OUT OR PULVERIZING OF PAVING MATERIAL





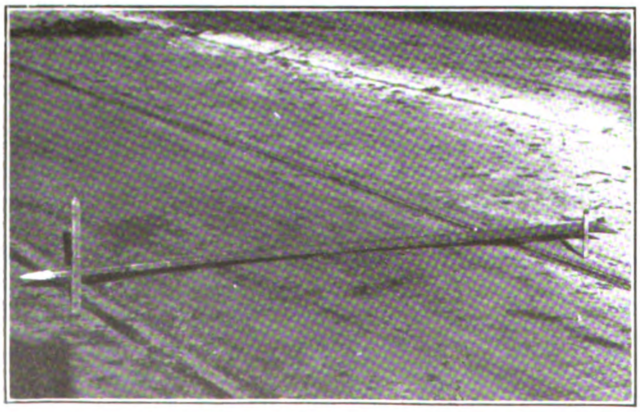
MORE ILLUSTRATIONS OF DAMAGE TO BRICK PAVEMENT. IN ONE CASE REMOVAL OF BRICK WAS NECESSARY. IN THE OTHER THE HEAVE WAS 5 IN.

grout or small brick fillers had been used between the track and the paving material, but that the fillers had in all cases broken up so as to cease to fulfill their function.

The heave in a wood-block pavement is shown in the picture below. This pavement was laid in 1909 and sustains a fairly heavy downtown traffic. It is laid on a 3.93 per cent grade with a 60-ft. roadway. The photograph does not indicate graphically the actual extent of the damage caused by the heaving. This pavement showed a greater height of heave than any of the brick or asphalt pavements examined, the heave measuring from 3 in. to 3½ in. The heaving appeared, generally, in the center of the car tracks and at no point on the outside of the tracks was any noticeable heave caused by frost action.

As in the case of the brick paving the wood-block paving did not have a close bond to the rail, a chamfered block next the rail being used with no filler. This allowed the formation of an ice filler between the block and the rail. That it was the expansion of the ice formed between the rail and the block that caused the heaving of the material was later demonstrated when wood blocks, frozen in the laboratory, showed an actual contraction in size in the freezing tests. It was noted that each rail joint, where the opportunity for the admission of water and snow was made easier by reason of the larger opening, that the heaving was greatest at these points. These blocks are of creosoted Douglas fir, 3¾ in. x 3½ in. x 6 in., and were laid upon a sand and cement cushion which was found to have held its place much better than the sand cushion in the portion of streets outside the tracks, which had been laid without mixing with cement.

All of the heaving described was due to the lack of proper drainage, which allowed the water to stand against the rail till it became frozen, or to the lack of proper fillers between the material and the rail, which allowed the snow and ice to become driven into the space by the action of the car wheel and other vehicles and there to expand when the temperature lowered.



FROST-HEAVED WOOD-BLOCK PAVING

In all cases, in four different cities, the paving affected was in and around car tracks which were laid with T-rail. Both brick and wood block laid against girder rail, which permitted a close bond and did not allow the formation of ice against the tracks, showed no heaving as the result of the low temperatures.

The investigations described were made and reported upon by J. Thomas Dovey, president Seattle Engineering Company.

Power Station Extension Completed at Lowellville, Ohio

The work of installing a 15,000-kw., 60-cycle, 2300-volt General Electric turbo-generator in the Lowellville power house of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, which was briefly described in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1915, has virtually been completed.

The addition to the generating station is housed in a 74-ft. extension on the east end of the older building, the arrangement of boiler and turbine rooms, electrical galleries and floors conforming to the layout of the original station. The entire building now covers an area 163 ft. in width and 175 ft. in length.

The generator is of the revolving-field type with motor or turbine-driven exciter. Clean air for cooling the coils is drawn through a duct containing water sprays. Attached to the turbo-generator is a Worthington surface condenser with 35,000 ft. of cooling surface. Water which is drawn from the Mahoning River through a new intake well and tunnel is circulated by a double suction volute pump, capable of delivering 27,000 gal. per minute.

The boiler-room equipment consists of five 600-hp. Babcock & Wilcox boilers, equipped with Foster superheaters and Taylor underfeed stokers. The boilers are supplied with feed water by a steam-driven centrifugal pump, having a capacity of 1000 gal. per minute. An engine-driven fan having a capacity of 60,000 cu. ft. per minute has been installed. An outdoor transformer and switching station with lightning arrestors located on the roof is being erected south of the new building.

The increased capacity of this plant was required by the demand for electric power in quantities by the large industries of the Mahoning and Shenango Valleys. The work on this installation was done by the Stone & Webster Engineering Corporation.

LONDON LETTER

Incorporated Municipal Electrical Association to Meet in June—Some War-Time Tramway Results

(From Our Regular Correspondent)

The twenty-first annual meeting of the Incorporated Municipal Electrical Association will be held in London on June 22 and 23 at the Institution of Electrical Engineers. On June 22, after the presidential address by A. C. Cramb, borough electrical engineer of Croydon, the following papers will be read: "Boiler-House Design," by W. W. Lackie, engineer and manager of the Glasgow Corporation Electricity Department; "Area of Supply from an Economic Standpoint," by H. S. Ellis, borough electrical engineer of South Shields; "The Application of Electrical Power to Agriculture," by W. T. Kerr, city electrical engineer of Hereford. The business meeting will be held on June 23.

A report of the tramways committee of the Newcastle Corporation presented at a recent meeting of the City Council states that the sum of £15,142 has been expended in excess of the sum of £81,700 named in the Newcastle-upon-Tyne Corporation Act, 1911, and recommends that application be made to the Board of Trade for sanction to borrow that amount. The expenditures were £4,094 for construction of tramways, and £11,048 for street works. The committee also reports that £10,789 was expended under the Newcastle-upon-Tyne Corporation (Tramways) Order of 1913, in construction and for equipment of the tramways. It recommends that application be made to the Board of Trade for sanction to borrow this sum also.

Statistics issued respecting the working of the Leeds City Tramways during the year ended March 31 last show that the total receipts were £41,150 in excess of those for the year 1914-15. This is equal to an increase of 9½ per cent. The total number of miles covered by the service decreased 117,616 miles, or 1.23 per cent. This is attributed to the fact that so many drivers and conductors joined the fighting forces the department was unable to utilize to the full the stock of cars at its disposal. In spite of the decline in mileage, the number of passengers carried increased more than 8 per cent. The receipts per car mile increased 1.187d. or 10.84 per cent.

Mr. Spencer, the general manager of the Bradford Corporation Tramways, reports that the total receipts for the past year were £334,315, an increase over the previous year of £14,921, or 4.7 per cent. The car mileage amounted to 6,199,601, a decrease of 172,109, or 2.75 per cent, compared with the previous year. So with a decrease in car mileage, due to a shortage of men and of stock, there was an increase in receipts of 4.7 per cent. Notwithstanding the many men who have joined the forces, the number of passengers carried, 74,000,000, exceeded that of the previous year by 4,000,000. Mr. Spencer says that the tramway department is now utilizing the services of six volunteers for driving cars on Saturdays and week-ends. The department has lost about 500 men through enlistment and transfer to Government work.

A number of matters relating to the tramway system were dealt with at a recent protracted sitting of the tramways committee of Edinburgh Town Council. The report considered dealt with the negotiations with the tramway company, and stated it was important to keep in view that, apart from all questions as to the best system of traction, the cable system must continue until June, 1919. The committee found that questions might arise with the company as to whether the Corporation would take over the company's cars at the end of the lease, and as to the extent of the obligation of the company in regard to the renewal of the tramway track and other parts of the tramway system. The whole of the tramway undertaking belonged to the Corporation, but the rolling stock was provided by and belonged to the company. The Corporation, however, was not under any obligation to take over the rolling stock from the company at the end of the lease. An expert instructed by the committee to inspect the cars and submit a valuation reported that in his opinion the Council would be justified in paying the company £25,000 for the 209 cars with the spare equipment at the termination of the lease. The directors of the tramway company would not accept less than £75,000. The committee regarded that as putting an end to its negotiations. With regard to the renewal of the tramway track, the company declined to enter into any agreement on this point unless an agreement was also arrived at on the question of taking over its cars. As a result this point also remained unsettled.

At the ordinary general meeting of the London & Suburban Traction Company, Ltd., the chairman said that the absence of any dividend on the ordinary stock this time brought home to the security holders the fact that in 1915 the country was at war during the whole year. This brought him to the subject of the effect of the war upon their fortunes. Theirs was not an operating enterprise, but a holding company, and its fortunes and prosperity depended on the operating companies whose stocks it held. In the first place, the year had seen a tremendous increase in the prices of materials and the cost of labor. Coal by rail had gone up by 13 per cent, while sea-borne coal had gone up 34 per cent; timber had gone up 50 per cent, glass 90 per cent, copper 50 per cent, wood blocks 31 per cent, and steel tires 20 per cent. All the subsidiary companies were interested in some of those commodities and some were interested in all. In some cases prices were still rising. Owing to railway congestion arising from Government requirements the companies had to put up with irregular deliveries at enhanced prices. Besides the increased cost of labor, the operating companies had to contend with depletion in the numbers of their men. The places temporarily vacated by those who joined the colors had been filled, so far as possible, by the employment of men above military age or otherwise ineligible for war, and recourse had also been had to female labor.

About 300 women have been trained to act as conductors by the London General Omnibus Company. As many as 1000 women are to be put in training for current needs, but as more than 1400 male conductors are liable to be called up for military service in the later married groups, it is probable that the above number will be largely exceeded.

A strike occurred early in April among the drivers and conductors of the South Metropolitan Tramway system running from Croydon to Sutton, Tooting, Penge, and the Crystal Palace. The women employees were in sympathy with the men, and those who are members of the men's union struck with their male colleagues. The particular grievance which precipitated the strike is said to have been the taking out of two women for instruction as drivers. A resolution was passed by the men refusing to return to work until such time as they were ordered by the union to do so. One of the demands of the men was that all women who learned to drive must be withdrawn indefinitely. It is understood that the two women who were taken out on cars and shown how to drive were on trial at the request of the Board of Trade, in order that a report might be made on their fitness for the occupation of driving. At the time this letter was written a limited service was being maintained on some of the routes with the assistance of the available members of the indoor staff.

A majority of the drivers and conductors of the Croydon Corporation Tramways came out in sympathy with the employees of the South Metropolitan Tramway and decided not to return until certain demands with regard to wages, hours, etc., have been conceded. The main line of the Croydon Corporation system runs between Purley and Norbury, where it links up with the Streatham line of the London County Council, and travelers by this route are being put to great inconvenience in getting to their work in town, the competing omnibus and railway services being much congested. It is stated that compliance with the men's demands would involve the Corporation in the payment of about £10,000 a year. The Board of Trade has intervened in the tramway strike, but while the South Metropolitan Tramway has agreed to submit the points at issue to arbitration, the Croydon Corporation has refused. A limited number of cars are still running on the Corporation's system, and it is hoped to supplement the present small staff with what additional labor may be obtained and to add to the number of cars running until normal service has been established.

A. C. S.

[This letter usually appears in the first issue of the month. Its appearance this week instead of last week is due to delay in transmission incident to the war.—Eds.]

NEWS OF ELECTRIC RAILWAYS

CITY LINE ATTEMPTS CONSTRUCTION

Legal Issues Stated Between United Railroads and San Francisco Municipal Railways

The Board of Supervisors of San Francisco, Cal., has directed the board of works to complete without delay the municipal street car line on Church Street and has also initiated proceedings for the construction on Market Street of lines from Twin Peaks tunnel to Kearny Street. This was indicated in the ELECTRIC RAILWAY JOURNAL of May 6, page 873, as the probable course of action.

When the Contra Costa Construction Company, which holds the contract for building the Church Street extension, was preparing to cut the United Railroads' line for the installation of the necessary crossing at Eighteenth and Church Streets it was denied permission to commence this work by United Railroads' officials. In replying to an inquiry from city officials, the United Railroads answered that since the city was preparing to force its way over company tracks, the legal department of the corporation had advised the refusal of permission for such construction.

The Church Street line has already crossed the United Railroads' tracks at Twenty-ninth and Twenty-fourth Streets at both of which crossings the corporation paid half of the expense, although as a matter of law, the cost of such crossings, as well as their maintenance, can be thrust entirely upon the new line. Precedent for this has already been established before the Railroad Commission of California.

Jesse W. Lilienthal, president of the United Railroads, has stated the case of the company in the *United Railroads Magazine* for May. He says in part:

"The threat of the city officials to smother our tracks on Market Street by building outer tracks on each side is attempted to be justified by the refusal of the company to exchange transfers with the city at Church and Market Streets on an equal basis, and by the refusal of the company to permit the use of its tracks on Market Street between Church Street and Van Ness Avenue except for a fair rental. So far as the latter proposition is concerned, your president expressly offered to the public utilities committee of the Board of Supervisors to permit the use of these tracks by the city for a consideration representing the exact loss to the company resulting from permitting such use. It is impossible to propose anything that would be fairer to both sides.

"So far as the exchange of transfers at Church and Market Streets is concerned, you will bear in mind that the privilege that would then be granted to the holder of a city transfer would give the right to ride a much longer distance than would be given to the holder of a company transfer riding on the Church Street line. The company was asked, with reference to this proposed exchange of transfers, to submit a proposition to the public utilities committee, and did so, by which the company offered to make the exchange on the basis of 3 cents to the company and 2 cents to the city. This, considering the difference in the length of the haul, was so favorable to the city that our honest and fair-minded city engineer made an official recommendation that the proposition be accepted as an eminently fair one. So that when our proposition was rejected and resolutions were thereupon introduced and recommended to the Board of Supervisors for adoption, looking to paralleling our tracks in Market Street, I do not need to express my own opinion as to the injustice of that action, but need only quote the opinion of that one of the city's own officials who is most competent, because of his learning and experience, to come to a just conclusion. It should also be borne in mind that by the very terms of our proposition the city would have received the right to terminate the arrangement if the city officials should at any time deem it advisable to do so.

"When this matter is properly understood by the people of San Francisco, in whose ultimate verdict (once they understand the facts) I have utmost confidence, I know that they will not stand for confiscation of the company's property, purchased in reliance upon the good faith of San Francisco. And I ask every one of you to help me in bringing to our fellow citizens a correct understanding of the facts that have led to the present crisis."

STRIKE IN SCHENECTADY

The motormen and conductors in the employ of the Schenectady (N. Y.) Railway decided at 2 a. m. on May 6 not to take out their cars on the day's run starting between 4 a. m. and 5 a. m. This decision by the employees was taken in an effort to require the company to meet a demand for a flat increase in wages of 5 cents an hour and followed the refusal of the men to accept the wage agreement reached by the New York State Railways with the electric railway employees in Oneida, Utica, Syracuse and Rochester. In each of these cities the wage offer, mentioned in the ELECTRIC RAILWAY JOURNAL of May 6, page 874, included an agreement covering three years. The Schenectady Railway offered an increase of 2 cents an hour to be in effect for the next two years and an additional 1-cent increase for the third year.

Thirty-six hours after the calling of the strike a settlement was effected following a conference at the office of Mayor Lunn, at which the strikers and the company officials agreed to arbitrate the dispute over wages and the duration of the agreement. The arbitration agreement provides that the board of arbitration shall be composed of three members, the company to select one, the representatives of the men one, and these two arbitrators to select a third. If the two arbitrators so chosen cannot select a third arbitrator within ten days from the date of their first meeting, the officials of the company and the committee of the association representing the men are to meet with the two arbitrators for the purpose of selecting the third arbitrator. Each side is to select its arbitrator within five days counting from the signing of the agreement. The decision of the majority of the board of arbitration is to be final and binding upon both parties to the agreement. Each side is to pay the expense of its own arbitrator, and each side is to bear half of the expense and services of the third arbitrator, together with any other expenses incurred in the arbitration. If any of the three arbitrators is unable to act the party making the original selection is to make another. Only the questions of wages and length of the agreement are to be submitted to the board of arbitration. No attempt was made to operate the cars during the time that the employees were out on strike.

In a statement which he issued to the public, James F. Hamilton, general manager of the company, said that he regretted very much the inconvenience to which the public had been put by the strike. He said that the settlement was satisfactory to the company, as it had stood for arbitration from the beginning of the controversy.

COUNCIL DELAYS ACTION ON CLEVELAND WAGES

The City Council of Cleveland, Ohio, has voted to delay action on the measure approving additional expenditures by the Cleveland Railway to cover the increase in the wages of the motormen and conductors agreed upon on May 4. The company estimates that it will be necessary to increase the allowance for operating expenses nine mills per car-mile to produce the sum needed for additional wages. In considering the matter the Council divided almost completely on political lines. The opponents of the measure intended to approve the expenditure were with one exception Democrats while those who favored it were all Republicans. Most of the arguments against the measure were based upon a fear that 3-cent fares would be imperiled by the increase. During the discussions, however, it was hinted that since Mayor Harry L. Davis took the credit for bringing about the settlement the administration should guarantee the city against any increase in fare. Mayor Davis is of opposite political faith from the majority in the Council. The vote on the matter stood seventeen for delay and nine against.

Fielder Sanders, street railway commissioner, recommended the passage of the measure at once and declared that he considered the settlement with the men a fair one. He said that in only two or three of the larger cities of the country are motormen and conductors paid less than the local men will receive under the new scale. He expressed the opinion that with the present increase in business activities the additional funds for the payment of wages will not necessitate a raise in the fare, although very careful management may be necessary.

Mayor Davis told the Council that it made no difference to him where the credit for the settlement is placed and that the administration will take the responsibility for the increase in the rate of fare, if it is ever necessary to make the change. He said that the administration acted for the good of the public. He referred Councilman Damm's remarks regarding a pre-election understanding with the street car men to Secretary Rea of the local branch of the Amalgamated Association. Mr. Rea denied that there had ever been a hint of such an understanding. He said, however, that the 3-cent fare should not be maintained at the expense of the street railway men.

NEW YORK CENTRAL IMPROVEMENT HEARINGS

Further arguments for and against the proposed plan of the port and terminal committee for improving Riverside Park and relocating the tracks of the New York Central Railroad were heard May 10 by the Board of Estimate of New York City. Charles W. Stoughton, president of the Municipal Art Commission, discussed the plan from the artistic side and advocated that whatever structure or buildings might be necessary in the proposed changes be placed in the control of his commission. At the conclusion of the hearing Controller Prendergast moved that the report, together with the record of the hearings, be referred back to the port and terminal committee. This was done with the understanding that there would be further hearings, if necessary.

Mayor Mitchel on the same day sent to Governor Whitman with his disapproval the two bills passed by the recent Legislature relating to the removal of the tracks of the New York Central Railroad from Eleventh Avenue at grade. One bill refers to the tracks as a public nuisance and the other seeks to protect the people of the city from the "injurious effect of smoke, odors, and noise" by having the road equipped with electricity. Regarding the first bill the Mayor pointed out that, if the Legislature had seen fit to pass it in 1911 or even last year, the city might well have accepted it as the means to the negotiation of a satisfactory settlement with the New York Central, but the situation was changed this year, the Mayor stated, as a settlement with the railroad company had been negotiated by the port and terminal committee of the Board of Estimate.

PHILADELPHIA TRANSIT ELECTION ON MAY 16

At the primaries in Philadelphia, Pa., on May 16 the voters will be called upon to pass on the transit loan of $57,100,000 approved by the City Councils on April 11. The transit matter now to be passed on has been before the people about five years. The plans for transit improvements drawn under the direction of A. Merritt Taylor, director of city transit during the Blankenburg administration, were adopted and $6,000,000 was made available for preliminary work under those plans. Then came a change in the city administration and the reopening of the whole transit matter through suggestions which were made for the modification of the system as originally proposed. The discussion which has followed has grown both acrimonious and bitter. Mr. Taylor has returned to the fray to conduct the campaign in behalf of the program of construction laid down by him. In an appeal to the public which he made on May 9 Mr. Taylor said:

"Three millions have been appropriated for the construction of the Broad Street subway and $2,000,000 worth of that work has already been placed under contract. You must remember that if the transit loan bill should be defeated it cannot be brought up again at the November election, or within one year of May 16.

"By voting for the transit loan you will enable the city to proceed with the construction of the high-speed lines. The city will then either be able to conclude the tentative agreement with the existing street railways or secure an independent company to equip and operate the city-owned high-speed system."

$500,000 TO BE SPENT IN ELECTRIFYING SALT LAKE LINE

Brief mention was made in the ELECTRIC RAILWAY JOURNAL of May 6, page 874, of the announcement by Joseph Nelson, general manager of the Salt Lake & Los Angeles Railway, to the effect that arrangements had been perfected for the electrification of the line, which operates from Salt Lake City to Saltair Beach, which is approximately 15 miles west of the city, and that the company will extend its line from Saltair to Garfield, a distance of 3 miles. Ties, rails and the other equipment necessary for this extension have already been ordered.

Preliminary work on the electrification of the main line to Saltair has been begun. At the half-way passing point an additional mile of passing track has been built. When the road is electrified it will at first be operated as a single-track line with long double-track turnouts at passing points, but these passing points will gradually be extended until the entire line has been double tracked.

Mr. Nelson has announced that arrangements have been completed with C. F. Childs & Company, Chicago, Ill., to finance the Garfield extension and the electrification of the line. H. A. Strauss, consulting engineer, with offices in the Harris Trust Building, Chicago, has been engaged to prepare plans and specifications for the electrification. Mr. Strauss will visit Salt Lake within the next thirty days to study the local problems connected with the work. The plans that are made will depend to a considerable extent upon the arrangements which the Salt Lake & Los Angeles Railway is able to effect with the Utah Light & Traction Company, which operates the local line in Salt Lake City.

The electrification of the line will involve the purchase of new rolling stock, as the present trailers, used with steam locomotives, would not be adapted to electric operation. Mr. Nelson states that it is proposed to use all-steel cars of the latest design for this new equipment. The cost of the proposed improvement will exceed $500,000.

I. C. C. Bill Ordered Favorably Reported.—Senator Newlands' bill increasing the membership of the Interstate Commerce Commission from seven to nine and dividing the members into three groups to expedite their work has been ordered favorably reported to the Senate by the Interstate Commerce Commission.

Change in Bay State Organization.—The office of superintendent of equipment of the Bay State Street Railway, Boston, Mass., has been abolished, and E. W. Holst has been appointed mechanical engineer of the company and Howard W. Irwin has been appointed superintendent of car repairs.

Strike of "Sand Hogs" Settled.—Through the efforts of Chairman Oscar S. Straus of the Public Service Commission for the First District of New York the strike of the "sand hogs" employed in the Old Slip-Clark Street and Whitehall-Montague Street tunnels under the East River, which began on April 5 last, has ended and the men, some 800 in number, have returned to work.

Agreement on Pittsburgh Terms of Service.—The terms of service of the employees of the Pittsburgh (Pa.) Railways other than those of wages, referred to in the ELECTRIC RAILWAY JOURNAL of May 6, have been adjusted. The final meeting on these matters was held on May 5. The most important change from the working terms as they existed previously was an increase from $1.40 a day to $1.65 a day in the guaranteed minimum for extras.

Borough Park Subway and Elevated Extension to Begin Operation.—June 2 has been tentatively set as the date to begin operation of the Borough Park section of the

Fourth Avenue subway and the elevated extension from Thirty-eighth Street to Sixty-second Street along New Utrecht Avenue. This line will be operated as part of the Brooklyn (N. Y.) Rapid Transit System.

Cincinnati Franchise Discussed.—The proposed revision of the franchise of the Cincinnati (Ohio) Traction Company was discussed before the street railways committee of the Cincinnati Council on May 3. Secretary Culkins suggested that the company would probably be willing to surrender its old franchise, which has thirty years to run, for a modern indeterminate grant that would include the lease of the rapid transit loop which is to be built by the city.

Hearing on Proposed Order Covering Reports on Physical Property.—The Public Service Commission for the First District of New York has set May 22 as the date for a public hearing, at which representatives of the railroad and rapid transit companies operating in New York will be heard upon the subject of an order the commission proposes to issue requiring these corporations each year to certify to the condition of the structures on the various lines that are operated by them.

Buffalo Employees Vote on Company Wage Offer. — An agreement has been reached between the officials of the International Railway, Buffalo, N. Y., and the motormen and conductors on the city and interurban lines of the company on practically every point at issue with the exception of the wage scale. The company has offered these employees an increase of 2 cents an hour, but after a vote of the union taken on May 10, it was announced that this offer had been rejected. Another special meeting of the employees will be held. It is expected that the wage scale will be arbitrated.

Electrified Terminals Predicted for Chicago.—John F. Wallace, chairman of the Railway Terminals Commission of Chicago, stated recently that it was his belief that the Chicago & Northwestern Railway and the trackage in the new union station now under construction would be electrified within a short time. Mr. Wallace is quoted as saying: "Electrification will be necessary by reason of the constantly increasing business. The Pennsylvania Railroad found at its New York terminal that by electrification as much business could be done on four tracks as on sixteen by steam."

Baseball News from Philadelphia.—The first issue of "Diamond News," official publication of the Philadelphia (Pa.) Rapid Transit Baseball League, is dated May 1. It indicates a very interesting and lively season in the contest for the championship cup, which will become the permanent property of the winning team. Hamilton watches will be awarded to the leading pitcher, the leading batsman and the player scoring the greatest number of runs. The player submitting the best baseball essay and the non-contestants submitting the two best essays will also receive Hamilton watches.

Action Taken Against Railway in Repair Case.—On motion of Commissioner Henry W. Hodge. the Public Service Commission for the First District of New York has sent a letter to District Attorney Swann of New York County, calling his attention to the failure of the Third Avenue Railway and the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway to obey the commission's order of May 21, 1915, requiring these companies to make certain repairs to their tracks. This action was taken under Sec. 58 of the public service commissions law, which makes violation of an order of the commission a misdemeanor.

Bulletin of the National Tax Association.—The National Tax Association has begun the publication of an official bulletin to be issued nine times during each year, *i. e.*, each month except July, August and September. It is intended for circulation among the members and others to keep them advised on topics of current interest and to serve as a medium for the intercommunication of ideas and suggestions. The subscription price to members is included in the annual dues, while to non-members it is $2 a year. Orders and inquiries should be addressed to A. E. Holcomb, treasurer, 15 Dey Street, New York, N. Y.

Superintendent Gaboury Praised.—At the recent Good Roads Congress in Montreal, Quebec, Chief Engineer Mercier of that city read a paper on "Snow Removal in Montreal." He said that the average snow fall for forty-one years had been 119 in., and there was snow on seventy-nine days in 1915, with rain on twenty-eight of these days. Mr. Mercier described the methods by which the city and the Montreal Tramways co-operated to clear the streets, and referred to the organization under A. Gaboury, superintendent of the railway, as "wonderful." The cost of cleaning sidewalks was 7⅛ cents per running foot, and clearing the roads cost $2,500 per mile.

Tentative Rules for Overhead Electrical Construction in Illinois.—The State Public Utilities Commission of Illinois has issued a bulletin covering tentative rules for overhead electrical construction which have been drawn up for discussion at a hearing to be held in the offices of the commission at Springfield, Ill., on May 16. The rules cover the following general classifications: overhead construction in general, construction at crossing between wires, construction at crossings of wires over railroad tracks, crossings of wires under railroad structures, construction for jointly used pole lines and general recommendations for construction and operation of supply systems and signal systems whose lines are involved in parallels.

Strike on Dorchester Tunnel.—About 500 Italian laborers employed in the construction of the Dorchester tunnel at Boston, Mass., went on strike early last week. No work was done on Monday night, May 8, under Fort Point Channel. At the office of Patrick McGovern, a contractor for the section latest affected by the walk-out, it was stated that the men are being paid $3 and $3.50 a day, an advance of 50 cents over the day rate of a few months ago. This is a higher rate than has ever before been paid for excavation labor in Boston subway work. Strikes were settled on May 9 on sections of the tunnel being built by Coleman Brothers and the T. A. Gillespie Company, Boston. It is understood that no increase in pay was granted.

Massachusetts Wages Conferences.—Negotiations as to wages are under way in Massachusetts on the Worcester Consolidated Street Railway and the Springfield Street Railway and on the Boston Elevated Railway. Although the details of the agreements under discussion between the managements and the employees are not as yet public, it is understood that they involve substantial advances affecting about 2000 men on the Worcester and Springfield properties. On the Boston system conferences have been proceeding practically every day for the past four or five weeks and it is hoped that an agreement may be reached without the necessity for arbitration proceedings. Press accounts state that the employees of the Worcester and the Springfield companies rejected proposals by the company for certain changes in the working agreement early in the week ended May 13 and that further conferences will be conducted.

Norfolk Franchise Before Aldermen.—The report of the joint committee of the Council of Norfolk, Va., which has been considering the matter of new franchises to be granted to the Virginia Railway & Power Company, was presented to the Board of Aldermen on May 9. That body concurred with the Common Council in postponing consideration of the franchises until a meeting of a committee of the whole Council, but set no date for the meeting. Citizens of what is known as Berkley Ward held a mass meeting the same night and passed resolutions to be presented to the Councils opposing the passage of the ordinances in their present shape. Their principal objection to the measures is the proposed abrogation of the 2½-cent labor ticket now in force between Norfolk proper and the portion of the city in which they live. They also want 80-cent gas. E. C. Hathaway, assistant general manager, appeared before the citizens and explained some matters in connection with transfer privileges and other features of the ordinance which they did not understand.

Baseball League at Baltimore.—The United Railways & Electric Company, Baltimore, Md., has formed a baseball league consisting of sixteen teams, the various nines being composed of employees of closely affiliated lines in order that the spirit of route rivalry which has been an interesting feature of the bowling contest will continue to be maintained. The company has provided playing space on its property at Carroll Park, and will supply the players with uniforms and all other equipment. One man has been employed to manage the league and devote all his time to the details. The company will provide a pennant and also a loving cup for the winning club. The second annual bowling tournament of the company terminated on April 13. The winning team received custody of a silver loving cup, to remain in its possession for one year and to become the permanent property of the team which wins it three times. The members of the winning team received gold medals and the individuals making the highest score, the highest single score and the highest number of strikes were presented with gold watches.

Three-Year Agreement Negotiated in Albany.—Negotiations between the officers of the United Traction Company, Albany, N. Y., and the representatives of the Albany and Troy branches of the Amalgamated Association terminated on May 8 in an agreement for three years, effective from July 1. The new contract virtually is identical with the one now in operation, with the exception of the wage scale. After July 1 motormen and conductors will receive 30 cents an hour instead of 28 cents. Wages of all other employees will be increased in similar ratio. All men now employed will receive the raise, irrespective of the length of their employment. The agreement provides, however, that new employees shall receive 28 cents an hour. This will be increased 1 cent at the end of six months and another cent at the end of twelve months, so that new men employed after July 1 will not receive the 30 cents an hour until they have been employed one year. Sections of the agreement covering working conditions are changed only slightly from the present agreement. In the draft submitted by the men the section on wages called for an increase of 5 cents an hour. The company responded by offering 2 cents, and after a vote the men decided to accept the company's offer.

Thompson Committee Hearings Continued.—On May 9 the Thompson legislative committee delved into the unsuccessful negotiations of several years ago between the Interborough Rapid Transit Company and the Longacre Power Company to have the transit company sell its surplus current to the Longacre concern. DeLancey Nicoll, of counsel for the Interborough Company, was called as a witness. He stated that in his opinion the life of the Thompson committee ended with the adjournment of the Legislature. Samuel Untermyer, counsel for the Longacre Company, and Frank Hedley, vice-president and general manager, and H. G. Stott, chief engineer of the Interborough Rapid Transit Company, were also questioned. Contractor John F. Stevens was asked about his negotiations with T. P. Shonts, president of the Interborough Rapid Transit Company, for the contract for third-tracking the elevated lines. On May 10 E. J. Berwind, a director of the Interborough Rapid Transit Company, was questioned regarding the proposed Stevens contract and matters relating thereto. Bridge Commissioner F. J. H. Kracke testified in regard to the proposed removal of the Brooklyn Bridge extension across Park Row to City Hall Park. He said that the structure would be removed as soon as the connection between the Center Street Loop and the Brooklyn Bridge was put into operation. On May 11 T. A. Gillespie of the T. A. Gillespie Company, which obtained the contract for third-tracking the elevated lines in Manhattan, was the principal witness before the committee.

PROGRAM OF ASSOCIATION MEETING

Railway Signal Association

A stated meeting of the Railway Signal Association will be held at the Hotel Astor, New York, N. Y., on May 24 and 25. The meeting will open at 10 a. m. on May 24 with reports from committees on signaling practice, mechanical interlocking, direct-current automatic block signaling, and electrical testing. There will also be a discussion on analytical methods of solving track circuit problems. On May 25 there will be reports from committees on power interlocking, standard designs, wires and cables, and on the harmonizing of specifications. It is expected that this session will be completed by 4 p. m. The association is planning a dinner and theater party for members attending the meeting, and it is requested that all delegates register promptly upon arrival at the association headquarters on May 24, so that the arrangements for the entertainment may be concluded.

Financial and Corporate

ANNUAL REPORTS

Chicago Surface Lines

A comparative statement of revenues and expenses of the Chicago (Ill.) Surface Lines for the twelve months ended Jan. 31, 1915 and 1916, follows:

	1915	Per Cent	1914	Per Cent
Gross earnings	$31,690,761	100.00	$31,966,048	100.00
Expenses:				
Maintenance of way and structures	$973,086	3.07	$931,407	2.91
Maintenance of equipment	1,677,570	5.29	1,533,155	4.80
Renewals	2,535,260	8.00	2,557,283	8.00
Traffic expenses	41,011	0.13	2,110	0.01
Operation of power plants	2,779,717	8.77	2,781,906	8.70
Operation of cars—				
Trainmen	8,162,239	25.76	7,596,036	23.76
Other	1,214,071	3.83	1,190,486	3.73
General expenses—				
Damages	1,054,982	3.33	1,198,726	3.75
Other	758,479	2.39	658,881	2.06
Expenses of Board of Supervising Engineers	112,307	0.36	86,205	0.27
Taxes	1,732,629	5.47	1,353,073	4.23
Total expenses	$21,041,356	66.40	$19,889,275	62.22
Residue receipts	$10,649,405	33.60	$12,076,773	37.78
Divided:				
Chicago Railways 59 per cent	6,283,149	....	7,125,296	....
South Side Lines 41 per cent	4,366,256	....	4,951,476	....

Detailed figures in regard to the subdivisions of gross earnings for the surface lines and in regard to the separate financial showing of the Chicago Railways and the South Side Lines were published from reports for these two divisions in the ELECTRIC RAILWAY JOURNAL of March 25 and April 15. The foregoing statement, however, is taken from the very complete second annual report of the Chicago Surface Lines to the board of operation. The greater part of the increase in operating expenses, amounting to $1,152,080, was caused by the wage increase which became effective on June 1, 1915. The effect of this increase will be approximately $950,000 for the first year of the contract and $1,250,000 for the second year. The balance of the increase was due to larger expenditures for maintenance of track, roadway and equipment and for taxes. The increase in equipment maintenance was more marked than that for way and structures. The total amount expended for maintenance of way and structures showed an increase of $45,162, whereas the expenditures for maintenance of equipment rose $144,415.

During the first year of unification the board of operation authorized $250,000 of the maintenance fund to be used in putting cars through the shops for painting and general overhauling, to be expended 60 per cent on cars belonging to the Chicago Railways and 40 per cent on cars belonging to the South Side Lines. Of this appropriation $236,658 was spent during the year. In 1915 $300,000 was appropriated to be expended in the same way. Of this amount $282,400 was expended, making the total expended during the two years $519,058, of which $313,117 or a trifle more than 60 per cent was expended on equipment belonging to the Chicago Railways, and $205,941 or a trifle less than 40 per cent was expended on equipment belonging to the South Side Lines.

During the year the Chicago Surface Lines made a contract with the Galena Signal Oil Company covering the lubrication of rolling stock equipment for five years on a mileage basis. The contract is said to have effected a material reduction in cost. Owing to the use of 34-in. wheels and improved shop methods the lines are getting better mileage out of the steel wheels. The average mileage per wheel for 1914 was 87,195 miles, while for the year just ended the average increased to 94,862 miles.

The lines have reached an agreement with the health department of the city with reference to the heating and ventilating of all of the cars not equipped with a mechanical system of ventilation, whereby additional heating capacity is to be installed, together with thermostatic control and a natural system of ventilation. Plans have been prepared and approved by the health department, and requests for bids for the necessary apparatus have been issued. This work will be pushed forward as rapidly as possible. The result of adjusting these questions is that, during the year, no suits were brought against the companies with reference to heating or ventilation of cars.

The city purchase price of all the properties as of Jan. 31, 1916, was $148,221,578. During the last fiscal year the companies expended for new capital requirements the sum of $2,972,413. Extensions totaling 22.34 miles were built, and 1.81 miles were abandoned, giving a net addition of 20.53 miles and a total single-track mileage of 1023.03. Two new substations, 4000-kw. and 8000-kw. capacity, were completed and put into operation. The power (a.c.) purchased from the Commonwealth Edison Company for the year, amounted to 498,152,705 kw.-hr. at a cost of $3,634,198. The total d.c. output at the substations and power houses was 465,139,489 kw.-hr. at a total cost, including maintenance, fixed charges, purchased power, etc., of $3,908,018.

The report of the companies describes in interesting detail the organization and work of the various departments, such as the transportation, purchasing, legal, claims, accounting and treasury departments, and also discusses various topics arising in Chicago operation, as the sustained validity of the unification ordinance and the pending questions of car renewals, State *versus* city regulation, and unification of the surface electric railways and the elevated electric railways.

In connection with the work of the purchasing department it is noted that there were 2371 requisitions for material, supplies, equipment, etc., received during the year, aggregating a total of 19,600 items. These requisitions required the placing of 13,000 purchase orders and 29,300 invoices were checked and recorded on these orders. Contracts made in the early part of the year for requirements of standard materials and supplies of various classifications enabled the companies to secure low prices, prompt placing of orders and prompt delivery. These contracts were of further benefit, inasmuch as a shortage of raw material and increased demand for practically all materials and supplies caused a steady increase in prices throughout the year.

All scrap and obsolete material, supplies and equipment accumulated or becoming obsolete during the year were sold in the usual way, *i.e.*, notices were sent to all available dealers in this class of material, and the material was sold to the highest bidder. All bids for the sale of scrap and obsolete material were submitted to and approved by the Board of Supervising Engineers. There were 169 contracts closed during the year covering the sale of scrap and obsolete material, supplies and equipment. The amount of scrap sold was divided as follows: Scrap iron and steel, 16,000 gross tons; scrap metals (such as copper, brass, etc.), 800 net tons. The prices obtained for scrap, particularly for metals, were much higher than those ever before obtained. In fact, in some instances, the metals were sold at a price which amounted to more than their original cost.

Under unified operation the claims investigated totaled 16,770 in the last fiscal year as compared to 14,358 in 1914, and the claims settled were 6967 and 7448 respectively. As compared to 1914, the accidents reported in 1915 showed a decrease of more than 14 per cent, with an increase of 16 per cent in the claims investigated. The Chicago Surface Lines reserve account for damages showed a balance on Jan. 31, 1916, of $1,047,017 as compared to $581,520 a year before.

The total passenger receipts for the year amounted to $31,086,715, making an average daily receipt of $85,169. The largest daily receipts during 1915 were on Dec. 24, 1915, amounting to $106,126. The average number of employees during the year was approximately 12,000. The total amount disbursed for payrolls during the year was $12,671,794. The average payroll per month amounted to $1,055,982.

North American Company

The comparative statement of income and undivided profits of the North American Company, New York, N. Y., for the calendar year 1915 follows:

	1915	1914
Interest received or accrued	$488,804	$610,145
Dividends received	1,438,028	1,503,801
Profits and compensation for services	28,671	42,377
Total	$1,952,503	$2,156,323
Salaries, legal expenses, net rentals and all other expenses of administration	$77,780	$77,630
Taxes	10,576	24,397
Interest paid or accrued	25,821	140,173
Sundry accounts written off and reserves	33,550	5,351
Total	$147,727	$247,551
Net income	$1,804,776	$1,908,772
Dividends paid and accrued during year	1,489,665	1,489,665
Balance carried to undivided profits account	$315,111	$419,107

The foregoing table shows the lessened income from dividends and interest in 1915, about half of which was met by the decrease in expenses, so that the net income suffered a loss of $103,996. The Wisconsin group of companies controlled by the North American Company includes The Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company, and the holding company also controls the United Railways of St. Louis. The showing of these companies is briefly reviewed below:

The operating revenues of The Milwaukee Railway & Light Company for 1915 amounted to $5,971,715, a decrease of $33,780, or 0.56 per cent, as compared with the previous year. Operating expenses, including taxes and reserves, decreased $67,543, or 1.60 per cent, while gross income decreased $2,722, or 0.15 per cent, and interest charges decreased $29,804, or 3.62 per cent, so that the net income increased $27,082, or 2.67 per cent. The operating revenues of the electric light and power department increased $164,995, or 8.71 per cent, while the operating revenues of the railway department decreased $198,775, or 4.83 per cent. This decrease was due to the industrial depression and the operation of jitneys in competition with the street railway lines. The expenditures for construction during the year amounted to $484,782, of which the following are the principal items: (1) Construction of 1.028 miles of additional track; (2) paving in track tone; (3) extensions to underground distribution system; (4) installation of additional mains and services.

The operating revenues of the Milwaukee Light, Heat & Traction Company for the year amounted to $1,480,625, a decrease of $13,042, or 0.87 per cent, as compared with the previous year. Operating expenses, however, including taxes and reserves, increased $44,615, or 4.72 per cent. Gross income decreased $57,564, or 4.62 per cent; interest charges increased $17,589, or 2.73 per cent, and net income decreased $75,153, or 12.50 per cent. The operating revenues of the electric light and power department increased $64,240, or 11.62 per cent, while the operating revenues of the railway department decreased $77,282, or 8.21 per cent. This decrease was due to the industrial depression and diverting of riding to automobiles. The expenditures for construction during the year amounted to $380,095, of which the following are the principal items: (1) Completion of installation of turbo-generator and boilers in Racine power plant; (2) installation of 750-kw. motor-generator set in Racine power plant; (3) extensions to electric distribution system in the various districts served; (4) paving and cost of heavier railway track laid upon reconstruction.

The operating revenues of the United Railways of St. Louis for 1915 totaled $11,681,200, a decrease of $769,724, or 6.18 per cent. Operating expenses, including taxes and reserves, decreased $486,340, or 5.17 per cent. Gross income decreased $272,800, or 8.73 per cent, with interest charges less by $30,287, or 1.16 per cent, so that the net income decreased $242,513, or 47.73 per cent. During the year the expenditures for construction amounted to $53,540, of which the following are the principal items: (1) Construction of 0.52 mile of track; (2) construction of permanent pavement in track zone; (3) additional passenger car equipment. The expenditures for construction work during the year, charged to depreciation reserve, amounted to $763,757, consisting principally of the replacement of 27.53 miles of track, retying and reballasting of 10.47 miles of unpaved track, remodelling of twenty-seven cars and rebuilding of 273 cars. The North American Company receives no dividends on the common stock of this subsidiary owned by it.

READJUSTMENT OF UNITED RAILROADS FINANCES PROPOSED

Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., was quoted in the San Francisco *Examiner* recently as discussing plans for the readjustment of the securities of the company referred to in the ELECTRIC RAILWAY JOURNAL of April 1, page 668. He is quoted in part as follows:

"I have been at work for a long time on a plan of reorganization of the company's securities looking to place them on a basis that will be absolutely conservative. When every detail of the plan has been worked out I shall wish to submit it to the Railroad Commission before making it public through other channels, but I see no objection to stating that in working out the plan I have had in mind three fundamental considerations:

"1. Reducing the bonded indebtedness of the company to a point under the value of the actual physical properties.

"2. Providing new securities for the holders of the present ones, which on the basis of present earnings, and in no way discounting the future growth of the city, will make an annual return at least as large as is now being paid.

"3. Providing a market for the new securities through an underwriting syndicate which will give to the present holder of securities, if he elects to sell instead of holding, a price substantially larger than the one that he could now realize by disposing of his existing securities."

CONSOLIDATION PROPOSED IN NEW ORLEANS

Stockholders to Vote on May 22 on Consolidation of New Orleans Railway & Light Company and Its Subsidiaries

It is proposed to consolidate the subsidiary companies with the New Orleans Railway & Light Company, New Orleans, La., into a company which will own directly all street railways now owned by the subsidiary companies. The plan for the consolidation has been approved by the directors of all the companies involved, and meetings of the stockholders of the several companies have been called for May 22 to ratify the plan.

The New Orleans City Railroad, the New Orleans & Carrollton Railroad, Light & Power Company, the Orleans Railroad, the St. Charles Street Railroad, the New Orleans & Pontchartrain Railway and the New Orleans Railway & Light Company own all the street railroads in New Orleans. The New Orleans Railway & Light Company operates the New Orleans City Railroad under a lease which runs until 1955, and in addition owns all but a comparatively few shares of the stock of that company and of all the other companies mentioned.

In order to obtain the large sums of money necessary to develop the railways in New Orleans, the New Orleans Railway & Light Company has had to use its own credit, as it was shown to be impracticable for the various companies to continue to borrow on their individual credit. To obtain these funds the New Orleans Railway & Light Company has, from time to time, issued and disposed of its own obligations on the credit of the stock of the subsidiary companies. This method of financing has proved cumbersome and costly, and, in addition, a large expense is needlessly incurred annually through the necessity of keeping up the legal organization and the overhead expenses and salaries of the several subsidiary companies. It is on account of these conditions that the consolidation is proposed.

The New Orleans Railway & Light Company has authorized and issued $10,000,000 par value of 5 per cent non-cumulative preferred stock and $20,000,000 of common stock. The property owned by the company consists in the main of all but a comparatively few shares of the capital stocks of the subsidiary companies and of the New Orleans Gas Light Company. The consolidation of the subsidiary companies with the New Orleans Railway & Light Company will be effected under the statutes of the State of Louisiana. The company resulting from the consolidation will own all of the physical properties of the New Orleans Railway & Light Company and of the subsidiary companies and the shares of stock of the New Orleans Gas Light Company now owned by the New Orleans Railway & Light Company, as for legal reasons the gas company cannot be a party to the consolidation. The consolidated company will be called the New Orleans Railway & Light Company, and will have the same stock capitalization as the existing New Orleans Railway & Light Company, to wit: 100,000 shares, of the par value of $100 each, of 5 per cent non-cumulative preferred stock, and 200,000 shares of common stock of the par value of $100 each.

The stock capitalization of the consolidated company, which will be the same as that of the present New Orleans Railway & Light Company, will be less than the sum total of the stock capitalization of the New Orleans Railway & Light Company, plus the outstanding stocks of the subsidiary companies not owned by the New Orleans Railway & Light Company. The shares of stock necessary to effect this reduction have been provided through an arrangement between the American Cities Company, which is the owner of a large part of the preferred and common stock of the old New Orleans Railway & Light Company, and the consolidated company.

AUBURN & SYRACUSE READJUSTMENT

New Note Financing with Common Stock Bonus Has Been Completed—List of New Management

The readjustment of the finances of the Auburn & Syracuse Electric Railroad, Syracuse, N. Y., has been carried out in accordance with the terms of the letter addressed to the stockholders of the company on Jan. 26. On Feb. 1, 1916, there came due $250,000 of one-year notes issued by the company. There also had to be paid at that time six months' interest at 5 per cent on these notes, amounting to $6,250. On Aug. 1 $115,000 of eighteen-month notes issued by the company are to mature. In the circular of Jan. 26 the company said that at that time $72,000 in cash was required by the company to provide for outstanding short-time paper, past due vouchers, accounts payable and accrued interest.

In order to provide for these requirements, the directors outlined a plan of financial readjustment which called for the issuance of $437,000 face value of five-year 6-per cent coupon notes to be dated Feb. 1, 1916, the total note issue under the trust agreement to be limited to $450,000. Common stock of the company was to be delivered as a bonus with the five-year notes at the rate of one share of stock with every $100 of notes. It was provided that this common stock bonus should be obtained from the holders of common stock. As the total outstanding issue of common stock was 12,500 shares substantially 35 per cent of the entire issue was required to furnish the 4370 shares needed for the bonus, and in order to distribute this requirement equally among all the common stockholders, every holder of common stock was called upon to furnish 35 per cent of the common stock held by him. The common stock to be delivered with the five-year notes was to be in the form of voting trust certificates and an additional amount of the stock was to be deposited under the voting trust so as to give the voting trustees a majority of all of the outstanding capital stock of the company. Stockholders were privileged to subscribe to the notes at par and accrued interest. The voting trustees were to be Hendrick S. Holden and Arthur W. Loasby, Syracuse, and F. W. Roebling, Jr., Trenton, N. J. The voting trust was to continue for a period of five years.

The $437,000 of five-year notes issued to provide for the maturing notes and other obligations mentioned previously were to be applied as follows: $250,000 to the payment of $250,000 of one-year notes maturing on Feb. 1, 1916; $115,000 to the payment of $115,000 of outstanding eighteen-month notes; $72,000 to furnish $72,000 of cash to pay short-time paper, past due vouchers, accounts payable and accrued interest; the remaining $13,000 of the five-year notes were to be used as the directors might determine.

On April 4 the Public Service Commission for the Second District of New York authorized the issue of the $437,000 of five-year 6 per cent gold notes referred to in the plan and also approved the proposed trust agreement under which the notes were to be issued. A sufficient amount of common stock was turned in to the treasurer of the company to enable the proposed voting trust to be established and the stock was turned over to Messrs. Holden, Loasby and Roebling as voting trustees. It is announced now that the notes have been disposed of and that they have been applied as set forth in the plans.

The new officers and directors of the company are as follows: Harold G. Metcalf, Auburn, N. Y., president; Hendrick S. Holden, Syracuse, N. Y., vice-president; T. C. Cherry, Auburn, N. Y., vice-president and general manager; W. A. Holden, Syracuse, N. Y., treasurer; S. C. Rogers, Syracuse, N. Y., assistant treasurer; H. C. Beatty, Syracuse, N. Y., secretary; C. Loomis Allen, A. H. Cowie, Hendrick S. Holden, W. A. Holden, Arthur W. Loasby, H. G. Metcalf, William O. Morgan, William Nottingham and F. W. Roebling, Jr., directors.

OUTLINE OF CHICAGO & MILWAUKEE REORGANIZATION PLAN

It is reported that the reorganization of the Chicago & Milwaukee Electric Railroad, Highwood, Ill., sold under foreclosure on May 1, as noted in the ELECTRIC RAILWAY JOURNAL of May 6, page 878, will very likely be carried out in accordance with the plan and agreement dated Jan. 20, 1912. This called for the deposit of the two classes of bonds with either the Chicago Title & Trust Company or the National Trust Company, Toronto. It provided for the formation of a new company, to be organized under the laws of Illinois or Wisconsin, or both, to take over the properties of the Wisconsin company, the Illinois company and the Wisconsin company holding the property in the city of Milwaukee, from and through the protective committee. Three new mortgages were to be created; one, a first mortgage to cover all property held at that time or afterward acquired, not to exceed $10,000,000 or 5 per cent rate of interest; a second mortgage securing first income bonds, not to exceed $4,500,000, non-cumulative 4 per cent per annum, interest payable out of net earnings only; a third mortgage, securing second income bonds not to exceed $6,000,000, non-cumulative 4 per cent per annum, interest payable out of net earnings only after the annual interest on the second mortgage income bonds had been paid in full. The capital stock was to amount to $6,000,000, all of which was to be turned over to the committee to be disposed of as they saw fit. The sale remains to be confirmed by the Circuit Court in both States.

American Cities Company, New York, N. Y.—The directors of American Cities Company have voted to retire on July 1 at par and interest by lot $2,500,000 of the 5-6 per cent eight-year collateral trust bonds, due on July 1, 1919. The remaining $7,500,000 of these bonds will continue outstanding on a 5 per cent basis until July 1, 1917, after which time they will bear interest to maturity at the rate of 6 per cent.

Cities Service Company, New York, N. Y.—It is understood that Cities Service Company will soon call for payment the entire issue of $7,000,000 of 7 per cent five-year notes due on March 15, 1918. The notes will be paid at 102 and interest any time between June 12 and July 12, interest ceasing after July 12. Funds for the retirement of the notes were secured from the proceeds of the sale of $14,000,000 of bonds of the Empire Gas & Fuel Company, a subsidiary. The notes were originally issued to acquire and develop natural gas and oil properties now included in the Empire Gas & Fuel Company.

Fargo & Moorehead Street Railway, Fargo, N. D.—On July 2 the Fargo & Moorehead Street Railway will pay, through the Northwestern Trust Company, St. Paul, all the outstanding 6 per cent second mortgage bonds of the corporation. The redemption will be made at 105 and interest. This is in accordance with the terms of the new financing of the Northern States Power Company, referred to in the ELECTRIC RAILWAY JOURNAL of May 6, page 877.

Gary & Interurban Railroad, Gary, Ind.—Judge Anderson in the Federal Court has authorized the issuance of $39,000 of receivers' certificates by the Gary & Interurban Railroad.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—The Supreme Court of Missouri has denied the motions of attorneys for the Kansas City, Clay County & St. Joseph Railway to require Judge Bird of the County Circuit Court to dismiss the receivership under which the company is operating, and prohibit the judge from exercising jurisdiction over the receivers or the property in their custody. The receivers were appointed following the judgment in the circuit court for $1,500,000 in favor of the Interstate Railway.

Mexico (Mex.) Tramways.—A protective committee consisting of E. R. Peacock, S. C. Boulter, H. F. Chamen, Robert Fleming, Arthur Hill, H. Malcom Hubbard and A. F. B. Roger has issued a letter asking for the deposit of bonds of the Mexico Tramways, the Mexico Light & Power Company, Ltd., the Mexican Electric Light Company, Ltd., and the Pechuca Light & Power Company. This action is taken because of the difficulties encountered from the unsettled conditions in Mexico. American bondholders may deposit with the Canadian Bank of Commerce in Toronto.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The San Francisco-Oakland Terminal Railways has filed with the California Railroad Commission an application for authority to issue promissory notes for $180,000 at 6 per cent, callable at 100½ and interest, on sixty days' notice, and maturing between 1917 and 1925. The company expects to use the money from these notes with $54,000 more for twenty steel cars costing $6,000 each, of the pay-as-you-enter type, and twelve cars costing $9,500 each in express service between Oakland and Berkeley. Contracts for the purchase of the first twenty cars are being negotiated. The twelve cars last mentioned will be built in the Oakland shops of the railways or bought elsewhere. Preliminary estimates show that the cars can be constructed in the Oakland shops for $9,500 each. Arrangements have been completed for the sale and disposition of the notes at par, with accrued interest. The notes are to be secured by a car trust agreement. The $54,000 needed above the $180,000 to be secured from the notes will be obtained by the payment by the company of $200 a day to its trustees under the car trust agreement, beginning on May 1, 1916, and continuing until fully paid. Of the notes $10,000 will be due on May 1, 1917, and $10,000 on Nov. 1, 1917. Similar sums will be due on the same dates in succeeding years until 1925.

Seattle, Renton & Southern Railway, Seattle, Wash.—On May 1 Scott Calhoun, one of the receivers of the Seattle, Renton & Southern Railway, offered the line for sale, acting under orders of Judge A. W. Frater of the King County Superior Court. No bids were received, and a new date at which time the property will be again offered for sale will be set in the near future. John C. Higgins, counsel for Peabody, Houghteling & Company, Chicago, Ill., and other bondholders, announced that no bid could be made by his clients, because in the time allowed by the court they had been unable to perfect their arrangements in accordance with the provisions of the reorganization plan approved by Judge Frater on April 1. The terms of the plan for the reorganization were reviewed in the ELECTRIC RAILWAY JOURNAL of April 15, page 752.

Southern Wisconsin Railway, Madison, Wis.—The Southern Wisconsin Railway has filed for record papers certifying to a change in the name of the company to the Madison Railways.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—The Terre Haute Traction & Light Company, operated under lease by the Terre Haute, Indianapolis & Eastern Traction Company, has asked for tenders, through the State Street Trust Company, until May 22, of sufficient of its first consolidated 5 per cent bonds to exhaust $33,048 now available for the sinking fund.

Toronto (Ont.) Railway.—The Toronto Railway has called a special meeting of the stockholders for May 29 to approve an increase in its capital stock from $12,000,000 to $15,000,000. Part or all of the new stock will be offered to stockholders at par, the proceeds to be used for corporate purposes of the company.

United Light & Railways Company, Grand Rapids, Mich.—Announcement has been made of the sale by United Light & Railways Company to N. W. Halsey & Company and Russell Brewster & Company of $1,000,000 of first and refunding 5 per cent bonds, making $8,451,000 of this issue outstanding. The proceeds of the bonds just sold will be used to reimburse the treasury of the company for cost of improvements and betterments to properties of subsidiary companies.

DIVIDENDS DECLARED

Brooklyn (N. Y.) City Railroad Company, quarterly, 2 per cent.

Kentucky Securities Corporation, Lexington, Ky., quarterly, 1½ per cent, preferred.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1½ per cent, preferred.

Monongahela Valley Traction Company, Fairmont, W. Va., 1 per cent, common.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1¼ per cent, common.

Philadelphia Company, Pittsburgh, Pa., quarterly, 87½ cents, common.

Public Service Investment Company, Boston, Mass., quarterly, $1.50, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$72,293	*$66,603	$5,690	$22,304	‡†$16,380
1 " " '15	68,846	*63,015	5,831	17,230	‡†11,269
9 " " '16	711,143	*594,675	116,468	173,821	‡†55,706
9 " " '15	725,301	*654,114	71,187	155,160	‡†82,663

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$55,204	*$45,072	$10,132	$16,155	†$6,023
1 " " '15	53,132	*35,603	17,529	15,663	1,866
12 " " '16	747,892	*490,819	257,073	191,224	65,849
12 " " '15	691,967	*461,458	230,509	187,048	43,461

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$194,038	*$121,775	$72,263	$42,807	$29,456
1 " " '15	175,946	*108,397	67,549	41,964	25,585
12 " " '16	2,189,901	*1,349,511	840,390	513,680	326,710
12 " " '15	2,226,710	*1,307,423	919,287	490,464	428,823

NEW YORK & STAMFORD RAILWAY COMPANY, PORT CHESTER, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$24,955	*$22,691	$2,264	$7,979	‡†$5,678
1 " " '15	24,051	*23,915	135	7,975	‡†7,810
9 " " '16	281,730	*227,699	54,031	71,959	‡†17,458
9 " " '15	283,059	*232,703	50,356	71,084	‡†20,378

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$39,834	*$46,537	†$6,702	§$5,997	‡†$10,986
1 " " '15	36,135	*45,048	†8,913	§6,259	‡†13,639
7 " " '16	375,154	*425,508	†50,354	§58,171	‡†93,802
9 " " '15	328,952	*392,400	†63,447	§57,617	‡†106,299

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$450,803	*$254,205	$196,598	$182,064	$14,534
1 " " '15	445,544	*266,308	179,236	183,854	†4,618
12 " " '16	5,453,357	*3,063,650	2,389,707	2,204,581	185,126
12 " " '15	5,978,042	*3,221,351	2,756,691	2,196,100	560,591

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$330,046	*$195,084	$134,962	$67,862	$67,395
1 " " '15	242,236	*158,298	83,938	55,244	28,697
3 " " '16	958,821	*556,477	402,343	201,365	201,920
3 " " '15	724,837	*459,347	265,489	165,888	99,867

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$451,308	*$355,741	$95,567	$118,373	‡†$21,828
1 " " '15	372,155	*311,891	60,264	117,308	‡†56,213
9 " " '16	4,046,643	*3,089,387	957,256	1,042,426	‡†20,834
9 " " '15	3,913,994	*2,978,147	935,847	1,061,947	‡†59,065

WESTCHESTER STREET RAILROAD COMPANY, WHITE PLAINS, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$17,997	*$18,657	†$660	$1,748	‡†$2,383
1 " " '15	18,408	*22,664	†4,256	1,449	‡†5,697
9 " " '16	186,361	*190,950	†4,589	15,037	‡†19,366
9 " " '15	193,687	*203,695	†10,008	11,719	‡†21,630

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*Includes taxes. †Deficit. ‡Includes non-operating income.

§Excludes interest on bonds, charged against income and paid by the New York, New Haven & Hartford Railroad under guarantee; also interest on notes held by the New York, New Haven & Hartford Railroad Company, not credited to income of that company.

Traffic and Transportation

BAY STATE CROSS-EXAMINATION CONTINUED

Proceedings in Fare Case Still Center About Valuation Expert

The Massachusetts Public Service Commission has continued on alternate days the hearings in the Bay State Street Railway fare case. The proceedings still center about the cross-examination of R. M. Feustel, expert witness of the company in valuation matters. Mr. Feustel stated that the expenses of the company arising from personal injuries had been apportioned in the valuation report by operative routes, on the basis of the total number of passengers hauled, as it was not considered fair to debit any route or section, as an average cost to that section, with the particular injuries caused in that section for any one year.

In regard to changes in the length of fare zones, the witness said that in general where two contiguous zones had been redivided, it had usually been done on through routes by shortening the first zone from the center of the city and increasing the one beyond. In some cases transfer privileges were shortened; in others the adjustment had been made in more than the immediate adjacent zone. As a rule the addition of a zone came naturally into the division of the longest zones that were in existence. Only a few passengers in proportion to the total volume of traffic would be obliged to pay a 12-cent fare for a journey now requiring 5 cents. About $1,000,000 in old power plant equipment on the south of Boston was credited at its scrap value in the report of the engineers headed by Mr. Feustel and about $250,000 in antiquated rolling stock. The witness said that the Milwaukee Electric Railway & Light Company, Kansas City, Clay County & St. Joseph Railway and Manchester Traction, Light & Power Company were basing their depreciation charges upon the composite property life theory.

The witness said that the average condition of the property might be expressed as 75 per cent of normal and that renewals had not been sufficiently looked out for in the past. The company had not earned enough to enable its operating condition to be expressed at 100 per cent efficiency. The company would have to provide for more depreciation in the future if it was going to be in operating condition. Although some of the early single-truck cars of the road lasted for thirty years, twenty years was beyond the time when modern roads were discarding them. In Cleveland cars were being discarded after only fifteen years service. The witness held that although turbo-generators represent an improvement over reciprocating engines, the former would last a shorter time than the latter, partly on account of depreciation and partly because of obsolescence. Emphasis was laid upon the replacement of vertical turbo-generators built only ten or twelve years ago by improved horizontal prime movers. Commissioner Eastman said that if an old open car lasts thirty years a modern semi-convertible car ought not to wear out in twenty years, but Mr. Feustel stated that the open cars showing the longer life operated relatively few car-miles compared with the service expected of double-truck semi-convertible cars. The former were continuous eight-hour cars, operating in the summer. Practically all the open cars represented a fractional year equipment, which meant a different life situation than applied to the semi-convertible type of car.

An exhibit was filed at the hearing of May 8 showing that the gross earnings necessary to meet the present operating expenses and provide for depreciation and a 7 per cent return on the revised investment value as determined for the Massachusetts property was $10,661,966. This represented $1,569,889 more yearly revenue than the representative year ending June 30, 1914, supplied; that is an increase of 18.20 per cent in passenger revenue was necessary. In this estimate the value of land included in the total investment had been changed from the present market value to the actual cost, a reduction of $648,502. This gave as the investment value of the Massachusetts property, $41,563,308, and the working capital assignable to Massachusetts property was $1,424,097, making the total $42,987,405. The revenue requirements for the Massachusetts property were: Variable expenses, $5,993,505 (composed of maintenance of way and structures, $783,906; maintenance of equipment, $768,887; traffic, $58,353; conducting transportation, $3,381,835; general and miscellaneous, $1,000,524); taxes $604,957; amount needed for depreciation in addition to present maintenance charges, $1,054,386; interest on $42,987,405 at 7 per cent, $3,009,118; total revenue needed, $10,661,966.

Mr. Feustel's exhibit showed that it was estimated that the revenue on the Massachusetts lines of the company north of Boston would be increased 13.61 per cent by the proposed tariff, and that the lines south of Boston would show an increased revenue of 15.89 per cent, or an average of 14.43 per cent for the Massachusetts system. The estimated increase in revenue was $753,962 on the northern and $490,127 on the southern lines, or a total increase of $1,244,089. This was $382,699 less than was required. In studying the apportionment of revenue and deficits by routes Mr. Feustel found that out of fifty-six operative routes north of Boston, fifty-two showed a deficit judged by the 1914 average standard of income, and that of thirty-nine routes south of Boston, thirty-six showed a deficit.

COMPARATIVE ACCIDENT FIGURES FOR FIVE YEARS

The Electrogram, published by the Puget Sound Traction, Light & Power Company, Seattle, Wash., contained in its issue for April 6 the following record of all accidents on the lines of the company involving damages or injury:

	1911	1912	1913	1914	1915
Collisions between cars	22	15	15	21	9
Collisions with vehicles	363	424	537	515	349
Collisions with pedestrians	176	149	136	116	89
Derailments	25	9	8	5	10
Defective car or track	79	21	56	28	18
Boarding moving cars	114	32	49	38	11
Leaving moving cars	209	125	110	106	46
Boarding and leaving still cars	172	151	172	184	150
Persons while on cars	361	351	384	427	321
Miscellaneous	257	76	83	84	66

In commenting on these figures the company said:

"The reduction in accidents by 'collisions with pedestrians,' and to 'persons while on cars,' shows that the public is co-operating with us in the safety work, and that our employees are watchful and careful. Most of the accidents to people while on the cars are of a minor character, such as are caused by a sudden stop while a passenger is just leaving a seat, or a child falling down in the aisle. The apparently large number of these is simply due to the fact that our conductors make a record of even trivial happenings."

DECISION RENDERED IN HUNTINGTON FREIGHT CASE

The Long Island Railroad in October, 1915, decided definitely to discontinue freight deliveries by electric railway to Huntington. Before actually taking the step, however, it caused a canvass to be made for the purpose of ascertaining local sentiment on the subject. No serious objection was then raised to the plan, but later the Public Service Commission for the Second District of New York was asked to issue an order directing the Long Island Railroad forthwith to re-establish its freight service to Huntington village by trolley, at the old rates. Notwithstanding the Long Island Railroad's ownership of a majority of the capital stock of the Huntington Railroad it appeared to the commission that it was dealing not primarily with a steam railroad which had well recognized obligations to the public in respect to freight transportation, but with a street railroad organized primarily as a passenger carrier, whose duties in respect to freight transportation were at least of a secondary and subordinate character. The commission felt that it would be an improper exercise of power on its part to grant the relief which the complainants asked. The commission said:

"For the commission to order a trolley line which is now losing money in its regular passenger business, to continue to carry freight at a loss, under such conditions as appear in the present case, would be to carry the principle of state regulation of street railroad corporations further than the present public service commission law intends that it shall be carried. The fact that a steam railroad happens at some given moment to own or control a majority of the capital stock of a trolley line, as to which such a question as is here involved arises, does not of itself alter the situation, or establish any material change in the obligations under which trolley lines, by whomsoever owned, stand toward the public in respect to freight transportation."

PENNSYLVANIA FIXES STATUS OF JITNEYS

A general ruling governing all auto-bus lines or jitneys in the State was issued on May 9 by the Public Service Commission of Pennsylvania. In part it is as follows:

Certificates of public convenience evidencing the approval of the commission will be "limited to the route and number of cars, and particularly to each automobile or auto-bus designated in the certificate."

Application may be made for the approval of additional cars, including substitutions and replacements, verified by affidavit; but certificates will be non-transferable.

Automobiles or auto-buses authorized to be common carriers shall have painted on each side of the vehicle three lines, containing the name of the person to whom certificate is issued, the words "auto-bus" and the number of the public service certificate.

Persons holding certificates will not be allowed to carry more persons than the seating capacity of the designated car, and the filed rates and charges must be posted in each car. The commission reserves the right to revoke any certificate.

TRANSPORTATION DEVELOPMENTS IN CALIFORNIA

Within a single week recently three significant things occurred in the transportation field in California. The Southern Pacific Company announced that it would take off certain passenger trains because jitney competition was so keen that there was no longer any profit for the steam lines. Contracts for carrying mail were awarded to jitneys between southern California cities. An ordinary stock automobile was driven from Los Angeles to San Francisco, a distance of 484 miles by rail, in three hours less time than is made by the fastest steam train between these points.

The jitneys are now affecting interurban steam line traffic in almost as serious a way as they at first affected urban systems. In the case of the mail contract award the jitneys by their competition first made it so unprofitable for the steam lines that the latter cut the service down to one train a day. The residents in the outlying towns who depended on the steam lines for the mails protested against the reduction in service, and the Postmaster-General turned the contracts over to the jitney lines. As to the ten-hour-and-forty-seven-minute run from Los Angeles to San Francisco, the run was made by a stock car over a route that is, at best, devious and somewhat rough. The significant fact, however, is that autos have repeatedly made the trip in time better than the fastest trains have made the run.

Toledo Rerouteing Plan Defeated.—The plan to take four of the eleven lines of the Toledo Railways & Light Company, Toledo, Ohio, from Summit Street and route them over Superior and St. Clair streets was defeated in the Toledo Council on May 8. This practically defeats the rerouteing plan that was prepared by a special committee of Council. Summit Street merchants opposed the plan from the beginning.

Inquiry Into Brooklyn Surface Equipment.—An inquiry into the sufficiency of the equipment of the surface lines of the Brooklyn (N. Y.) Rapid Transit System will be held by the Public Service Commission for the First District on May 15, on motion of Commissioner Travis H. Whitney. The commission will determine as a result of the hearing whether an order should be issued requiring the company to purchase additional cars.

Janitors Become Traffic Officers.—Janitors of four schools of Louisville, Ky., have been named by the Board of Education and have applied to the city officials for authorization to act as traffic officers before and after school hours. Three of the schools are located on much traveled street railway lines. The results of this manner of surveillance of the school children will be observed carefully during the remaining weeks of the school year. If the plan is deemed to be successful it will be carried out on a larger scale next year.

"The Public Be Pleased."—This is the title of an article by F. H. Sillick, comptroller of the Hudson & Manhattan Railroad, which appears in the May issue of *System*. Mr. Sillick emphasizes the value of training employees to be sincere, calm and courteous at all times. Among other things, he says: "Being square with your patrons is giving them efficient, courteous service and not 'public be pleased' cant. To gain the good-will of the public your attitude must be sincere. Three factors are essential to the successful management of any corporation—pleased capital, pleased labor and pleased patrons."

Suit Against Bellingham Jitneys.—The Puget Sound Traction, Light & Power Company has started suit against seventeen local jitney bus owners in Bellingham, Wash., alleging that the jitneys there are being operated in unlawful competition with the street railway system. An injunction is asked to enjoin the jitney service until such time as the operators see fit to comply with the city ordinance and the State law regulating jitney buses. The suit of the company follows closely a suit instituted by the jitney drivers to prevent the city ordinance from being enforced. This is now before the Supreme Court of the State.

Opinion on Sanitation.—According to an opinion written to the Public Service Commission of the State of Washington by Attorney General W. V. Tanner, as the result of an inquiry from the health department of the city of Spokane, a city of the first class may prevent the operation of street cars in a condition calculated to affect injuriously the health, safety or welfare of the inhabitants of the city. The Attorney General said: "If it can be established as a fact that a poorly ventilated car or a car not cleaned as provided in the city ordinance is a nuisance or is detrimental to the general health of the community, as distinguished from the convenience of the passengers, the city may properly prevent the use of such a car within the city limits."

Effective Brooklyn Safety Poster.—The Brooklyn (N. Y.) Rapid Transit Company has issued a number of very effective safety posters recently. One is entitled "More Haste—Less Speed." It gives a short account, from one of the Brooklyn papers, of an accident to a man who tried to board a moving car on Gates Avenue and then continues: "There are 1050 trips made by trolley cars on Gates Avenue between 7 o'clock in the morning and 7 o'clock in the evening. If this man had, without an accident, caught the car for which he was running, he would have saved, approximately 1¼ minutes. The chances are he will remain in the hospital for a week at least. During that time he will miss 7,350 Gates Avenue cars and perhaps be deprived of the use of his hand for a month. It is better to wait on the near side curb for the car we are going to get than to lie in the hospital and miss them all." This poster is being issued by the National Safety Council.

Portland Jitney Ordinance Amended.—The City Council of Portland, Ore., on April 26, passed the amendments to the original jitney ordinance. The changes have been pending for about two months. The jitneys are required to operate at least eight hours out of every twenty-four and to give continuous service during the eight hours. They may select any eight hours in twenty-four they desire. They are prohibited from stopping more than five minutes at either end of their route and except during the morning and evening rush hours are required to operate to each terminus of the route without turning back. The measure provides that the drivers may pay their licenses quarterly in advance instead of monthly in advance as at present. In case of a machine going out of business before the end of the quarter the city will refund the unearned part of the license. The city will not, however, make any refund of more than $4 on the $6 license for each quarter. Provision is made for tagging machines that are unsafe. An emergency clause was attached to the ordinance making its provisions enforceable at once.

Personal Mention

Mr. C. A. Leonard has been made purchasing agent of the Tampa (Fla.) Electric Company.

Mr. C. L. Howe has been appointed electrical engineer of the Tampa (Fla.) Electric Company.

Mr. J. M. Eaton, formerly purchasing agent of the Tampa (Fla.) Electric Company, is now in the Boston office of Stone & Webster.

Mr. James Orr, formerly chief engineer of the Tampa (Fla.) Electric Company, has been transferred to the Dallas (Tex.) Electric Company.

Mr. E. J. Seabom, formerly assistant treasurer of the Pensacola (Fla.) Electric Company, is now assistant treasurer of the Tampa (Fla.) Electric Company.

Mr. Harold G. Metcalf, Auburn, N. Y., has been elected president of the Auburn & Syracuse Electric Railroad, Syracuse, N. Y., to succeed Clifford D. Beebe.

Mr. H. E. Harley, formerly chief engineer of the power station of the Jacksonville (Fla.) Traction Company, has been appointed chief engineer of the power station of the Tampa (Fla.) Electric Company.

Mr. C. Peterson, heretofore line foreman of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., has been appointed superintendent of the line department of the company, reporting to Mr. C. P. Cooper, superintendent.

Mr. J. C. Nelson has been appointed general manager of the Gary & Interurban Railroad, Gary, Ind., to succeed Mr. A. C. Miller. Mr. Nelson was graduated from the University of Alabama and from Cornell University and was with Ford, Bacon & Davis, New York, for twelve years.

Mr. A. Baltzer, heretofore master mechanic of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., has been appointed electrical engineer of the company in charge of power house and rolling stock. He succeeds the late W. W. Chisholm.

Mr. R. A. Moore has been appointed general manager of the Aurora, Plainfield & Joliet Interurban Railway, Joliet, Ill., to succeed Mr. F. C. Eckmann, who has resigned to give his entire attention to the affairs of the Joliet & Eastern Traction Company. Mr. Moore will assume his duties on June 1.

Mr. LeRoy T. Harkness has been transferred by the Public Service Commission for the First District of New York from the position of assistant counsel in the legal department of the commission and has been placed in administrative and executive charge of all rapid transit matters, responsible directly to the commission.

Mr. Louis H. Palmer has been appointed acting general manager of the Eastern Pennsylvania Railways, Pottsville, Pa., to succeed W. B. Rockwell, deceased. Mr. Palmer has been general superintendent of the company. His previous railway and business connections were reviewed in the ELECTRIC RAILWAY JOURNAL of April 8 in connection with his appointment to the company.

Mr. John T. Corrigan has been promoted to supervisor of the division of the Kansas City (Mo.) Railways having Fifty-eighth and Harrison Streets as headquarters, formerly filled by Mr. Julien Harvey, recently made efficiency superintendent. Mr. Corrigan is a son of the late Bernard Corrigan, formerly president of the Metropolitan Street Railway and other Kansas City companies.

Mr. F. C. Eckmann, joint general manager of the Aurora, Plainfield & Joliet Railway and of the Joliet & Eastern Traction Company for the last two years, will sever his connection with the former company on June 1 and will give his entire attention to the system between Joliet and Chicago Heights, with his headquarters, as heretofore, in Joliet, Ill. Before taking charge of these two roads in 1914 Mr. Eckmann was general manager of the Joliet & Southern Traction Company, by which name the entire system was known before the division.

W. V. HILL

Mr. W. V. Hill, who, as noted in the ELECTRIC RAILWAY JOURNAL for May 6, has been appointed manager of the California Electric Railway Association, was born in Raleigh, N. C., on Oct. 2, 1877. Mr. Hill was educated in private and public schools, and left the high school in Asheville, N. C., at the age of fifteen to go to work as a telegraph messenger under his father. Later he became manager of a branch office of the Postal Telegraph Company at Richmond, Va. He was promoted and sent to Georgetown, Ky., to open a new Postal office, and later was again promoted and sent to Paris, Ky. When he was nineteen years of age Mr. Hill was recalled to Richmond, Va., to relieve his father. He worked in the Richmond office for five years, resigning to go to New York. There he worked with the Western Union and the Associated Press jointly for about a year, when he resigned to accept a position as night manager of the Postal Company at Norfolk, Va. Six months later he returned to New York to work with the Western Union and the Associated Press. In 1901 Mr. Hill was recommended by the officials of the Western Union to the late E. H. Harriman to install and operate a private wire which Mr. Harriman leased, connecting directly with his vast railway interests. In addition to handling the telegraphic work he accompanied Mr. Harriman as traveling secretary on numerous trips over the country. Mr. Hill resigned his position under Mr. Harriman after eight years of service and accepted a position as assistant to the general manager of the Los Angeles Pacific Railway. Fourteen months later he was promoted to the position of right-of-way, land and tax agent of the company, and when the eight electric railways at Los Angeles were consolidated in 1911, Mr. Hill was appointed tax and contract agent of the Pacific Electric Railway System, affiliated land companies, Visalia Electric Railroad, Fresno Traction Company, Stockton Electric Railroad, San Jose Railroads and Peninsula Railway. He continued with these companies in the capacity mentioned until May 1, 1916, when he was appointed manager of the California Electric Railway Association.

Mr. Edward N. Lake, managing engineer of the Krehbiel Company, and assisting engineers have been engaged by the board of control of the Kansas City (Mo.) Railways to make tests and suggest improvements of service. Their inquiry will extend to high-tension generating stations, high-tension conductors, stations and substations, low-tension conductors, car distribution and passenger traffic.

Mr. J. M. Ahearn, assistant master mechanic of the Ottawa (Ont.) Electric Railway, has been appointed assistant superintendent of the company, in charge of equipment. Mr. Ahearn has worked in almost every capacity in street railway work up to his present position and is familiar with the different branches of the work. He spent several years in electric railway work in the Western States and was for some time located in San Diego.

Mr. F. A. Alspach has been appointed tax agent of the Pacific Electric Railway, Los Angeles, Cal., to succeed Mr. W. V. Hill, tax and contract agent, who as noted previously in the ELECTRIC RAILWAY JOURNAL has resigned to become manager of the California Electric Railway Association. Hereafter contract work will be undertaken by the departments directly interested. Franchise and insurance records will be maintained by the tax department of the company as heretofore.

Mr. Milo R. Maltbie, former member of the Public Service Commission for the First District of New York, has been appointed by Mayor Mitchel of New York to be city chamberlain, succeeding Mr. Henry Bruère. The Mayor said that in inviting Mr. Maltbie to take the office he had had in mind securing for the city an expert and adviser in public service matters. In addition to the regular work of the chamberlain's office, the Mayor hopes to have Mr. Maltbie give special and constant attention to public service matters that come before the city administration.

Mr. Charles Harper Batchelor has been appointed traffic manager of the Toronto (Ont.) Civic Railway. Mr. Batchelor was born at Bradford, England, on May 18, 1885. He entered electric railway service in August, 1907. From April 9, 1909, to April 1, 1913, he was a conductor and motorman with the Bradford City Tramways, and motorman on the trackless electric system at Bradford. From April 20 to June 1, 1913, he served as a motorman with the Toronto (Ont.) Railway. Later he acted as controller man for the Toronto & York Radial Railway. From August, 1913, to March, 1916, he was roadmaster of the Toronto Civic Railway.

Mr. D. I. Clough, who has been appointed master mechanic of the East St. Louis & Suburban Railway, East St. Louis, Ill., was engaged in general electric railway construction from April 1, 1903, until September, 1910. From September, 1910, to March, 1912, he was master mechanic of the Central California Traction Company, at Stockton. From March, 1912, to February, 1914, he was with the General Electric Company, at Portland, in railway construction. From March 1, 1914, until March 15, 1916, he was master mechanic of the Oregon Electric Railway and the United Railways, Portland. On Aug. 15, 1915, his jurisdiction was extended over the Spokane & Inland Empire Railroad, Spokane, Wash. Mr. Clough has been connected with the East St. Louis & Surburban Railway at East St. Louis since March 15.

CHARLES N. BLACK

Mr. Charles N. Black, vice-president and general manager of the United Railroads of San Francisco, will sever his connection with that company on June 1 and thereafter will devote all of his time to the interests of the firm of Ford, Bacon & Davis, of which he is a member. In the announcement of his resignation he said that his only reason was because the business of the firm demands his presence in New York. Mr. Black is one of the best-known electric railway men in the country and has always been very active in association work, having been president of the American Electric Railway Association in 1913 and 1914 and a vice-president of the association from 1908 to 1913. Previous to 1907, when he went to San Francisco, he was vice-president and general manager of the Metropolitan Street Railway, Kansas City, Mo., as well as vice-president of the Kansas City Railway & Light Company and Kansas City Electric Light Company. He is a graduate of Princeton University in the Arts course, and after a post-graduate course in engineering in that university entered the employ of the Brush Electric Company and later went with the Westinghouse Electric & Manufacturing Company. He has been connected with Ford, Bacon & Davis since 1899. The San Francisco newspapers announce Mr. William von Phul, a member of the firm of Ford, Bacon & Davis, residing in New Orleans, as the probable successor of Mr. Black, but confirmation of this report could not be obtained. Mr. von Phul was formerly vice-president of the American Cities Company. As a member of the firm of Ford, Bacon & Davis, Mr. von Phul has followed closely the work of the United Railroads of San Francisco for the last ten years. He spent a year in that city after the fire, during which time he assisted in the reconstruction of the electric railway system and its conversion from cable power.

Mr. Charles A. Floyd, superintendent of the northwestern division of the Michigan Railway, Jackson, Mich., and formerly general manager of the Grand Rapids, Holland & Chicago Railway, Grand Rapids, Mich., has resigned, effective on June 1. He will after that date devote his entire time to the business of the Construction Supply Company, of which he is president. Mr. Floyd entered the electric railway business in 1901 in the offices of the Grand Rapids, Holland & Chicago Railway. Later he was made superintendent of the road, which was then a short suburban line connecting Holland and Macatawa Park, Mich. He held this position for two years, during which the road was extended to Grand Rapids. Mr. Floyd had charge of both its construction and operation. In 1904 he was also appointed purchasing agent and traffic manager of the company. In January, 1912, the Grand Rapids, Holland & Chicago Railway changed ownership and Mr. Floyd was made general manager. He held this position until the railway was made a part of the Michigan Railway System through the completion of the line between Kalamazoo and Grand Rapids, when he was appointed superintendent of the northwestern division.

OBITUARY

Willard Parker Hough, assistant structural engineer of the Brooklyn (N. Y.) Rapid Transit Company, and a member of the American Legion, died on May 8 from peritonitis. Mr. Hough was thirty-five years old.

John W. Wyman, manager of the "Sunshine department" of the Interborough Rapid Transit Company, New York, N. Y., who spent years visiting the sick employees of the company, died on April 19, in his seventy-fourth year.

Charles E. Cook, first president of the Acushnet (Mass.) Street Railway, died at his home in New Bedford, Mass., on April 23, at the age of eighty-two. He also was associated with the construction of the Dartmouth & Westport Street Railway.

Enos M. Barton, chairman of the board of directors of the Western Electric Company, New York, N. Y., died at Biloxi, Miss., on May 3, at the age of seventy-two. Mr. Barton was one of the founders of the Western Electric Company and served as its president for twenty years. Mr. Barton began work as a messenger in the telegraph office at Watertown, N. Y., when he was twelve years old. He was a telegraph operator in New York during the Civil War.

George G. Whitney, chief clerk of the Washington Railway & Electric Company, Washington, D. C., died on May 7 after a short illness, the immediate cause of death being diabetes. Mr. Whitney was a native of Nebraska, but had lived in Washington since he was three years old. He was educated in the grade schools of the National Capital, and upon graduation from the business high school entered the service of the Washington Railway & Electric Company, gradually working his way up through the clerical branches to the position of chief clerk, which he held for a number of years. Mr. Whitney was the first president of Company Section 4 of the American Electric Railway Association. He was also third vice-president of the American Electric Railway Accountants Association and a member of the board of governors of the Washington Railway Relief Association. Mr. Whitney was thirty-four years old. He is survived by his widow and three small children.

Henry Floy, electrical engineer and valuation expert, died suddenly at his residence in New York City on May 5. Mr. Floy was graduated from Cornell with the class of 1891, and during several years following graduation served with the Westinghouse company in its shop, engineering and sales departments. He resigned as manager of the Minneapolis office of the company in 1898 to open an office as consulting engineer in New York City, where he has since been located. Mr. Floy installed the first 25,000-volt underground transmission line at St. Paul, Minn., in 1900. Later he served in many important appraisal cases in New York City; Buffalo, N. Y.; Springfield, Mo.; Tucson, Ariz., etc. He was a frequent contributor to the technical press, and was the author of a number of volumes, including "The Colorado Springs Lighting Controversy," "High-Tension Underground Electric Cables," "Valuation of Public Utility Properties" and "Value for Rate Making." He was a member of the jury of awards at the St. Louis Exposition, a fellow of the American Institute of Engineers, and a member of the American Society of Civil Engineers, the National Electric Light Association, the American Electric Railway Association and the Illuminating Engineering Society.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Womelsdorf, Richland & Myerstown Street Railway, Womelsdorf, Pa.**—Application for a charter will be made by this company to construct a line from Womelsdorf via Newmantown and Richland to Myerstown, 7 miles, where it will connect with the Reading Transit & Light Company. Incorporators: Leroy Valentine, J. H. Mays, A. C. Klopp, Frank Rader and John L. Shultz, all of Lebanon.

FRANCHISES

New Haven, Conn.—The Connecticut Company has been granted authority by the Public Utilities Commission to double-track its Shelton Avenue line from Thompson Street to Harriet Street and its Winchester Avenue line from Division Street to Highland Street.

Hutchinson, Kan.—The Hutchinson Interurban Railway has received a franchise from the city commissioners to construct a single-track extension from Main Street east on Carpenter Street to Elm Street, north on Elm Street to Avenue F and west on Avenue F to Main Street.

Baltimore, Md.—At a recent hearing held before it, the Public Service Commission granted the request of the Maryland Electric Railways that it be permitted to exercise its franchise on St. Paul Street north of Merryman's Lane. It is stated that the Roland Park Company would practically finance the extension and pay all operating expenses for the next seven years.

Baltimore, Md.—The Public Service Commission of Maryland has authorized the United Railways & Electric Company to construct its proposed extension to Guilford.

Brookline, Mass.—The Boston Elevated Railway has been granted permission to relocate its tracks on Harvard Street. The company will establish a crosstown line on Harvard Street from Brookline Village to Allston.

Lynn, Mass.—The Bay State Street Railway has received a franchise from the Council to construct an extension on Rock Avenue from Hollingsworth Street to Grant Street, thence along Grant Street to Bay View Avenue to the present tracks on Hollingsworth Street.

***Ecorse, Mich.**—The Samuel A. Merchant Company has asked the Council for a franchise to construct a line in Ecorse.

Royal Oak, Mich.—At a recent election residents of Royal Oak approved the thirty-year franchise asked for by the Detroit, Pontiac & Owosso Railway. Dr. Oliver M. Lau, Detroit, is interested. [Nov. 6, '15.]

Brooklyn, N. Y.—The Brooklyn, Queens County & Suburban Railroad, a subsidiary of the Brooklyn Rapid Transit Company, has asked the Public Service Commission for the First District of New York for permission to construct an extension over Metropolitan Avenue from Dry Harbor Road to Jamaica Avenue, Jamaica.

Dunkirk, N. Y.—George Bullock, receiver of the Buffalo & Lake Erie Traction Company, has asked the Council to amend the company's franchise in Dunkirk by which permission will be given to remove the tracks of the city belt line. The company claims to be losing $15,000 a year by operating the belt line service.

Portland, Ore.—The Portland & Oregon City Railway has received from the Council a six-months' extension of time on its franchise to construct an extension from Oregon City to Portland.

***Richland, Pa.**—The Womelsdorf, Richland & Myerstown Street Railway, which proposes to construct a line from Womelsdorf to Myerstown, has asked the Council of Richland for a franchise to construct a line in that city. The company has also asked the Council of Myerstown for a franchise within the borough limits.

TRACK AND ROADWAY

Fort Smith Light & Traction Company, Fort Smith, Ark.—Surveys have been begun by this company for an extension of its Van Buren line to the Arkansas Zinc Company's smelter and probably to Alma.

Municipal Railways of San Francisco, San Francisco, Ca.—The Supervisors have directed the Board of Public Works to proceed without delay to complete the Church Street municipal line. Proceedings are also under way for the extension of the municipal railway on Market Street from Church Street to the Twin Peaks tunnel and from Van Ness Avenue to Kearny Street. The Board of Park Commissioners has unanimously refused to permit the extension of the Municipal Railway across Golden Gate Park on the lines proposed by the Public Utilities Committee of the Board of Supervisors. The Board stated, in taking this action, that it was not averse to permitting the railway to cross the park, but insisted that the route selected must meet with its approval. It was agreed that the Board would be willing to co-operate if the supervisors would adopt a course across the park at Twentieth Avenue.

Boise-Bruneau Railway, Boise, Idaho.—It is reported that construction of the proposed electric railway from Boise to Bruneau is assured with the final closing of the contract between the State Land Board and the Wickahoney Land & Water Company, which is promoting the line. The project will cost about $1,000,000 and is being backed by the Thayer-Moore Brokerage Company of Kansas City. [April 22, '16.]

Cairo & St. Louis Railway, Cairo, Ill.—The Public Utilities Commission of Illinois has approved the contract for the sale by the Cairo & St. Louis Railway to the Cairo Electric & Traction Company of electrical energy for the operation of the street car system and distributing system in Cairo, Mounds City and Mounds.

Kewanee & Eastern Electric Railway, Kewanee, Ill.—General offices have been established at Kewanee by the Kewanee & Eastern Electric Railway. The company proposes to construct a line from Kewanee to Magnolia via Modena and Castleton. C. G. Lampman, engineer. [April 3, '15.]

Iowa Railway & Light Company, Cedar Rapids, Iowa.—The municipal electric lighting plant of Adair will be taken over by the Iowa Railway & Light Company within a few weeks and 24-hour service will be inaugurated by the company.

Sioux City Service Company, Sioux City, Iowa.—In connection with proposed improvements to its lines this company contemplates the abandonment of its West Third Street line and the extension of its Sixth Street line from Pierce Street to Jackson Street, to converge with other lines at Fourth and Jackson Streets.

Kentucky Traction & Terminal Company, Lexington, Ky.—Among the improvements planned by this company this year is the reconstruction of its Dewees Street line.

Paducah (Ky.) Traction Company.—This company will construct double-track on Broadway from Fourth to Seventeenth Streets.

Bay State Street Railway, Boston, Mass.—This company has asked the Council of Haverhill for permission to abandon its line on Cedar Street.

Berkshire Street Railway, Pittsfield, Mass.—This company will construct new track on North Street from Bradford Street south and will also lay new track on West and Tuler Streets.

Detroit (Mich.) United Railway.—Work has been begun by this company on the construction of an extension on Forest Avenue from Gratiot Avenue to Cadillac Avenue, north to Warren Avenue and east to the city limits. Work will soon be begun on the construction of a line on Davison Road from Oakland Avenue in Highland Park to Joseph Campau Avenue in Hamtramck. Inasmuch as Davison Road is to be paved from Oakland Avenue to the Grand Trunk tracks the track construction between these points will be of the standard type for paved streets. The line will be of interurban construction from the Grand Trunk tracks to Joseph Campau Avenue.

Duluth-Superior Traction Company, Duluth, Minn.—Plans are being made by this company to extend its lines to the fair grounds in Superior. The company is also considering the double-tracking of its East End line from the courthouse to the Nemadji River.

Springfield (Mo.) Traction Company.—This company plans to construct an ornamental concrete viaduct at the entrance to Walnut Grove Park. The cost is estimated at $10,000. A. M. Torbitt, architect.

Belmont & Northern Traction Company, Lincoln, Neb.—This company advises that negotiations are now under way with the Lincoln Traction Company for the construction of its proposed line from Thirteenth Street and P Street, Lincoln, to Belmont. [Aug. 8, '14.]

St. John, (N. B.) Railway.—Residents of Simonds have asked the New Brunswick Legislature to compel the St. John Railway to carry out an agreement made in 1914 for the extension of the company's lines to Simonds.

United Traction Company, Albany, N. Y.—Plans are being considered by this company for the construction of an extension over Temperance Hill, Troy.

New York, N. Y.—The Public Service Commission for the First District of New York is advertising for bids for the construction of two more sections of rapid transit railroads under the Dual System, being Section No. 2 of Route No. 8, a part of the Fourteenth Street-Eastern District subway, and Route No. 31, being the Livonia Avenue elevated extension of the Eastern Parkway subway in Brooklyn, the first for operation by the New York Municipal Railway Corporation and the latter by the Interborough Rapid Transit Company. These two contracts will complete the letting of construction work on both lines. Bids on Section No. 2 of Route No. 8 will be opened on May 25, and on Route No. 31 on May 23.

Interborough Rapid Transit Company, New York, N. Y.—The contract for the Westchester Avenue branch of the new subway has been signed. The contractor, Lawrence C. Manuell, will proceed with the work of construction without delay. Work on the Lexington Avenue line which extends from the Grand Central Station to One Hundred and Thirty-eighth Street, where it will connect with the Westchester Avenue line, is nearly completed, and it is expected that trains will be in operation before the end of the year. The Jerome Avenue line, which also connects at One Hundred and Thirty-eighth Street with the Lexington Avenue branch and extends north to Woodlawn, 1½ miles south of Yonkers, is likewise nearly completed and will be in operation in the early fall.

***Akron, Ohio.**—Attorney General Turner has approved a lease of the bank of the Ohio Canal between Akron and New London to Frank R. Fauver and Glenn Brown. It is said that these men plan to construct an electric railway between these two points.

Oklahoma (Okla.) Railway.—This company reports that it is building a 16-mile extension from Edmond to Guthrie.

Lake Erie & Northern Railway, Brantford, Ont.—It is reported that operation will be begun on this company's extension between Brantford and Port Dover on May 15.

***Portland, Ore.**—Plans are being considered for the construction of an electric railway to extend from Berkely Station, through Sunnyside easterly, at the head of Pleasant Valley, to tap a timbered area in Clackamas County. J. D. Lee, L. H. Chambers and F. Viereck, land owners on the southern slope of Mount Scott, are interested.

Portland Railway, Light & Power Company, Portland, Ore.—It is reported that an agreement has been reached between the Portland Railway, Light & Power Company and the Oregon-Washington Railroad & Navigation Company, whereby both corporations will abide by the decision of the City Council in the division of that portion of the cost which they will be required to pay for the Sandy Boulevard viaducts in the proposed Oregon-Washington Railroad & Navigation Company regrade. The estimate for the construction of the eight viaducts over the tracks of the railway is $560,000, of which 60 per cent will be paid by the railways, 20 per cent by the city, and 20 per cent by the property owners benefited.

Lancaster & Berks Electric Railway, Lancaster, Pa.—Work has been begun by this company on the construction of its proposed line from Womelsdorf to Kleinfeltersville. [Jan. 22, '16.]

Montreal & Southern Counties Railway, Montreal, Que.—Operation has been begun on this company's extension to Granby.

Montreal (Que.) Tramways.—This company has placed an order with the Standard Underground Cable Company of Canada, Ltd., Hamilton, for 1,500,000 c.m. paper insulated lead covered single conductor cable for the Bleury Street section of its underground conduit system.

Houston, Richmond & Western Traction Company, Houston, Tex.—Announcement was recently made that construction would be begun by this company on May 10 on its first division out of Gonzales. The company proposes to construct a line between San Antonio with an extension from Victoria to Austin. C. C. Godman, Kansas City, president. [March 18, '16.]

***Tazewell, Va.**—It is reported that a company is being organized to construct an electric railway from Tazewell to New Tazewell, about 2 miles. The Board of Trade may give information.

Tacoma Railway & Power Company, Tacoma, Wash.—Work will be begun in June or July on this company's proposed line across the Tacoma Avenue bridge fill. The proposed line will connect the South End line with Broadway, via Jefferson Avenue.

Charleston (W. Va.) Interurban Railroad.—The extension of this company's line from Cabin Creek Junction to Montgomery, a distance of 10 miles, has been suspended owing to the high price and difficulty of obtaining material.

SHOPS AND BUILDINGS

Union Traction Company, Anderson, Ind.—This company will begin the erection of a temporary station on its building site at the corner of Meredian and Twelfth Streets, Anderson. The company must vacate its present quarters by June 1.

Bridgeton & Millville Traction Company, Bridgeton, N. J.—This company will construct a new carhouse in Bridgeton in the near future.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—It is reported that a new station will be built by this company at Standard to replace one recently destroyed by fire.

Toronto (Ont.) Suburban Railway.—This company will erect an office building at 938 Keele Street, Toronto. The structure will be 109¼ ft. long on one side, 100 ft. long on the other side and 28 ft. wide, one story high. The foundation walls will be of concrete and the main building walls of brick. The basement will contain boiler and coal rooms and a fireproof vault. The rest of the basement will be used for stores. The ground floor will contain a waiting room and express room, while the upper floor will contain offices, conductors' and motormen's room and lavatories.

Monongahela Valley Traction Company, Fairmont, W. Va.—It is reported that work will soon be begun by this company on the construction of a new three-story station building on Main Avenue, Weston.

POWER HOUSES AND SUBSTATIONS

Tampa & Eastern Traction Company, Tampa, Fla.—This company, which proposes to construct a line from Tampa to Lakeland, contemplates the construction of a power plant at Seffner. E. J. Binford, Tampa, manager.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—It is reported that this company has awarded the contract for the construction of a new power plant in Perry to W. J. Zitterell & Company of Webster City. The plant will cost about $100,000.

Public Service Railway, Newark, N. J.—This company has ordered one 35,000-kw. turbo-generator from the General Electric Company, for use in the Essex Station.

Carbon Transit Company, Mauch Chunk, Pa.—This company is in the market for a second-hand 300-kw. unit. J. F. Geiser, general manager.

Manufactures and Supplies

WIRE MANUFACTURERS DOING LARGE BUSINESS

Reports from the various wire and cable manufacturers, including those who have refused to accept war orders, concur in revealing a general condition of full capacity production in the factories. Although the railway wire orders comprise a fairly comfortable portion of the business, the greater bulk of the requirements are for the power and lighting fields, because of the much smaller amount of new railway transmission and line construction undertaken at present, particularly in the intensely populated East, where most of the railways are ordering only just what they urgently need in order to maintain their equipment in proper operating condition. Although the manufacturers are feeling the customary spring surge of orders incident to the return of seasonable construction weather, this year the annual spring wave has arrived somewhat earlier, owing to an endeavor on the part of the buyer to anticipate the rising prices of material. One company records last February as having been the best month, March and April also having been strong periods, and predicts the continuance of a good demand from those companies which have not yet followed the example of the earlier buyers. Another large concern describes the peak of orders as being more in the line of fine wire which is not very extensively used by the electric railways.

As a natural result of the war demand for copper, wire prices have increased about 60 per cent over last year, the present base price of bare copper wire being about 32 cents per pound as compared with about 20 cents per pound a year ago, and that of weatherproof wire about 31 cents as compared with 19 cents a year ago. In addition to copper costs the high cost of insulating materials has contributed toward the advanced price of protected wires and cables. In one plant, where aluminum wire is manufactured, production facilities are already crowded to the limits, and the company is no longer quoting prices on its material. In this case the great demand for the aluminum wire already under order now was believed to be partly caused by the market scarcity of copper. An interesting counter-tendency, however, is indicated by a recent instance where copper transmission wires were substituted for the higher priced aluminum wires, the latter being taken down from the line and sold for scrap.

Retardation of deliveries have been a general and serious complaint. As a typical example of the condition of deliveries as affecting prices, the following schedule now offered by a large concern may be cited: May deliveries in bare copper were 33¾ cents per pound; June deliveries, 32¾ cents; July deliveries, 32½ cents and August deliveries, 32¼ cents. One manufacturer is not quoting sooner than for June deliveries, and still another company refuses to deliver any orders before the fall, except to its biggest customers.

ROLLING STOCK

Berwick & Nescopeck Street Railway, Berwick, Pa., is considering the purchase of two single-truck cars.

Shore Line Electric Railway, Norwich, Conn., has ordered two 44-ft. freight car bodies from the Wason Manufacturing Company.

Quebec Railway, Light & Power Company, Quebec, is building four double-truck pay-as-you-enter city cars at its Ste. Anne de Beaupré shops.

United Traction Company, Albany, N. Y., has ordered from the Laconia Car Company ten single-truck cars of the same type as its last order.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is reported as having ordered 100 trucks from the Baldwin Locomotive Works.

Tri-City Railway, Davenport, Iowa, has ordered three city cars from the St. Louis Car Company and one single-truck snow plow from the McGuire-Cummings Manufacturing Company.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont., has ordered two single-truck, double end, pay-as-you-enter cars from the Preston Car & Coach Company.

Montoursville (Pa.) Passenger Railway is in the market for double-truck motor cars of ten-ton capacity for hauling crushed stone and sand.

Kansas City (Mo.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of March 25 as having ordered fifty cars from the St. Louis Car Company, have increased the total order to seventy-five cars.

Southern Cambria Railway, Johnstown, Pa., has ordered from the Niles Car & Manufacturing Company two 50-ft. cars to be equipped with Baldwin trucks, G. E. 205 motors and G. E. Type K control.

Three Rivers Traction Company, Three Rivers, Que., has ordered from the Ottawa Car Manufacturing Company two single-truck, single-end, one-man, near-side cars and one single-truck, double-end, one-man, near-side car, to be equipped with Brill radiax trucks.

Worcester Consolidated Street Railway, Worcester, Mass., has just received from the Osgood-Bradley Car Company a sample prepayment car for operation on the Boynton Street-Elm Park line. If operating results prove satisfactory additional cars of the same type will be ordered.

San Francisco-Oakland Terminal Railways, Oakland, Cal., has applied to the Railroad Commission of California for permission to issue car trust certificates to provide funds with which to purchase twenty steel pay-as-you-enter cars and build twelve center-entrance, pay-as-you-enter cars for express service between Oakland and Berkeley.

Salt Lake & Los Angeles Railway, Salt Lake City, Utah, will probably be in the market soon for new all-steel cars in connection with the change in motive power on its line from steam to electricity. At present the company has three locomotives and twenty-four cars. H. A. Strauss, Harris Trust Building, Chicago, is consulting engineer.

New York (N. Y.) Railways has placed an order for seventy car bodies with the Southern Car Company. These will be used for storage battery operation and are to be of the same general type as the storage battery cars now in operation. The cars are expected to be in service within six months and are to replace the horse cars now in operation on Avenue C and Madison Street.

Schenectady (N. Y.) Railway has ordered ten 50-ft. center-entrance, all steel city cars and six 48-ft. all-steel interurban cars from the Cincinnati Car Company, through the W. R. Kerschner Company, Eastern sales agent. The city cars are to be duplicates of the cars now being built by the Cincinnati Car Company for the New York State Railways, Rochester Lines, and the interurban cars are to be duplicates of those under construction for the Utica Lines.

Toledo Railways & Light Company, Toledo, Ohio, through H. L. Doherty & Company, has ordered fifty cars, with an option to increase the number to one hundred, from the G. C. Kuhlman Car Company. The cars will be of the Cleveland type, with a few changes and will be equipped with Brill trucks; Westinghouse 2-motor equipment, H. L. field control and air-brakes; Tomlinson couplers, Smith heaters and National Pneumatic door control. It is planned to operate two-car trains during the rush hours.

TRADE NOTES

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip with ventilators the thirty cars now being built by The J. G. Brill Company for the Boston Elevated Railway.

The J. G. Brill Company, Philadelphia, Pa., has received a $65,000 order from the Brooklyn Rapid Transit Company, Brooklyn, N. Y., for inside-hung brake riggings for 800 pairs of 22-E trucks for use on double-truck cars now in operation, which are equipped with air brakes.

Joseph A. Horne, general superintendent of the Yale & Towne Manufacturing Company, New York, has been elected second vice-president. Mr. Horne, who is also a director, has the entire management of the works at Stamford, Conn., and of all manufacturing operations of the company.

Holden & White, Chicago, Ill., have received orders from the following railways for Miller Nonarc trolley shoes: Indianapolis Traction & Terminal Company, Des Moines City Railway, Waterloo, Cedar Falls & Northern Railway, Chicago & West Towns Railway, Alton & Jacksonville Railway, Chicago, and Harvard & Geneva Lake Railway. This company has appointed the U. S. Metal & Manufacturing Company as district representative in the Atlantic Coast States from New England to Florida. This announcement corrects an item which appeared in last week's issue, and which stated erroneously that Holden & White are representing the U. S. Metal & Manufacturing Company, whereas the latter company is really representing the former.

Samuel M. Vauclain, vice-president of the Baldwin Locomotive Works, has been elected a director of the Westinghouse Electric & Manufacturing Company, to succeed C. F. Brooker, who resigned. Mr. Vauclain is also a director of the Standard Steel Works, Midvale Steel & Ordnance Company, Cambria Steel Company, Philadelphia Trust Company, and a number of other well-known concerns.

William R. Garton, New York, N. Y., sales engineer with offices at 299 Broadway, has been elected vice-president of the Lansden Company, Inc., Brooklyn, N. Y., manufacturer of commercial electric vehicles. This company states that it has over 2000 vehicles in service, many of which are in the Philippine Islands, Australasia, England, France and other European countries, as well as in Central and South America.

Niles Car & Manufacturing Company, Niles, Ohio, has opened a salesroom at 1904 East Thirteenth Street, Cleveland, Ohio, for the sale of its new auto trucks, with E. M. Jones as manager. The company has arranged to make two models for the present. One is designed to carry from three-fourths of a ton to a ton, and the other, from two to two and a half tons. These two types are equipped with worm drive, with all parts of standard design. Service stations will be opened in various cities and it is said the trucks will be sold under prevailing prices through this plan.

Stone & Webster Engineering Corporation, Boston, Mass., at present has under construction approximately 125,000 kw. in capacity of electric railway and central station steam plants. One of the largest of these in the railway field is a 35,000 kw. addition to the South Boston station of the Boston Elevated Railway, together with the building of a 4000-kw. rotary converter substation at Dewey Square, Boston, which will be used in connection with the operation of the Dorchester tunnel. A 15,000 kw. extension of the Lowellville, Ohio, station of the Republic Railway & Light Company is nearing completion, and work is under way upon a large terminal station at Dallas, Tex., for the Dallas Interurban Terminal Association.

ADVERTISING LITERATURE

Underwriters' Laboratories, Chicago, Ill., have issued a booklet which describes the organization, purpose and methods of this concern. Laboratories are maintained in a number of cities throughout the United States for the examination and testing of appliances and devices. Whenever reports are ready to be issued the favorable opinion is followed up by one of the following three forms of supervision over goods marketed under the approval. The oldest form is the re-examination service, in which the manufacturer agrees, during the continuance of the approval, to pay certain fees annually, with which the laboratories defray the cost of obtaining samples in the open market, and of making examinations and tests one or more times a year. The second form of supervision is the instruction service which includes regular and frequent examinations and tests of products at factories by engineers of the laboratories together with supplementary examinations at the laboratories of samples purchased in the open market. This forms a countercheck on the factory inspection work. The label service, which is the third form of supervision, consists of inspections of devices and materials at the factory and the labeling of standard goods by stamps, transfers or labels whereby they may be recognized wherever found and, in addition, of systematic supplementary examinations and tests of samples of labeled goods purchased in the open market. The booklet also illustrates and lists the prices of the various types of labels.

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PSYCHOLOGICAL TESTS FOR MOTORMEN

It is some four years ago that Professor Münsterberg outlined his tests for motormen. They were planned originally because of several striking instances of "man failure" in railway service, which indicated that the attention of the operator of the car wandered at a critical moment from his work and his mind failed to grasp a situation which required action on his part. The general subject was brought to the attention of a number of prominent psychologists by Martin J. Insull, now vice-president Middle West Utilities Company, and Professor Münsterberg invented the apparatus described in his book on "Psychology and Industrial Efficiency." So far as we know, the only company to adopt this equipment has been the Dallas Consolidated Electric Street Railway, but, according to P. W. Gerhardt, superintendent, in a paper presented at the Galveston meeting this week and published elsewhere in this issue, the use of this test apparatus and of other psychological tests for prospective employees introduced on the line has been satisfactory. The plan is certainly an ingenious one, although we believe that many managers will consider that careful observation of the action of a man in actual service of the road will be at least equally as valuable as that with a test model.

REGULATING RATES UPWARD

Bowing to the final prevailing opinion of the Court of Appeals, the up-State New York Public Service Commission has finally allowed the Ulster & Delaware Railroad to increase its mileage-book rates 0.9 cent above the maximum of 2 cents a mile fixed by the old railroad law. This enforced action at last cancels a distinct reversion by the New York commission from constructive regulation to the old practice of inexperienced legislative domination over rates. The old 2-cent maximum rate fixed by the New York Legislature before commission regulation began in the State, which rate the New York body last summer refused to exceed, was simply a makeshift guide pending the installation of more scientific rate-making methods, and the commission was not justified in claiming to be limited thereby. It is, of course, wise for administrative bodies to exercise constraint in interpreting doubtful provisions of law relating to their own powers, but it is also necessary for them to have a clear understanding of regulatory theory and the intent of their governing laws. The idea that commissions are free to regulate rates only downward from an old arbitrary maximum limit fixed by legislative enactment is a travesty upon justice, and we hope that the courts have now made this point clear to the excessively timid minds of the New York commissioners. One single official body to handle the entire rate question and to regulate rates either upward or downward as justice demands, forms the real basis of regulation, and the New York Commission will do well in the future to display eagerness rather than reluctance in the carrying out of its duties to all parties concerned.

TERMINALS AND TRAFFIC CONGESTION

The completion of the great Public Service terminal in Newark, N. J., is an important event, not only locally but as one solution of a most perplexing and complicated problem, namely, How are cars to be handled in the business districts of large cities? No general solution of this problem is possible because cities are as characteristically different as are individuals. Where it is possible to do so, the simplest plan is to spread out the downtown traffic by routeing no more cars through the congested centers than is absolutely necessary. If outlying points can be connected by crosstown lines which do not pass through the business districts congestion can be reduced somewhat. This procedure is being followed in many important cities. There is, however, a traditional desire on the part of patrons to go through the business districts, even when it is not necessary. An educational campaign must be conducted, therefore, whenever extensive rerouteing is contemplated. On first thought it would appear that a central terminal like that in Newark would increase rather than decrease congestion, as it seems to involve a deliberate bringing of many lines to the same point. Actually, it does not do this on account of the peculiar local transportation conditions. In spite of its large population, Newark is a city of one restricted business district from which the lines radiate somewhat like the ribs of a fan. It is practically necessary for all lines to pass near, or to terminate in, the business center. A great deal of the traffic is with outlying towns of importance which border closely on the city. It was this traffic, superimposed upon the local traffic, which produced an unbearable congestion. The merits of the terminal plan as adopted in Newark are, first, that the long-distance and local traffics are separated, and, second, that a considerable proportion of the cars are loaded and unloaded upon the company's property, where all modern devices for expediting traffic can be utilized without interference from vehicular street traffic. By the use of a subway and elevated structure it has been possible to deflect the suburban traffic from the streets without congestion, and the use of train floors on two levels, with a concourse between, has provided for rapid loading and unloading. Coincidently with the inauguration of the new service, some rerouteing has been carried out with the purpose of averaging the downtown traffic density, thus making the most of the present opportunity to prepare for future growth. All of this has been done after the most painstaking collection and study of traffic data, and this journal shares the expectation of the management that the terminal itself, and the other improvements which it made possible, will be increasingly appreciated by the people of central New Jersey.

COMBINATIONS FOR EXPORT TRADE

The European war has shown our unpreparedness in other directions than in a purely military way and has turned topsy-turvy some of the pet ideas of the political reformers who have had a great deal to do with the direction of the policies of this country during the past few years. For instance, we have been taught that combinations of capital designed to secure monopolies or practical monopolies in transportation or industrial lines have been most iniquitous. Interlocking directorates are evidence of an effort to throttle trade, and holding companies are anathema, even when they control public utilities whose rates are subject to regulation by commissions. Combinations of labor to raise wages are permissible, but combinations of capital to raise prices are punishable under the penal code.

The researches of the Federal Trade Commission, however, initiated to determine the means by which American manufacturers can extend their export trade now and after the war, has led to some surprising discoveries. It is found, for example, that it has been upon the same system of combinations and price agreements which have been condemned here that the foreign manufacturers have been building up extensive trade abroad. Indeed, in many cases, these combinations have not been limited by the boundaries of any one country, but have been international in character. According to the Federal Trade report, it has been through just such a combination as those described that a large export business has been built up in the electrical apparatus field by the two leading German electrical manufacturers. More than one-half of the coal and coke exported from Germany has been sold by one central agency in that country, and practically all of the iron and steel export business of Germany has been conducted through a single selling agency. Much the same condition has existed in Great Britain, as well as in France and Belgium. Even Japan has its central export agencies controlling the output and sale of certain of its manufacturing, mining and merchandising enterprises. Nor have these organizations been confined to the activities of selling alone. There are corresponding combinations, encouraged by the governments of many of the different countries, to conduct buying, and they have succeeded in fixing the price at which the individual American producer has been able to dispose of his goods abroad.

In view of these facts, the Federal Trade Commission has reached the conclusion that Congress should definitely declare that the existing law does not forbid similar co-operation among American manufacturers for export trade. At present, uncertainty as to the extent to which the law covers foreign business deters American manufacturers and producers from developing effective export organizations. The commission believes that permission of this kind would not permit the manufacturers to exploit the home market or act unfairly against individual American exporters in foreign trade, and it urges all interested in this development of the country's business to impress their ideas on Congress, so that the necessary legislation can be secured. Undoubtedly, the plan proposed will assist greatly to establish our manufacturers on an equal basis with those in other countries and thus help to develop the foreign business which has almost been forced upon this country as the result of the war. While this unnatural condition continues, legislation of this kind may not be so necessary, but with the close of the war, it would be very desirable to have in operation export organizations similar to those possessed by our foreign competitors, so that the American producer will not be handicapped as he has been in this direction in the past.

ENGINEERS AND PREPAREDNESS

The turn-out of the engineering profession in the parade in New York City last Saturday is significant not only as showing the patriotism of the profession at large, but in indicating that a great body of trained men will put themselves at their country's service on short notice. The engineer, taking that term in its broadest signification, is going to be an extraordinarily important factor in the next war, as he has been in the one now wrecking a hemisphere. Battles are won not by waving swords in a wild charge against the serried ranks of the foe, but by organizing the production of beautifully fused shrapnel and high explosive shell, and launching them with a mathematical precision that leaves no serried ranks to contest the advance. The man with the rifle still counts, as he always will, yet he must wait for the engineer who plans, and the skilled artisan who executes, to make his way passable. It is for this reason that the engineering professions are so important to that national preparedness which, thank Heaven, is now on the road to becoming a reality in the not distant future.

A remark recently made by a distinguished past-president of the American Institute of Electrical Engineers is worth mentioning in this connection. He suggested that although one instinctively thinks of the lawyer as leading in political and civic movements, yet in the last analysis the lawyer's mind is trained to work in a beautifully qualitative analysis of situations, invaluable in estimating the general relations of affairs, while the engineer's mind is trained to think quantitatively, grasping with instinctive precision elements of force and balance in his physical environment. Therefore, when it comes to the precise organization of men and material to meet a given situation, it is the engineer whose qualities of mental training ought to make him superlatively useful, while his legal colleague may excel in grasping the motives which lead to the determination of strategy.

Along the line of transportation in particular, which determines the success of mobilization and supplying the armies in the field, engineers can work with peculiar success, especially if they have been trained in the problems of this particular work, and transportation is now more than ever before the fundamental requirement of successsful war on account of the enormous bodies of men involved and the huge supplies of munitions which must be put ready at their hands. It behooves American engineers, therefore, to get together in a permanent effort to increase the military efficiency of their country. Their march last week was only a pledge of loyalty to be redeemed by persistent and organized effort until the country is ready to meet, if the dire need should arise, its enemies within and without, and to smite them without the unnecessary loss of a man, a shell or an hour of time.

PASSING OF THE HORSE CAR IN NEW YORK

What proof can Chicago now offer that New York is but a backward village? How will Philadelphia repel the traditional slander as to her slowness? What will replace the old reliable resource of countless comedians and joke writers—now that the date has been set for the disappearance of the horse car from the streets of New York? It is well enough to laud this latest triumph of the storage-battery car, but in the round of ribald comment that has already begun upon this happening we shall hope to find here and there a word of kindlier requiem. Is there none so poor to do the horse car reverence? Probably not, for in the affairs of the world in general and the business of transportation in particular

> . . . . The wiser mind
> Mourns less for what age takes away
> Than what it leaves behind.

May we not, however, and should we not in simple justice, at least credit the horse car with being one of those ladder rungs by which St. Augustine in his famous passage—"*De vitiis nostris scalam nobis facimus, si vitia calcamus*"—tells us that we may rise to higher things? Efficiency first, by all means—though it is a doctrine that sharpens the intellect more than it softens the heart. And we whose lives lie mainly in this century should remember that while the horse car is extinct outside of New York, and about to vanish from that territory, there are many men now living who cherish the kindliest recollections of horse-car days. Keeping a few horses moderately well shod and maintaining the strips of strap-iron on which the horse car ran was an easy life compared with the trials of present-day transportation. The pioneers of urban transportation, if no others, will feel the pathos of these lines by William Watson, written, it would seem, with foresight of the passing of New York's last horse car:

> Onward the chariot of the Untarrying moves;
> Nor day divulges him nor night conceals;
> Thou hear'st the echo of unreturning hooves
> And thunder of irrevocable wheels.

EXPLAINING SERVICE CHANGES

The mere announcement of a contemplated change in service generally carries news of great interest to the public, but it is often possible to go much farther than this toward creating an appreciation on the part of passengers of the advantages of such changes from the transportation point of view. Thus, the Boston Elevated Railway has lately issued various bulletins of service changes in its cars for the benefit of patrons, and in the wording of these announcements the superintendent of traffic goes out of his way to make the meaning of such changes clear and to point out just how the service will be improved by the announced modifications.

These bulletins discuss such points as the previous headway on lines affected, the improved facilities resulting from any reduction in car intervals, the increase in seating capacity in totals and percentages for both normal and rush hours, provision of extra service in rush hours and changes in transfer points associated with the introduction of additional service. In one interesting case where it was decided to divert cars on two lines via a route 0.29 mile longer than before, the point was made that this would be unlikely to result in a lengthened running time, for the reason that the transfer of rolling stock movement would take place from a line where seventy-two cars per hour were operated to a line carrying but twelve cars per hour. Such a change, it was explained, would tend to result in freer movement. In another case, where the more balanced headway was substituted for a somewhat irregular schedule, the bulletin showed that this would improve the facility of transfer at an important station, and thus materially contribute to the shortening of the time of journeying between points separated by a transfer.

Publicity material of this kind is read with interest by a large number of patrons, and the opportunities thus afforded to give them some insight into the problems of rendering service are indeed well worth utilizing. Nothing like the throwing of bouquets need be attempted, and the use of many figures in such bulletins depends almost entirely upon the opportunity for interpretation. Some figures, of course, are necessary, and if pithy explanations, couched in terms easily understood by the average passenger, are supplied, there is no question that the trouble taken to set forth the effect of service changes on the public's convenience is well warranted. It is an eye-opener to most riders to learn that so many scores of cars per hour are normally provided, or that the service is increased by specific amounts in the rush period. The patron, perhaps, senses the latter provision, but is often surprised to find how many cars an hour actually are run over the rails in a given district in those periods of the day where short waits are occasionally his fortune. This sort of publicity is useful in bringing the patrons to a better understanding and also to a better use of the facilities which are possible with the existing volume of revenue. A service change furnishes an excellent occasion for such educational propaganda.

Traffic Development on the Scranton & Binghamton Railroad

The Methods Used to Stimulate Receipts on This Interurban Line Have Brought a Traffic of 82,000 Passengers per Mile of Road, the Returns from Operations Other than Handling Passengers Amounting to 23 Per Cent of Gross Receipts

In the heart of the anthracite coal mining region of northeastern Pennsylvania is situated the city of Scranton, whose phenomenal growth in population, resources and wealth, since it became a city about fifty years ago, ranks it as the third largest community in the State. Naturally, its progress has been reflected in the tributary territory, and with the recent rapid exploitation of the coal mining resources and the development of many industrial plants attracted to the locality by the numerous natural advantages, the need of adequate common carriers has become pressing.

To meet this need the properties which now comprise the Scranton & Binghamton Railroad were organized, being conceived with the idea of providing more frequent and satisfactory transportation facilities between Scranton and the numerous thriving towns and villages scattered through the rich agricultural district to the north. The enterprise had for its ultimate objective the connection of Scranton, by means of a high-speed electric railway system, with the flourishing manufacturing city of Binghamton, N. Y., as well as the provision of passenger and freight service suitable for the thickly-populated intermediate territory. Much has been accomplished since the project was launched. The properties, which made a modest beginning eight years ago under the name of the Northern Electric Street Railway Company, have been successively taken over by the Scranton & Binghamton Traction Company and the Scranton & Binghamton Railroad Company in order to permit an enlarged scope of operations, and at the present time there is being operated a high-speed interurban railroad from Scranton, Pa., to Montrose, Pa., a distance of 43 miles, together with a 7-mile branch to Lake Winola, Pa. In addition, the company has purchased the entire capital stock of the Binghamton Railway Company, which operates about 50 miles of street railway in the city of Binghamton, N. Y., including extensions to several near-by villages. It will, therefore, be seen that the Scranton & Binghamton Railroad Company controls approximately 100 miles of street and interurban railway and has under construction an extension of its interurban tracks to the New York State line for the establishment of physical connection between its two systems, the latter work being planned for completion late during the current year.

GILBOY & BARRETT
CAFE
LOBSTER
McHugh
HOTEL

SCRANTON & BINGHAMTON TRAFFIC—PASSENGER TERMINAL AT SCRANTON

The interurban mileage extending north of Scranton has been built in accordance with a policy of gradual extension, under which each section of the line, as soon as it was completed, has been placed in revenue-producing service. This has been done not only because each section would thus carry the fixed charges upon it, but also for the purpose of beginning intensive development of its traffic resources at the earliest possible moment. A large share of the company's success has been ascribed to the latter feature, as exemplified by the record of the interurban line for the year ending June 30, 1915, during which period 2,201,430 passengers were carried on the 27 miles of interurban road then in operation. Since the rates of fare ranged from 5 cents to $1.05, the receipts from passenger traffic amounted to $220,476.59. The results of the company's outside activities are reflected by the receipts from milk and from express traffic for the same period, these amounting to $31,980.26, while the sale of current and miscel-

SCRANTON & BINGHAMTON TRAFFIC—POWER STATION AND REPAIR SHOP AT DALTON

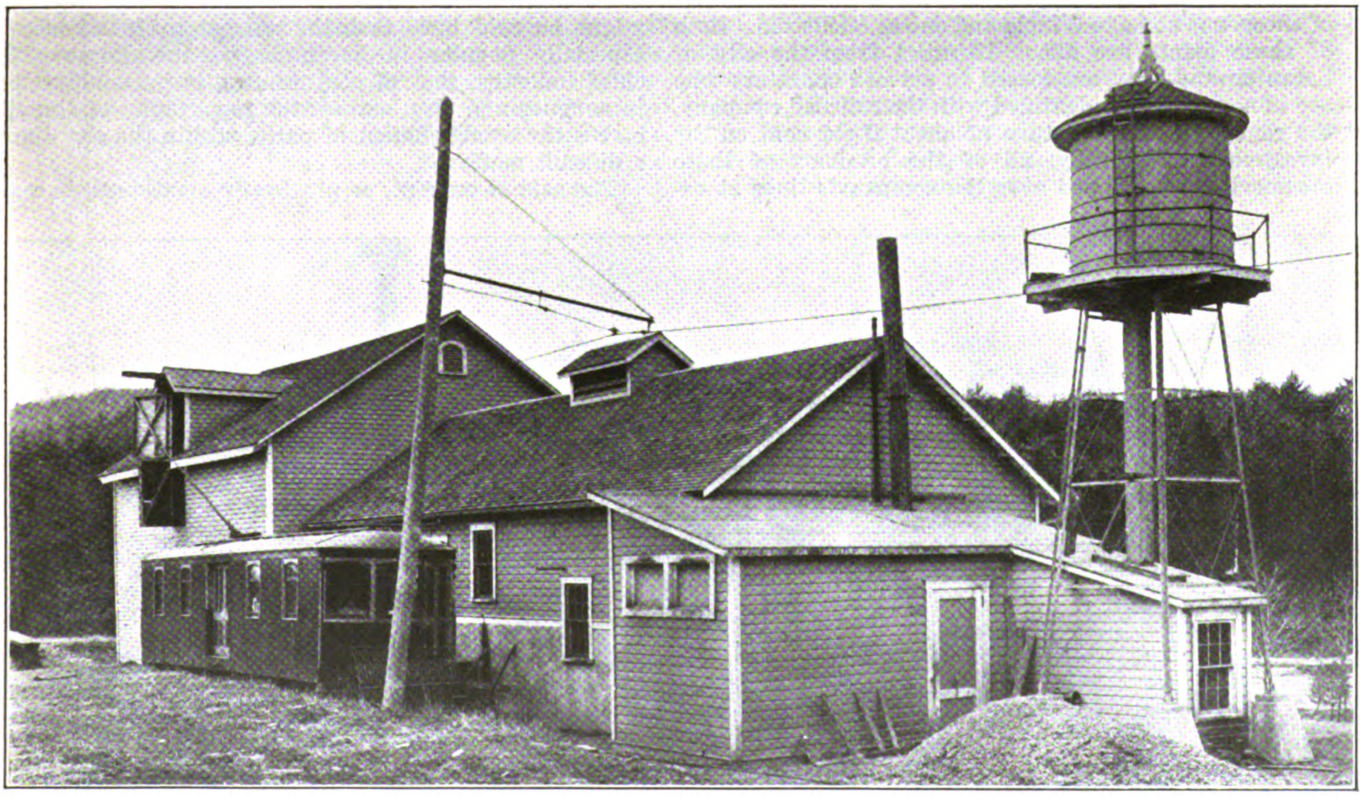
laneous operations brought $32,459.90. Together, the two latter items amount to no less than 23 per cent of the total receipts.

OUTSIDE ACTIVITIES

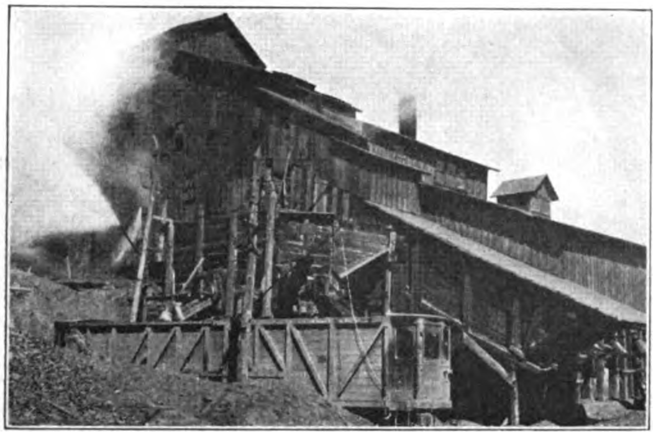
It should be said here that, with the exception of the sale of current for commercial purposes, all of the outside activities of the company have in view the common end of increasing freight, express and passenger traffic over its lines. In no instance does the company deal direct with the public except as a common carrier, and it is only to augment its revenues in that capacity that its various enterprises are undertaken. Aside from this, however, each one of these enterprises is designed to provide sufficient rental returns to cover approximately the capital charges on the money invested.

In general, a list of the company's outside activities embodies the following: The provision of facilities, mainly in the form of coal pockets, for the handling of fuel for retail purposes; the provision of creameries to encourage shipments of milk and dairy products from the farms served by the line; the operation of amusement parks to produce passenger traffic in the summer months; the sale of current for commercial purposes to companies operating lighting and power businesses which in turn retail the current to the local consumers.

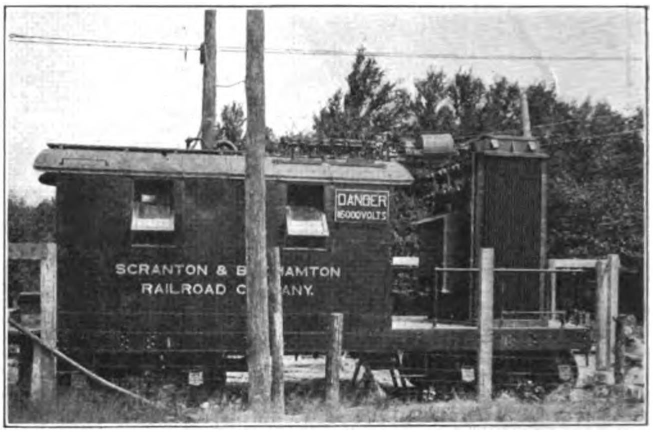
The company's coal business constitutes an excellent example of the policy of developing outside enterprises solely to produce traffic. Some years ago the company purchased a large bank of culm, or refuse coal, from a mine, from which steam fuel is obtained through the operation of a coal-washing plant. Nevertheless, no attempt has been made to develop a retail coal business through this ownership, the culm bank having been acquired solely to insure an adequate and economical fuel supply for the company's power plant during a reasonable number of years to come. It is considered to be too valuable an asset for the company's own future



SCRANTON & BINGHAMTON TRAFFIC—CREAMERY AT LAKE WINOLA



SCRANTON & BINGHAMTON TRAFFIC—COAL CAR BEING LOADED



SCRANTON & BINGHAMTON TRAFFIC—PORTABLE SUBSTATION

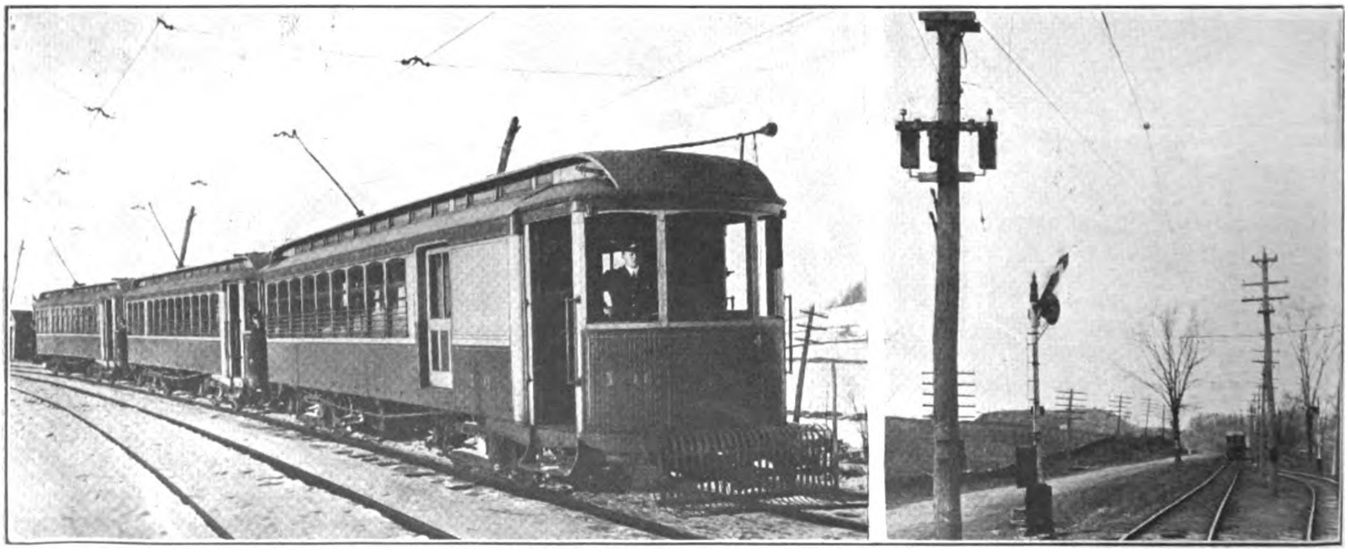
needs to be exhausted in retail sales, as witnessed by the fact that the value of the company's culm holdings has approximately doubled since acquisition. On the other hand, although the company has never contemplated entering the coal business either on a wholesale or retail basis, it has constructed coal pockets, at the towns of Factoryville, Nicholson and Brooklyn with the intention of providing facilities for the stimulation of its coal traffic.

These pockets are leased to local dealers for a nominal rental, the company looking only for increased coal shipments as its source of revenue. The pockets are supplied with coal of the required grades and sizes direct from the mines at Scranton, so that they constitute merely distributing stations for fuel in the country districts. The pockets cost about $500 each, and the wisdom of the investment is clearly indicated by the fact that at the pockets at Nicholson, a typical installation, the receipts for the year 1915 were $1,021, representing shipments of 756 tons of coal which otherwise would not have been obtained.

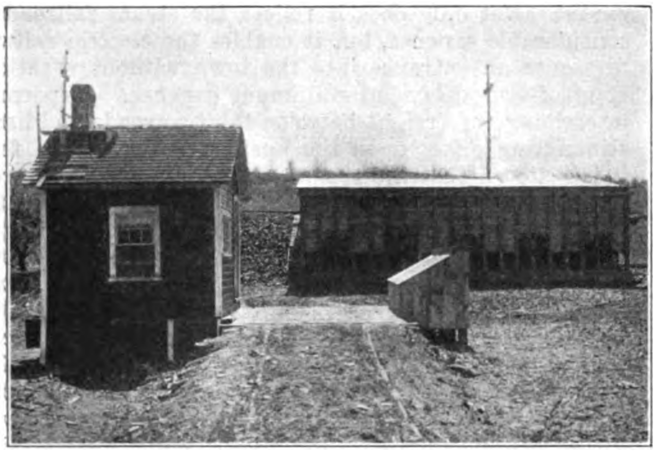
A similar policy has been followed in the case of the creameries that the company has built, there being two of these, one at Lake Winola and one at Nicholson. Both of these plants are about 18 miles from the city of Scranton and they are leased to private operators who are in no other way identified with the railroad company, the rental yielding a return of about 6 per cent on the investment. Naturally, all of the products of these creameries are shipped over the company's lines at established rates, and this is the primary reason for their existence. The company is thus relieved from the complication of being connected with the dealings between the creamery operators and the farmers from whom the milk supply is derived and with the consumers to whom the products are delivered. The railway thus becomes merely the medium through which the products are transported between one and the other of the directly-interested parties.

The company's amusement parks, of which there are two, one at Lake Winola and one at Clarks Summit, are operated indirectly by the company, under the direction of an agent who reports direct to the general manager. It is the duty of this agent to book excursions and picnics on suitable dates for the parks and to supervise the operation of everything in and about them. Practically all of the devices for the entertainment of patrons are rented on a percentage basis by concessionaires who are under the supervision of the agent. The revenue derived from this park business is very gratifying, not only because of the large number of passengers carried, but because of the fact that the regular round-trip fare is 75 cents to one park and 25 cents to the other. It might be said here that the amusement park idea is especially popular in Scranton, possibly because the chief industry, that of coal mining, is invariably slack in summer and also because the topography of the city makes the establishment of parks within the city limits a difficult matter.

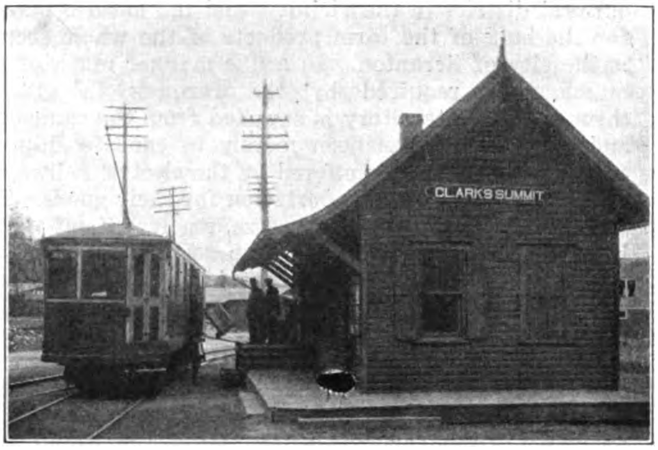
The sale of current, as previously mentioned, is made



SCRANTON & BINGHAMTON TRAFFIC—THREE-CAR PASSENGER TRAIN; TYPICAL VIEW OF LINE SHOWING AUTOMATIC SIGNALS



SCRANTON & BINGHAMTON TRAFFIC—COAL POCKETS AT FACTORYVILLE



SCRANTON & BINGHAMTON TRAFFIC—TYPICAL FREIGHT AND PASSENGER STATION

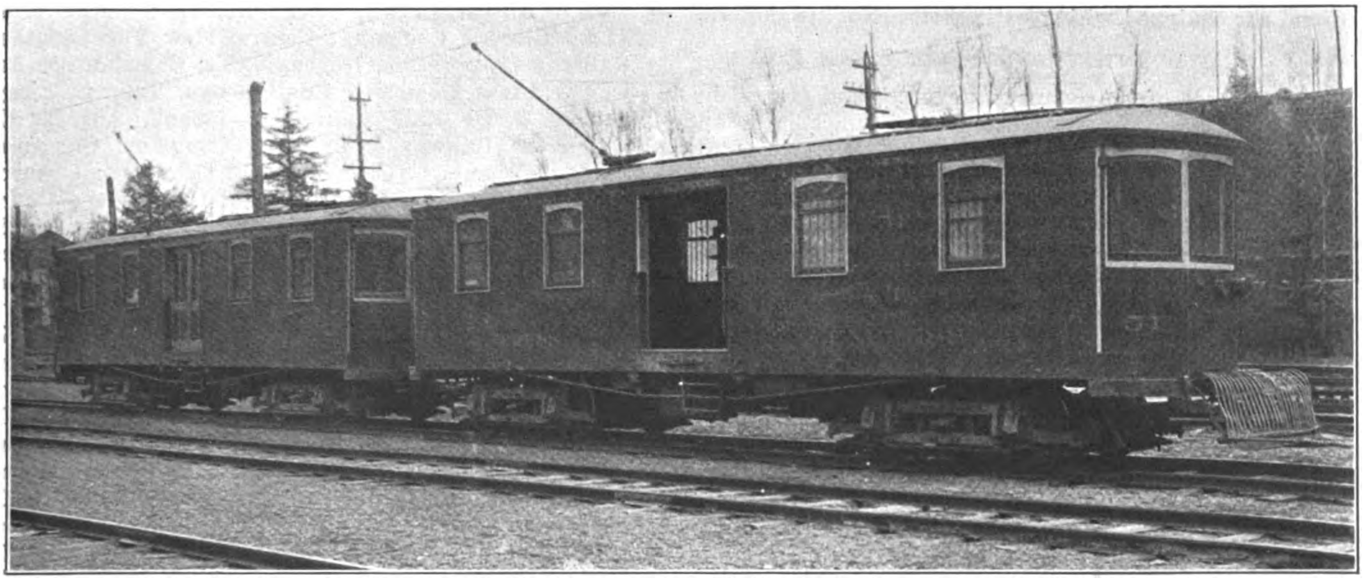
to local lighting companies which are not affiliated in any way with the Scranton & Binghamton Railroad Company. They are supplied, under contract, with current measured at the railroad company's switchboard and they retail it to their patrons, all of the wiring and apparatus required to serve the consumers belonging to the lighting companies and being operated and maintained by them.

This branch of the business developed naturally from the fact that the railway company had to develop its own power, and because of the policy of gradual extension, which involved locating the central power station at a point only 12 miles from the Scranton end of the line. Since the ultimate length of the line was to be about 70 miles, the transmission of high-tension current was a necessity, and this made the furnishing of current for commercial purposes along the company's lines and in the towns adjacent thereto an easy matter. The power plant, which is located near the town of Dalton, is designed to handle (with additional generating units and substations) the requirements of the whole system, including the Binghamton railway and its connections. It is equipped with 2000 hp. of boilers, and the generating units now being installed, in addition to the present equipment, bring its capacity to 4000 kw. Substations to supply 600-volt railway power are located at approximately 15-mile intervals, being situated at Chinchilla, Foster and Heartlake. North of the power station there is a 66,000-volt transmission line which is erected on 40-ft. poles carrying three No. 4 gage solid copper wires. For the shorter section running south to Scranton, a 16,500-volt transmission line fully meets the requirements of the situation.

FREIGHT AND EXPRESS TRAFFIC

In general, the development of freight and express business has been accorded the major share of the company's efforts. It is felt that, in this particular case, only the surface of a very rich revenue producer has yet been scratched, and there are now in hand plans that contemplate the rapid advancement of this side of the railway's business to a point where it will at least equal, if not surpass, the passenger business now being carried on. Even at the present time the company's efforts to educate its patrons in the use of its line for this purpose are showing gratifying results, and this branch of the railway's operations is already of great assistance in tiding over the lean spots in the year.

The principal method of educating the public to use the company's facilities for handling freight and express is that of personal solicitation. In the long run this has been found to be the most effective means to the desired end, several solicitors being practically continually occupied in pointing out the advantages of the service to prospective shippers. There are no really unusual features in connection with the history of the development of the various major classes of freight that are handled. The road taps the richest dairy and agri-



SCRANTON & BINGHAMTON TRAFFIC—TYPICAL EXPRESS TRAIN cultural district in the vicinity, and the natural market for the bulk of the farm products of the whole section is the city of Scranton. In a like manner much of the merchandise required by the farmers in villages throughout the territory is supplied from the same city, and the problem has been merely to educate shippers to prefer the facilities offered by the electric railway to any other means of transportation for their goods. The securing of patrons has, therefore, resolved itself simply into a matter of salesmanship to secure a trial of the company's facilities and to provide such satisfactory service that the business, when once secured, may be retained.

Some idea of the extent of the freight and express operations may be gathered from the statement that during the year 1915, with only 27 miles of road in operation, 3172 carloads were moved for 87,801 car-miles. The commodities carried consist chiefly of coal, crushed stone, grain, hay, merchandise and general agricultural products such as fruit, poultry, eggs, fresh meat, milk and dairy products. In this list practically the only one that is unusual is the item of crushed stone, this material being obtained from a quarry near the town of Nicholson and delivered in carload lots to the Delaware, Lackawanna & Western Railroad at an interchange point near by. For this the electric railway receives a switching charge of $3 per car, about 600 cars being interchanged with the steam road during the course of a year.

In accordance with the company's policy to serve the public merely as a common carrier and to make no special effort to get the buyer and seller of transported commodities together, there is no provision for pick-up and delivery service in connection with the express business in any of the towns that are served. The only service that is rendered by the company in this connection is an immediate notification to the consignee when goods are ready for delivery at the company's station.

Express shipments are made in cars that have Brill standard express bodies 40 ft. long which are mounted on No. 27-E trucks equipped with Westinghouse 101-D quadruple motor equipments. These cars have been proved by experience to meet the requirements of the company in a thoroughly satisfactory manner, and at the present time two new express cars of the same type are on order, together with a new freight car which will be used, in addition to the existing coal-handling equipment, principally for hauling coal. These freight cars have 40-ft. gondola bodies mounted on No. 50-E-3 trucks and are equipped with Westinghouse No. 318 motors.

TRAFFIC INTERCHANGE WITH STEAM ROADS

A feature of the company's express and freight business has been the establishment of amicable arrangements with intersecting steam railroads. One of these appears in the previously-mentioned interchange arrangement with the Delaware, Lackawanna & Western Railroad at Nicholson. Another example, which constitutes an interesting feature in the construction of the company's connection to the town of Montrose, appears in the electric railway's agreement with the Lehigh Valley Railroad. Under this agreement the Scranton & Binghamton Railroad is to electrify 3100 ft. of the steam railroad company track, using jointly with it a handsome new station that has been built in the town. By an arrangement between the two companies the expenses of maintenance and operation, together with the capital charges, are equally divided, the latter being covered by payment by the electric railway of a rental which is based on an appraisal of the facilities used.

The advantages of this arrangement are readily apparent. Not only does it relieve the steam railroad of considerable expense, but it enables the electric railway to secure an entrance into the town without vexatious right-of-way delays at minimum expense. It permits interchange of freight between the two roads and has a stimulating effect upon the business of both. In fact, it is believed that the results obtained under the agreement will go far to explode the ancient theory that the interests of electric and steam railroads operating in the same locality are necessarily at variance. The town of Montrose, it may be said, is a county seat which was served originally by the Lehigh Valley and D., L. & W. Railroads. But since the electric railway desired access to the town by mean of a stub branch from its main line, a few miles east of the town, the agreement permitted the company to construct this stub so as to connect with the nearest point on the Lehigh Valley tracks, electrifying the latter as far as the railroad station, as explained in the preceding paragraph.

Safety Council Growing Rapidly

Active Campaign Now in Progress Is Bringing Many Electric Railways Into the Membership

TWENTY-TWO new members joined the electric railway section of the National Safety Council between March 1 and May 15. The membership now embraces about eighty electric railways, and the active membership campaign that is being carried on is resulting in one or two new members each week. This growth is in keeping with a phenomenal increase in membership by the National Safety Council itself. At the time of the annual congress last October approximately 1400 firms and corporations were members. On May 1 the number had grown to nearly 2000. The objective of 3000 members by next October seems easily within sight.

The electric railway section, through George Oliver Smith of the Doherty Operating Organization, chairman, and H. A. Bullock of the Brooklyn Rapid Transit Company, chairman membership committee, has been pressing its campaign by means of circulars. It has doubled its membership since last fall. The section maintains a weekly service of safety bulletins dealing with hazards of electric railway operation in addition to the regular weekly bulletin service of the National Safety Council, and its members are supplementing this by co-operative exchange of special safety material. The members added between March 1 and May 1 are as follows: Austin (Tex.) Street Railway; Baton Rouge (La.) Electric Company; Central New York Southern Railroad Corporation, Ithaca, N. Y.; Chattanooga Railway & Light Company, Chattanooga, Tenn.; Chicago, Aurora & De Kalb Railroad Company, Aurora, Ill.; Claremont Railway & Lighting Company, Claremont, N. H.; Columbus (Ga.) Railroad Company; Connecticut Company, New Haven, Conn.; Cumberland County Power & Light Company, Portland, Me.; Jacksonville (Fla.) Traction Company; Key West (Fla.) Electric Company; Nashville Railway & Light Company, Nashville, Tenn.; Ohio Valley Electric Railway Company, Huntington, W. Va.; Tide-Water Power Company, Wilmington, N. C.; Vicksburg Light & Traction Company, Vicksburg, Miss. Since May 1 the following have joined: Charleston Consolidated Railway & Lighting Company, Charleston, S. C.; Mason City & Clear Lake Railroad, Mason City, Iowa; New York State Railways, Syracuse, N. Y.; Ogden, Logan & Idaho Railway, Ogden, Utah; Salt Lake & Ogden Railway, Salt Lake City, Utah; Salt Lake & Utah Railroad, Salt Lake City, Utah; Shore Line Electric Railway, Norwich, Conn.

Southwestern Association Holds Twelfth Annual Convention in Galveston

Employee Training, One-Man Cars and Coasting Recorders Were Among the Topics Discussed at the Meeting Held May 17 to 20—Abstracts of Several of the Papers Are Published

As this issue of the ELECTRIC RAILWAY JOURNAL goes to press the Southwestern Electrical & Gas Association is in session in Galveston, Tex., with a registration of 200 railway, gas and electrical men from the Southwest, and many manufacturers' representatives.

On Wednesday morning an address of welcome was delivered by Mark H. Royston, city attorney of Galveston, with a response by H. B. Head, Texas Light & Power Company, Dallas. This was followed by the presidential address of David Daly, Houston Electric Company. Mr. Daly discussed in a forceful manner the short-sightedness of the public in the present jitney situation.

At the first railway session held on Wednesday afternoon the discussion centered in the one-man car, and it was suggested that this might better be termed "the front-entrance car," or "the safety car." Several abstracts of papers delivered at the railway sessions are given in this issue, and other abstracts with a report of the discussion will follow.

Scientific Selection of Employees

BY P. W. GERHARDT

Superintendent of Transportation Dallas Consolidated Electric Street Railway

How many railways have attempted to carry the safety-first idea to its logical conclusion—the elimination of the unfit applicant before he is placed on the car as a trainman? After all, in its final analysis the question of accident prevention rests almost wholly with the man on the car. It is the man behind the controller who really counts. Too often the matter of hiring the man to whom is intrusted the handling of expensive equipment and who will be responsible for the very lives of his passengers, is left to some subordinate whose only recommendation is that he is an old, experienced trainman, sometimes too old to be used elsewhere.

Even where the hiring of trainmen is done by one of the higher officials, all too frequently the only test brought to bear is this official's reliance in his ability to size up a man. After having passed this superficial test the applicant is placed in charge of a trainman or platform instructor, who instructs him to a greater or lesser extent in the duties and responsibilities of a trainman. He is then placed on the extra board, and if he does not make good is discharged and another man employed to take his place.

In his treatment of this subject the writer will confine himself to his personal experiences in the hiring of trainmen for the Dallas Consolidated Electric Street Railway. It must be borne in mind that the psychological tests outlined are in a manner experimental, and are no doubt susceptible to improvement.

Confronted by conditions of employment somewhat as outlined above, we finally decided that the best course lay in the entire reorganization of our methods of employment and training. We then sought for a man competent to build up this department to a high state of efficiency. We decided that such a man must be an educated, technically trained man, must possess the ability of handling men and, more than all else, he must be imbued with enthusiasm and with an abounding belief in the importance of his work. Such a man was secured by employing a graduate in electrical engineering and supplementing his technical training by many months of actual experience as a trainman and shopman. This man was then put in charge of our school of instruction, and much credit is due him for the development of the tests now in use.

Let us assume that an applicant presents himself for employment. As he takes the half dozen steps from the door to the desk of the employment agent he is watched for any signs of physical defect. His manner of approach is noted, and aside from a brief "good morning," he is left to open up the question of employment in his own way. We naturally expect him to have the innate courtesy to remove his hat and state his business in a polite manner. A few general questions as to age, previous occupation, etc., are asked, the effort being made to have the applicant do as much talking as possible. He is encouraged to give his reasons freely for wanting to secure work on the cars and for thinking that he can qualify for the work.

At this stage we can eliminate from further consideration all applicants who are in any wise crippled, deformed, repulsive in appearance, dirty or slovenly in their dress, or show signs of excessive use of tobacco or liquor. We further eliminate all applicants under twenty-one years of age, or over forty years. We also eliminate all applicants under 5 ft. 6 in. or over 6 ft. 1 in. in height, the one being too short to reach his signal cords or properly handle his controller; the other too tall to see under his route sign when standing erect. These limits would, of course, vary with the equipment that may be in use on different roads. Moreover, we can find no use for the man who shows symptoms of tuberculosis or other contagious disease; the man who wears glasses, or has any defects in his speech, or the overly fat man. The latter is too apt to be lazy and awkward, and in any case takes up unnecessary space on the cars.

The applicant having passed this preliminary test receives an application blank and is told to take it into the outer office and carefully fill in all the information called for. The time consumed by the applicant in filling out the blank, as well as the number of errors or omissions made, is noted. From this application blank we can judge the applicant's handwriting, and from his answers to the different questions we get a fair indication of his general fitness for the work. The application in use by us requires forty-five minutes for the average applicant to properly fill out. A bright man, or one who has had clerical experience, can complete it in from fifteen to thirty minutes. Any applicant who consumes more than an hour and a half to complete it, or who omits answering five or more questions, is deemed too slow or careless for further consideration.

If a perusal of the application proves satisfactory the applicant is told to report to the chief instructor for further test. All applications are marked with a grade, A, B or C, and filed for future use. In this manner we have on hand at all times a large number of applications from which to select our men as we may need them. This obviates the chance of being caught in a pinch and having to hire such men as may present themselves at the time.

As soon as the applicant presents himself to the chief instructor he is weighed and his height is measured, his hearing is tested with a stop watch, and his eyes are tested for range of vision with a standard chart and for color blindness with Holmgrene yarns. We also use a distant signal placed at the far end of a long room and controlled by push buttons in such a manner that red, green, violet, yellow and clear light can be flashed at random, the applicant being required to name the colors as they appear.

Up to this point the applicant has undergone such tests as are ordinarily applied by all electric railways, but these simple tests have served to eliminate fully 80 per cent of the applicants.

The remaining 20 per cent are now subjected to the psychological tests, which we shall designate as follows: The attention test, the observation test, the judgment test.

THE ATTENTION TEST

This test consists of a printed sheet of standard size paper, 8½ in. x 11 in., divided into six divisions. Divisions 1 and 2 are in the way of catch questions, and require the closest attention of the applicant. Divisions 3, 4, 5 and 6 are simple problems in addition, subtraction, multiplication and notation. At the top of the sheet is printed the following:

"General Directions—Do what the printed instructions tell you to do.

"Do not ask the examiner any questions about the examination.

"Do not ask any other person who is taking the examination any questions or watch anyone to see what he does.

"Work as rapidly as you can without making any mistakes."

The applicant is handed this sheet and told to follow the printed instructions. He is then timed with a stop watch and the number of omissions and errors counted. In practice we call this sheet test Attention A, covering Divisions 1 and 2. Attention B, covering 3, 4, 5 and 6. The time consumed is noted separately for A and B, as we have found that many of our applicants who make a good grade on A fall down on B, due to not having had any recent practice in arithmetic.

This test is given but once, as its effectiveness depends wholly upon its novelty. The object of this test is to determine the applicant's ability to receive instructions and to do as he is told to do. How often do accidents occur due to the trainman's neglect or misunderstanding of a rule or bulletin? If by so simple a test we can decrease the chances of such accidents, is not the effort well worth while?

OBSERVATION TEST

This test is adapted from the test originally devised by Prof. Hugo Münsterberg primarily for street car motormen. The apparatus as used by us consists of a rectangular box approximately 11 in. long, 5 in. wide and 4 in. deep, in the cover of which is fixed a glass window 2 in. x 4½ in. Inside this box, and made to pass under this window by means of a series of rollers, is a continuous belt 60 in. long and 4½ in. wide. Through the center of this strip are drawn two parallel lines one-half of an inch apart representing the tracks of a street railway in the middle of a street. The whole strip is divided into ½ in. squares; thus there are four squares on each side of the track. The squares between the tracks are white and marked A, B, C, D, etc. The four squares on each side of the track are colored red and green, in an irregular manner, and upon each square is one of the first four digits, these digits being arranged indiscriminately.

The digit 1 represents the movement of one square, the digit 2 represents a movement of two squares, the digit 3 represents a movement of three squares, and the digit 4 a movement of four squares, or, as it is usually explained to the applicant about to take the test, the digit 1 represents a pedestrian, the digit 2 a horse-drawn vehicle, the digit 3 an automobile, and the digit 4 a piece of fire apparatus or a jitney.

Furthermore, the green squares denote a movement parallel to the track and therefore are not liable to collision, while the red squares represent a movement toward the track, and represent potential collisions.

The idea to be grasped by the man taking the test is that any digit on the green square cannot come into collision with his car, but any digit on a red square may do so. Thus the digit 1 on a red square adjacent to the track means a collision, while the digit 1 on a green square or digit 2 on a red square, two or three squares away from the track, cannot cause a collision. Likewise the digit 3 on a red square one, two or four squares from the track does not mean a collision, as in the first place it will have crossed in safety ahead of the car, and in the second case will not have reached the track until after the car has passed.

After the principle of the apparatus is fully explained to the applicant, he is requested to turn the crank and announce by letter the spaces on the track where collisions will occur, and the number of such collisions. The time required to run through this entire strip, as well as a record of the omissions is kept, and a grade is established therefrom.

It is significant that repetitions of this test do not show any improvements. The test is therefore run through from three to five times, and an average taken. This test will bring out two types of undesirable motormen; first, the type who will make few errors but will consume so much time that he would never be able to maintain a schedule, and second, the type who will make fast time, but may have a collision with anything that chances to pass onto the track. It is well worth our while to eliminate both types and employ only the men who can make the best test with a minimum of omissions in a reasonable length of time. The limit for both errors and time are both established from actual tests on trainmen already in service.

JUDGMENT TEST

We have all had experience with the motorman who, when danger becomes imminent, loses his head and cannot decide whether to trust himself to his brakes or to his reverse; or who, on a slick track, forgets until too late that his car is equipped with sand. If he has time, this man would know exactly what to do and when to do it, but when two or more conflicting factors present themselves he is unable to decide which is of the greater importance. We usually ascribe this man's action to poor judgment, or in the case of an old, experienced man, we call it "man failure." On the other hand, we point with pride to certain of our motormen who, no matter what the conditions may be, can be depended on to take the best action under the circumstances. The object of this test is to determine this class of man. This test, like the previous one, was devised by

Prof. Hugo Münsterberg, to be used in the selection of ship captains, but we felt that it could well be adapted to street railway service.

The apparatus consists of twenty-four cards, 3 in. x 5 in. The upper half of each card is divided into forty-eight squares. In each square is printed the letter *a*, *e*, *o* or *u*, in irregular order. On four of these cards one of these vowels appears twenty-one times, and the others nine times each. On eight cards one letter appears eighteen times, the others ten times each. On eight cards one appears fifteen times and the others eleven times each. On four cards one appears sixteen times and the others eight times each, and in addition there are eighteen consonants mixed in. The applicant to be tested is given this set of cards well shuffled and told to sort them into four piles in such a way that the first pile shall contain all cards in which the letter *a* predominates. The second pile shall contain the cards in which the letter *e* predominates. The third pile, all cards in which the letter *o* predominates, and the fourth pile all cards in which the letter *u* predominates.

The applicant is warned that he must not attempt actually to count the letters on each card. However, any attempt to do so would so increase the time required for the test that the final result would be highly unsatisfactory. The time required to sort the cards is taken with a stop watch. After the cards are all placed the number of errors made in placing them is recorded. It should be noticed that there are four different combinations to each pile. It is manifestly easier to place those cards correctly where the predominating letter appears twenty-one times and the other three nine times each, than it is to place those cards whereon the predominating letter appears fifteen times against eleven for each of the other three. Naturally the easier it is to make a correct selection, the graver is the offense in making an error. The penalty for mistakes in the selection of the various cards is arbitrarily taken as four points for every mistake in those cards in which the predominating letter appears twenty-one times, three points for mistakes in the eighteen-letter cards, two points for mistakes in the fifteen-letter cards, and one point in the eight-letter cards.

As in the observation test, the limits for errors and time can best be established from tests made upon employees in the service. In this test to a greater extent than in either of the other two, much can be learned from a close observation of the applicant under test. As a matter of fact, we give more weight to the observation of the applicant while taking this test than to the actual score made.

We find the man of snap judgment who will rapidly place the cards but in doing so will make many errors. On the other hand, there is the man who cannot make up his mind, but will hesitate, start to place the card in one pile, then draws back, reconsiders and perhaps will finally place it in another pile. This man seems to be undergoing mental strain, and while he will consume much time in making the test, his errors in sorting will be erratic, or, to use a technical term, he "hunts." Again we have the dishonest man who will attempt to count the letters, and with furtive, sidewise glances, try to see if he is being watched. The man for whom we are searching will be observed to give each card a few moments' consideration before placing it, and once his decision is made, he will not hesitate in placing the card. This man will appear to take a keen interest and enjoyment in the test.

This test, like the observation test, can be repeated without any material change in the results obtained, and it is our practice to make from three to five tests on each man.

We appreciate the fact that unless the results obtained from these tests are borne out in actual practice, the tests are more of a theoretical than of a practical value. To this end the entire series of tests was given to the men already in service, and an especial attempt was made to secure tests on men who had been previously discharged for incompetency and recklessness in handling their cars. It is gratifying to state that the tests so made bear out the theory to a remarkable degree.

We feel that not only do we secure a higher grade man by our present method of employment, thereby reducing our accidents and increasing the good will of our patrons, but a considerable saving is effected in the hiring of fewer men. The cost of hiring and training a new man for street railway work has been variously estimated at from $25 to $75.

On the lines of the Dallas Consolidated Electric Street Railway there were employed new trainmen, as follows: in 1912, 551 men; in 1913, 527 men; in 1914, 282 men; in 1915, 222 men. For the first quarter of 1916 there were employed seventeen trainmen.

It is interesting to note in this connection that whereas in November of 1911 the average length of service of all trainmen was twenty-six months, in April, 1916, the average length of continuous service was forty-six months, showing an increase of more than 77 per cent in less than five years. Moreover, of the trainmen employed during the first three months of 1912, only 71 per cent were still in service on May 1 of the same year. Of those employed in the first quarter of 1914, 80 per cent were still in service on May 1. Only seventeen men were employed during the first three months of the present year, and all of them were still in the service on May 1.

In conclusion we wish to repeat that what has been done is largely in the nature of experimental work and must be improved and amplified, but we believe that we have made a start in the right direction. The final goal will not be reached until there is established an employment bureau in charge of a trained, competent man, who will employ all the men needed by the various departments, and until there is in each position a man who is in the best place in the world for him.

The Effectiveness of Coasting Recorders in Reducing Power Consumption and Operating Costs

BY V. W. BERRY

General Superintendent Northern Texas Traction Company, Fort Worth, Tex.

Only very recently has the question of economical operation of cars been given the thought that its importance justifies. To get the best results in economical car operation, some means of checking the operation of each motorman must be provided. The Northern Texas Traction Company has installed for this purpose the coasting time recorder of the Railway Improvement Company, a device which is compact and neat in appearance, has no particularly intricate parts to get out of order, is reliable, and of which the cost of maintenance is very small.

While considering the installation of coasting recorders we arranged with the Railway Improvement Company to make a test in the early part of 1914 on the Hemphill line of this company. For a period of six weeks in May and June we metered the energy used by the cars, kept a careful record of passengers carried, car mileage, etc., all without the knowledge of the trainmen. We also made a stop-watch check of the coasting being done by motormen on this line, and found it to average 5 per cent.

Following this test, we installed coasting time recorders on the cars on this line, keeping records similar to those kept during the preceding six weeks. During this time motormen were instructed in the use of the recorder, and its operation and object were explained to them.

A comparison of the results obtained during these two six weeks' tests follows:

	Before	After	Difference
Kilowatt-hours per car-mile....	2.73	2.02	0.71 or 26.0%
Watt-hours per ton-mile.......	145	108	37.0 or 25.5%
Coasting, per cent.............	5.0	29.6	24.6%

We also made a test to determine the saving in brakeshoe wear. The brakeshoes were weighed prior to and following each six weeks' test. A saving of 38 per cent in brakeshoe wear was indicated.

As compared with 1912, our cost per car-mile of maintenance of electrical equipment of cars was reduced 40.5 per cent; as compared with 1913, 31.6 per cent, and as compared with 1914, 17.5 per cent. Just what part of this decrease was due to increased coasting and what part to increased efficiencies at the car shops is, of course, an indeterminate quantity. However, it is my opinion that a part of it was due to increased coasting.

Another phase of this matter is the reduction in accidents due to increased coasting. A great deal has been said and written within the last few years about safety first. In the operation of cars to obtain the best possible coasting record it is absolutely necessary that motormen be on the lookout for opportunities to let their cars "roll," and if sufficient interest is developed among the men along this line a material reduction in accidents should follow.

We have observed in connection with the operation of recorders that our motormen run their cars more nearly on schedule time than they did before. Our schedules are made with the idea that we want them maintained as given to the men. We do not want men to leave the terminals on schedule time and then run to suit themselves, just so they get back at the terminals on time. But we want them to be at the various time points along the line at the proper times. This is especially important on loop lines and on double-track lines in maintaining proper spacing of cars. Having sufficient interest in coasting the men watch their time closely, and do not run ahead of their schedule. They use spare time in "rolling" in order to keep up their coasting percentages.

It is frequently suggested that the men who make the high records run late and drag the line. This is an erroneous idea, because in doing so they would have to make more stops per mile, due to picking up passengers that rightfully should be carried by the car following. For a proper distribution of loads the cars must be kept on schedule time.

To obtain the best results in economical car operation, we must recognize the fact that all men are not equally endowed with the requisites which make a good motorman. In employing new men some system should be developed whereby we can ascertain their qualifications to some degree. Good judgment is necessary, and coasting is simply the exercise of good judgment. The man who can best judge what speed his car should attain before cutting off power in order that it may "roll" a certain distance in a given time is the man who will become a good coaster. A man who had been operating a car in Fort Worth but a short time, who seemed to be having trouble making the schedule, and who was also a low coaster, told me that he could not understand how his instructor made the time so easily and apparently rolled along so uniformly, while he had to fight all the time to keep on schedule. The new man kept his car at a maximum speed a greater length of time than did the instructor, but in so doing had to apply his brakes much sooner in making a stop, thereby reducing his coasting and increasing his power consumption.

Practicability and Operation of One-Man Cars

BY D. R. LOCHER
Vice-President and General Manager Corpus Christi Railway & Light Company, Corpus Christi, Tex.

The conditions recently faced by a great many street railway companies, especially small systems, have been the cause for adding one more indorsement to the saying, "Necessity is the mother of invention." Necessity must have been the cause for conceiving the up-to-date, one-man cars. It surely was the cause of the Corpus Christi Railway & Light Company adopting them, and, in the writer's opinion, the results that this company has had prove their practicability, at least for small and medium-sized street railway systems.

The city of Corpus Christi has about 20,000 population, and the railway system consists of 10 miles of single track. The company was operating three lines with a total of five two-man cars on fifteen- and twenty-minute headways. The present owners purchased the property in the early part of 1914, just at the time the city had started its first permanent street paving program. As the street railway was built on the principal streets, the company was required, under its franchise, to rebuild an unusually large part of its track, substituting 70-lb. rail in concrete for the lighter old rail, which was laid in natural soil. Consequently, at the close of the first year's operation the new owners found themselves with three times as much investment in the property as there was the year before, and notwithstanding that the city was showing a healthy growth in population the earnings were decreasing each day.

This company has never had any jitney competition, but its competitor was found to be the accommodating automobile owner who picked up a load of friends who were on the corners waiting for the street cars. A survey showed that the friendly automobile was hauling about as many passengers as the street cars. To beat the accommodating friend it was decided to cut the headway in half. Obviously this would be impossible if the operation costs would double, so we were forced to consider one-man cars. The controlling elements in consideration were the public, the carman, the cars and the electrical equipment.

The company placed an order for eight double equipments of the "Wee" railway motor with the Westinghouse Electric & Manufacturing Company. This was the first purchase of motors of this size, which have a rating of 17.5 hp., at 600 volts, and weigh complete about 800 lb. each. Eight all-steel cars with folding doors and steps at each corner were also purchased. These cars seat twenty-eight, and are 26 ft. long over bumpers. The bodies are mounted on radial trucks, with 9 ft. 6 in. wheelbase and 24-in. wheels. A featherweight air brake, in addition to a hand brake, sanding apparatus, fare box and motorman's mirror complete the equipment. The cars, fully equipped, weigh about 12,000 lb.

The subject of one-man operation was taken up with the platform men. It happened to be an opportune time, for they had just petitioned for a raise in the wage schedule. They were called together, the condition of the business was frankly stated to them and the new equipment was described. They were asked to assist in working out the problem and increased wages were promised if they would do their share toward making the undertaking a success. The men enthusiastically entered into the new order of things.

The public was next notified of the proposed change through the local press. The new cars were described and the increase in service was emphasized, with satisfactory results. The newspapers and many citizens have commended the service. The company is now giving a five-minute service each way through the business district of the city.

The earnings before the one-man cars and increased schedule were put into operation had been decreasing 10 per cent to 15 per cent each month over the same month of the previous year. For the three months of this one-man, ten-minute service the earnings have increased 29.7 per cent. The five cars formerly operated, each equipped with two 35-hp. motors, made 737 car-miles daily and used an average of 1336 kw.-hr. Ten cars are now operated, making 1356 miles and using 1708 kw.-hr. Eight are equipped with 35-hp. motors. In addition a work car was in use on construction work. However, charging all of the energy to the passenger cars, we were able to operate 84 per cent more car-mileage with only 27 per cent more energy.

The total result has been to increase the car-mileage 84 per cent, to decrease earnings 15 per cent per car-mile and to decrease operating expenses 37 per cent per car-mile. The car-mileage has not been increased 100 per cent because 1600 ft. of track on one line has been torn up for the past six months. This fact, together with the increased wages paid the car men, the extra power required and the wages of one extra car cleaner, account for the failure of the expenses per car-mile to decrease 50 per cent.

The cost of journal-box lubrication for the five cars which were in service for January, February and March, 1915, was $45.08. The cost for the same months in 1916 was only $9.31. Most of this reduction is due to the use of a different method of lubrication on the new cars. The power and speed of the small motors have proved very satisfactory. As many as seventy-eight passengers have been carried on one car up a 6 per cent grade with no difficulty. Our schedules are all at the rate of 8 m.p.h., the same as when the cars were operated by two men.

The car operator keeps a pad of transfers hanging in front of him, and at the end of each trip he punches a number of these, which are good on any one of the other routes, so that when a transfer is asked for he has only to tear it from the pad and hand it to the passenger, thus avoiding any delay or loss of time consumed in punching transfers as they are asked for. We operate with a locked fare box but, as all lines pass the office the men experience no trouble in keeping themselves supplied with change. The "stop-look-and-listen" rule is rigidly enforced at railroad crossings. A comparison to show the tendency of one-man cars either to decrease or increase accidents would, in my opinion, be futile.

It is my belief that mental alertness and thoughtfulness on the part of the motorman is the controlling factor in preventing accidents. The one-man car is no more "bonehead-proof" than is the two-man car. It does, however, have some advantage due to the fact that it is possible to have only one "bonehead" in its crew.

As a consequence of the adoption of one-man cars it has been possible for this company to give the community just twice the street railway service that was formerly given and at the same time increase the company's earnings about 30 per cent, with an increased operation cost chargeable to the one-man cars of only 6 per cent.

Missouri Association Holds Aquatic Meeting

The C., M. & St. P. Electrification Was the Principal Electric Railway Topic Discussed

THE convention of the Missouri Association of Public Utilities was held on the steamer Quincy during a cruise from St. Louis to Peoria, Ill., and return. The meeting was attended by 213 members and guests and it was held on May 11, 12 and 13. Among the guests were the mayors of four cities.

The program was largely made up of papers on lighting, industrial power and district heating. Of particular interest to railway men, however, was an illustrated talk by J. C. Thirlwall of the railway and traction department of the General Electric Company, Schenectady, N. Y., on the electrification of the mountain division of the Chicago, Milwaukee & St. Paul Railway. He described the staggered suspension used in the power lines to prevent flashing over and to permit the carrying of higher potentials. Of interest also to railway power plant men was the paper by W. D. Stuckenberg, president of the Commercial Testing & Engineering Company, Chicago, who showed that tests of composite coal samples properly selected are very representative of the fuel a consumer receives.

At the executive session on the last day of the convention the following officers were chosen for the ensuing year: President, Hugo Wurdack, Light & Development Company of St. Louis; first vice-president, Bruce Cameron, United Railways, St. Louis; second vice-president, J. H. Van Brunt, St. Joseph Railway, Light, Heat & Power Company, St. Joseph; third vice-president, J. M. Scott, Kansas City Gas Company, Kansas City; secretary-treasurer, F. D. Beardslee, Union Electric Light & Power Company, St. Louis.

B. R. T. Motor-Car Maintenance

The thirty-one automobiles operated by the Brooklyn (N. Y.) Rapid Transit Company traveled 222,975 miles in the year 1915. The cost of maintenance averaged 7.76 cents per mile exclusive of operation, storage, chauffeurs' wages and depreciation. This equipment consists of seven touring cars, seven runabouts and twelve service vehicles, of which three are electrics. The condition of each machine is reported daily to the shop for such minor attention as may be necessary, and this is supplemented by a careful shop inspection weekly. Defects are not permitted to become aggravated and where general conditions require, usually after 10,000 to 12,000 miles service, each car is thoroughly overhauled.

In addition to the above information, which was published in the *B. R. T. Monthly*, the following details of this automobile operation have also been secured:

CALENDAR YEAR 1915

Mileage—Touring cars and runabouts		130,572
Service vehicles		92,403
		222,975
		Cost per Mile
Costs—Gasoline, electricity and oil	$3,912.13	$0.0175
Tires and tubes	3,256.97	.0146
Motor parts and sundries	3,278.81	.0147
Shop tools and miscellaneous supplies	490.68	.0022
Shop labor	6,365.71	.0286
	$17,304.30	$0.0776

Des Moines Front and Center-Door Cars

These Cars Combine Several of the Features of the Pittsburgh Low-Floor Cars and the Cleveland Front-Entrance, Center-Exit Cars, Provision Being Made So That Either Method of Passenger Handling May Be Used as Desired

When a new franchise was granted to the Des Moines City Railway Company, Emil G. Schmidt, its president, promised the public that he would rehabilitate and modernize the property and place in service new cars which represented the most advanced ideas in design and construction. After a careful study and a personal investigation of various types of equipment in actual service, Mr. Schmidt decided on a combination of the Pittsburgh low-floor car and the Cleveland front-entrance, center-exit car. It was found that a four-motor equipment was best suited for service in Des Moines, and the management preferred the small-wheel trucks used on the Pittsburgh cars to the larger trucks used on the Cleveland cars. The low truck and the installation of a slight ramp at each side of the center door made it possible to reach the car floor level with two steps, the one from the street being 14 in. and the one to the car floor level being 12 in.

All of the Des Moines City Railway's lines have loop or wye terminals, hence the new car is single-end, and it seats fifty-four passengers. The rear half of the car is fitted with cross-seats, and a circular seat is built around the rear vestibule. The front end of the car has cross-seats on one side and a longitudinal seat on the other and thus provides a wide aisle for the ingress and egress of passengers. At this time no definite plan of operation has been adopted for the new equipment, but it is of interest to note that practically any system of fare collection may be used. With the front and center doors either the pay-as-you-enter or pay-as-you-leave plan may be adopted, or the combination of the two, such as is employed in Cleveland and known as the pay-as-you-pass plan, is equally adaptable to this type of car.

The desire for light weight, consistent with necessary strength for safety and reasonable life, has governed the design. The car is of all-steel construction below the belt rail, except for the floors, and in many instances pressings were substituted for standard sections to keep down the weight. The inside finish is plain, being designed particularly to facilitate car cleaning. Regarding this car, President Schmidt states: "We have learned by experience that the public would rather ride in a plain car that was kept clean than in one that has elaborate ornamental trimmings which collect the dust and dirt." In connection with the adoption of a light-weight car, the management was of the opinion that although this car might not last as long as the heavier types, the saving in power and wear and tear on the track would more than offset the loss due to a shorter life of the car. The principal dimensions are as follows:

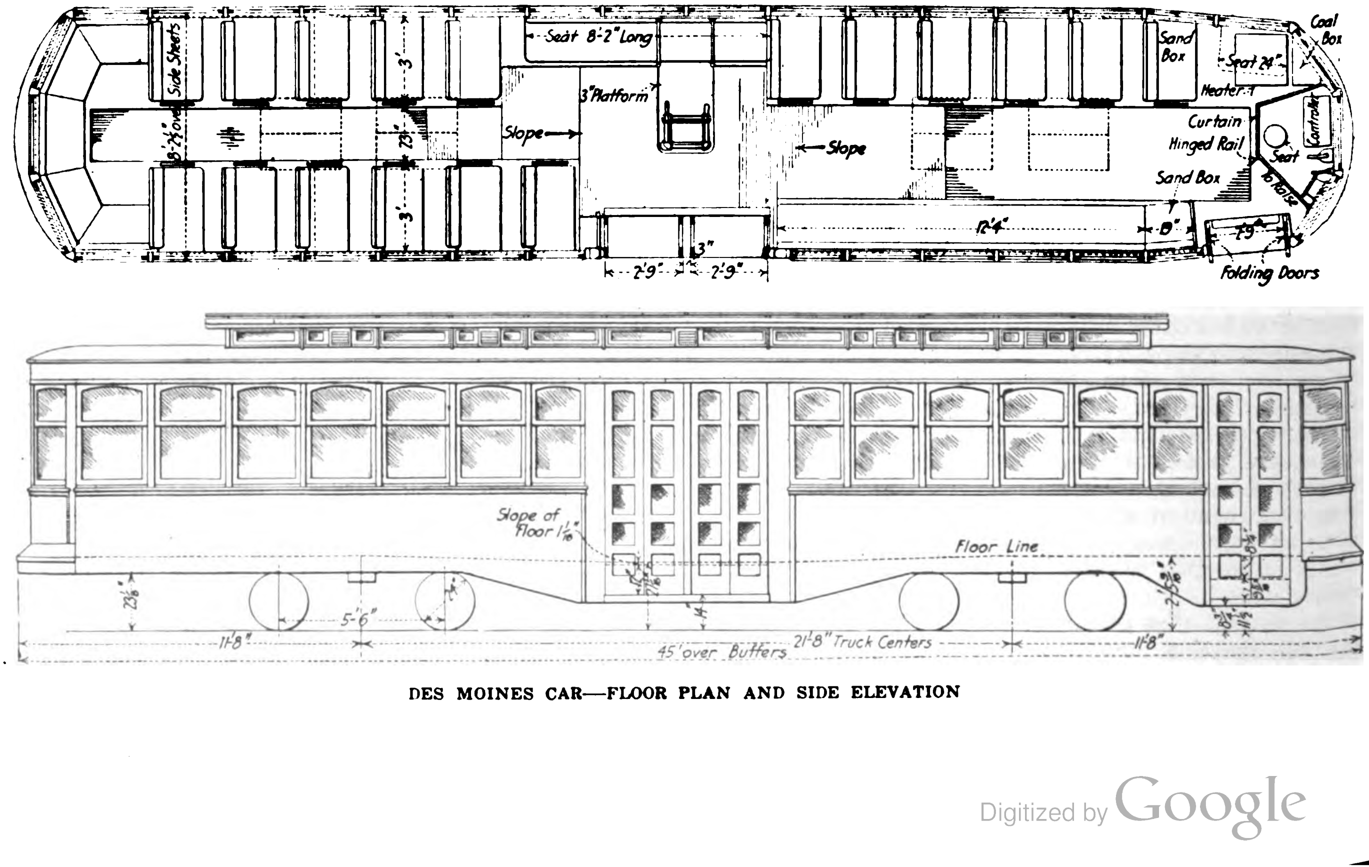
Length of car body over buffer	45 ft.
Length of car body over dash	44 ft.
Length of bolster centers	21 ft. 8 in.
Width of car body over all	8 ft. 5½ in.
Width of car body over side sheets	8 ft. 2½ in.
Width of car body inside of wainscoting	7 ft. 11 in.
Height from rail to top of trolley board	10 ft. 10 in.
Height from rail to top of floor at bolster	2 ft. 5 9/16 in.
Height from rail to top of floor at center	2 ft. 3 1/16 in.
Height from rail to first step at center door	14 in.
Height from rail to first step at front door	11½ in.

The weights are:

Car body	16,000 lb.
Trucks	12,000 lb.
Air brake and electrical equipment	5,000 lb.
Total	33,000 lb.

This weight corresponds to 648 lb. per seated passenger.

The underframe is of the side-girder construction with a continuous fish-belly girder on one side and a girder of the same dimensions on the operating side,



DES MOINES CAR—FLOOR PLAN AND SIDE ELEVATION but with the special construction necessary to carry the stresses around the center door opening by way of the underframe, and the side plate and letterboard. Vertical stresses due to car loads and track conditions are cared for by the side girders, the floor system merely serving as a means of transmitting stresses to the girders.

The side sills, which also serve as the bottom flanges of the fish-belly girders, are formed of ⅜-in. x 2½-in. x 3-in. angles extending continuously from buffer to buffer. The buffers are 5-in. 6½-lb. channels, bent to form the car ends, securely riveted to the side sills and provided with ⅛-in. x 26½-in. anti-telescoping plates which extend the full width of the car body. Essentially the underframing is composed of the vestibule panels at each end of the car, the two panels containing the body bolsters, and the panels forming the central portion of the underframe. Both the vestibule and the bolster panels are braced diagonally, but the central panel contains simply longitudinal and transverse members. Two 4-in., 5¼-lb. channels, spaced 15 in. back-to-back, frame into the buffers and are riveted to the fish-belly cross-sills at the body corner posts. All the cross-sills are of the fish-belly design and are pressed from steel 3/16 in. thick.

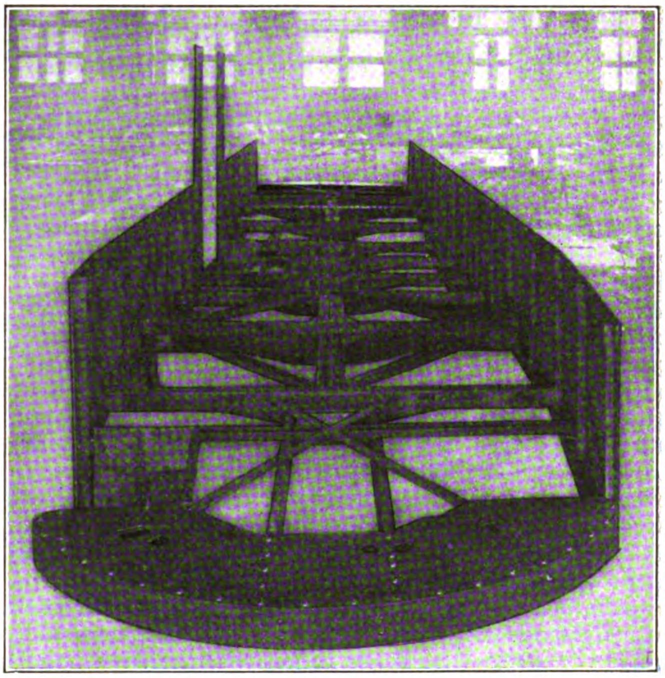
The body bolster construction also is somewhat unusual in that it is composed of two-pressed steel fish-belly channels made of 5/16-in. steel and fitted with a top cover plate ⅜ in. x 11 in. extending the full width of the car body, and a bottom cover plate 7/16 in. x 11 in., also extending the full width. The two bolsters frame into the side girders, which are reinforced at this connection, and they are provided with side bearings which will permit a 5-ft. 6-in. wheelbase truck to operate around the 45-ft. center radius curve. The fish-belly girders are built up of 3/32-in. plates with the ⅜-in. x 2½-in. x 3-in. angle side sills forming the bottom flanges, and a ⅜-in. x 3-in. steel plate forming the top reinforcement. A uniform post spacing of 2 ft. 6 in. has been adopted, except for the panels at each side of the center-door opening, where the spacing is reduced to 2 ft. Girder stiffeners are provided at each side post by riveting ⅛-in. x 1½-in. x 1½-in. angles to the web plate. Each joint in the girder side plate is spliced with a 3/32-in. x 5-in. plate. It is also of interest to note that the side girders extend into the vestibules from the front-entrance door opening to the rear-vestibule corner post.

That portion of the body above the belt rail is built of wood. Ash side posts support the iron carlines which are made of the ⅜-in. x 1¼-in. bars bent in one piece to the contour of the roof, extending between the side plates and bolted securely to them. The side plates, deck sills and plates are of long-leaf yellow pine and extend the full length of the car body. The deck mullions, the end transoms and the carlines are made of ash, and the carlines are placed one over each post and one between posts. The body roofing is of tongued and grooved ½-in. poplar, and the hood roofing is formed of two thicknesses of ¼-in. basswood. Covering this roof is the usual 8-oz. cotton duck laid in white lead and oil.

The body floor is built of a single thickness of tongued and grooved yellow pine, depressed along the aisles and provided with hard maple floor mattings. A 2¼-in. ramp extends from the body bolster to the side of the center door opening. A tapered flat-front type vestibule and a straight rear vestibule were adopted for these cars. The outside of the vestibule is sheathed with 14-gage sheet steel between the buffer and the sash rail.

Each vestibule is fitted with three drop sashes, the one at the right of the motorman's position being made in two parts and the upper or Gothic sash is arranged for a Keystone illuminated sign. The rear center vestibule sash is also made in two parts and arranged for an illuminated sign. Sashes in the sides of the car are single and made in two parts, of which the upper one is fixed and made in continuous lengths. The lower sashes are of the Forsyth beadless brass type, and they are provided with two spring sash locks and bottom-cushion weather stripping. The deck and transom sashes are all stationary, and five of the deck sashes on each side of the car are provided with automatic ventilators.

The lighting system for these new cars follows the Cleveland standard and includes five 92-watt Mazda lamps in series, fitted with Alba shades and mounted along the center line of the deck ceiling. A spare lamp is connected with a Nichols-Lintern selector switch so that it can be instantly cut into the circuit in case any one of the other five lamps fails. In addition to these lamps for general illumination, five 23-watt tungsten lamps are distributed in the sign boxes at the front vestibule step opening, over the fare box, and in the head lamp.


DES MOINES CAR—END VIEW OF ASSEMBLED GIRDERS AND UNDERFRAME

Two sections of two-leaf folding doors, arranged with an operating mechanism under the control of the conductor, close the center openings. The front opening is closed with one set of two-leaf folding doors and fitted with an operating mechanism of the overhead type which is under the control of the motorman. All the steps are stationary and provided with Mason carborundum safety treads. Incidentally, the two center-door openings and the front-door opening are all of the same width, being 2 ft. 9 in. in the clear. The general arrangement of the car body is shown in the plan in one of the accompanying illustrations, and the inside finish is in light cherry of a plain, sanitary design. The wainscoting between the floor line and the window stools is of steel, and the headlining is Veosote.

Other specialties include Pantasote curtains, Rexall metal rollers and National Lock Washer Company's curtain fixtures, Consolidated Car Heating Company's signal buzzer system, Sheraduct conduit, Crouse-Hinds condulet fittings, Peacock staffless hand brakes, Wyoming sand traps and Ohio Brass Company's sand valves, Automatic ventilators, Keystone destination signs, Golden Glow incandescent head lamps, Heywood Brothers & Wakefield Company's rattan upholstered pressed-steel seats, Peter Smith Heater Company's forced-circulation, hot-air heaters, International R-5 type registers, H. B. Life-guard fenders, General Electric air brakes, McGuire-Cummings trucks equipped with 24-in. Griffin F. C. S. wheels, Symington malleable-iron journal boxes, More-Jones Brass & Metal Company's journal brasses, Railway Materials Company's brakeshoes, Hartman self-centering center bearings and Perry anti-friction side bearings. General Electric Type 25-A, fully ventilated, multi-fan, light-weight motors and K-35 control, were also adopted for these cars.

Iowa Association Changes Name

At the Closing Session of the Dubuque Convention Maintenance Was Discussed, Officers Were Elected and the Constitution Was Revised

THE closing session of the Iowa Street & Interurban Railway Association's convention at Dubuque, Iowa, was held during the morning of May 12. John Sutherland, master mechanic Tri-City Railway, Davenport, read the paper on "Inspection and Maintenance of Rolling Stock," abstracted in last week's issue. C. M. Feist, master mechanic Sioux City (Iowa) Service Company, opened the discussion by emphasizing the importance of keeping men constantly at particular repair jobs, so that they may become expert. He said that the maintenance of rolling stock equipment had not been very expensive with his company because all old-type motors had been replaced with new interpole motors about five years ago. Since making the change not a single commutator had been turned, whereas the old-style motors had to have their commutators turned and slotted every six or seven months. Mr. Feist also said that armature-bearing life had been prolonged by broaching the babbitt linings. The inside diameters of these bearings were babbitted slightly scant, and the broaching compressed the babbitt to the correct diameter. This process made the metal both denser and smoother. O. S. Lamb said that it was difficult at times to get the management to purchase modern equipment to replace the obsolete. In many instances it would be economical to scrap old motors and cars and purchase modern motors and lighter cars. President Leussler closed the discussion by suggesting that the best way to convince a management of the economy of a change in equipment was to submit to it carefully prepared data.

In the executive session which followed the constitution and by-laws of the association were amended, changing the name to the Iowa Electric Railway Association, and permitting manufacturing companies to become members for an annual fee of $10. Representatives of manufacturers will receive the same privileges as the railway members except that they cannot serve on the board of directors or vote on matters pertaining strictly to railway methods, standards or rules. The field of the association was also extended to include Nebraska.

Following the report of the resolutions committee, E. C. Allen, general manager Cedar Rapids & Marion City Railway, was elected a director of the association and its president; C. E. Fahrney, general manager Ottumwa Railway & Light Company, was elected vice-president, and H. E. Weeks, secretary and treasurer Tri-City Railway, was re-elected secretary and treasurer.

Some Comments on Public Utility Commissions*

Utilities Are Natural Monopolies and Duplication of Service Produces Wasteful Competition—Centralization of Control in Competent Commissions Is Advantageous to the Utility

BY SAMUEL INSULL

President Commonwealth Edison Company, Chicago, Ill.

PUBLIC utility business as a whole, including telephone, electric, gas, steam and electric railways, receives operating revenue of upward of $4,313,000,000. Of this amount one-third is received by local public utilities. This business yields $985,000,000 annually and it pays more than $2,000,000 in taxes. It is capitalized at $25,000,000,000, which represents assets of about $30,000,000,000. Public utilities pay more than $1,750,000,000 annually in wages and salaries, and they employ 2,250,000 men. About two-fifths of the capital employed is for local utility business, and it also pays about the same proportion of taxes. The ratio of capital employed to revenue produced is of the order of $5 to $6 of capital to $1 of revenue. In other words, this shows that the public utility business as a whole is among the most conservatively capitalized of any class of business. The utility business is not over-capitalized, but its assets exceed the capitalization. Instead of apologizing to those who criticise our economical situation we should refute their arguments with the foregoing figures, which were taken from the Federal census reports. I am a great believer in hitting back, and if critics will take the broad general view they cannot help but be convinced by these census figures.

The public utility business to be economical must be a monopoly. Duplication of investment should be prevented by refusing to grant competitive franchises. It has been a good many years now since politicians came to the conclusion that the public utility business must be a monopoly. I have given a great deal of thought to public utility regulation. About eighteen years ago, as president of the National Electric Light Association, I read a paper in which I indorsed regulation on the ground that for economical reasons public utilities must be monopolies. [Mr. Insull then read portions of this address.] Franchises granted to utilities should obtain the same rights for their security-holders as those given to other investors.

Public utilities perform a public function, and for that reason there is no question about the right of states to regulate them. Since it is granted that the business must be a monopoly the state must see that the price of service is based on the cost and a fair return. This is a fundamental, inherent right of the business. The establishment of commissions was due to the failure of competitive franchises, and also to a failure of public utility officials to realize their responsibilities. Many of them were in the habit of charging all the traffic would bear, or they were ruled by a desire to possess themselves of the other man's property. I want to sound a note of warning against the practice of disregarding the rights of existing public utility corporations operating in a given territory. I have yet to find a case where it was good business deliberately to invade the territory of another utility. Since I became connected with the public utility business I have started twenty-five or thirty different utility corporations, but I have never found it economical or desirable to parallel another man's investment. On the other hand, if my rightful territory is invaded I will fight back relentlessly.

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*Abstract of paper read at the meeting of the Iowa Gas, Electric Light, Street & Interurban Railway Association, in Dubuque, Iowa, on May 11, 1916.

After years of experience and consideration I cannot see any other solution of the public utility problem than through strong regulative bodies. The more centralized and powerful they are the better they are for all public utilities. If there is anything wrong with my business I want to know it, and the best way to find it out is for high-class men with the regulative viewpoint to investigate it. I understand that this view is not popular in Iowa and elsewhere, nevertheless I am very certain that the best results can be obtained by state commissions. In Illinois, home rule for Chicago is being urged, and probably will be granted. I consider such a move a step backward. Thirty-three states now have commissions with jurisdiction over public utilities. This is sufficient evidence that the trend is in that direction. A large proportion of the people may think wrongly on some problems for a time, but they will hardly make a mistake on fundamental questions.

Commissions are in a fair way to substitute arbitration for war between the public utilities and the public. In Idaho, for instance, the state commission ruled in a certain case that it would not be placed in a position of throttling ambition by fixing a rate of return. Such a ruling creates greater incentive for better management. If the laws creating a commission are properly drawn, and permit the employment of competent men, they, as a rule, after a few years of experience, see the necessity for changes in the laws affecting public utilities, and will champion a move to that end. Commissions have a right to regulate in the way that best suits the purposes of government, and they ought to exercise that right. The changes taking place in the utility business are not confined to any one community, and local regulation cannot much longer remain effective. Regulation gives much greater permanence to investment, and in the final analysis we cannot have regulation without protection.

One of the greatest disadvantages of commission regulation is the possibility of the creeping in of politics. It would be the poison and ruin of any regulative body, and it is our business to decry the commission's being used for political purposes. Regulation interferes with our liberties of action, yet it is very good discipline. Some human beings, when working for large corporations, are apt to feel a little bit "sot up," and regulation is good for that ailment. Public utilities cannot keep their power without the good-will of the communities they serve, and regulation is a great aid to this end.

One very serious question in commission regulation is to what extent such a scheme is disastrous to enterprise. If the businesss is run too much by rule the initiative and enthusiasm of the operators may be unfavorably affected. This is a very serious consideration and deserving of much thought. Moreover, states are not in the habit of bidding as high for brains as utility companies. If the price only permits the hiring of relatively cheap commissioners instead of obtaining high-grade men, the commissions are very liable to hold the men of great finance in distrust. Such commissions also, when newly appointed, think their function is to prosecute and persecute public utility companies.

The census figures show the enormous amount of money invested in the utility business, and that money has rights under all circumstances. The capital invested is not owned by a few, but represents the savings of the workers of this country, the widows and orphans. It is a mistake for anyone to claim that the captains of the industry own the utilities, when, in fact, they own relatively a small proportion. Utility security-holders have a right to protection as much as anyone. It is a wise policy for utilities to get their employees to invest in their securities. Such a policy brings their influence for the utility and is an aid to regulative relief.

If public regulation fails public ownership will follow, and I believe it should in that case. The success of regulation is up to the public utility operators, and they must recognize the principle that monopolies must be regulated if privately owned. It should become our duty to see that regulation is a success, because it is to our own best interests. Argument that public regulation is a failure is no argument against public ownership. Present indications point to the fact that in but a short time every state will have some form of regulation.

It is fundamental that our best interests will be served by maintaining cordial relations with our patrons and commissions. One does not buy his goods from a man who is disagreeable unless the goods are very cheap. Cordial relations will give a bigger return on our investments than any other one thing. I believe in being candid and aboveboard in my relations with the public. I believe in taking them into my confidence, not as a favor but as a right. We get our income from them and are dependent upon them for our success.

Small and large companies alike need initiative and enterprise in developing a public utility business. Do not manufacture your product when you can buy it cheaper. The increase in the business will be enormous in the next few years, hence it is wise to have a broad policy as to rates. In other words, do not be afraid to sell your product too cheap. We public utility men have a great opportunity to benefit ourselves. We are more or less semi-public servants, however, and we should not make the mistake of looking too much to personal interests and not enough to community interests.

U. S. Civil Service Examination for Assistant in Transportation

The United States Civil Service Commission announces an open competitive examination on June 13, 1916, for assistant in transportation, for men only. From the register of eligibles resulting from this examination certification will be made to fill a vacancy in this position in the Office of Markets and Rural Organization, Department of Agriculture, Washington, D. C., at a salary ranging from $1,800 to $2,400 per annum, and vacancies as they may occur in positions requiring similar qualifications, unless it is found to be in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The duties of this position will be to assist in the rendering of practical service to producers and distributors of farm commodities, especially perishable commodities, in every phase of the transportation problem, and to co-operate with both shippers and carriers in raising the standard of transportation service and in reducing the economic waste of foodstuffs in transit.

The division of statistics of the Interstate Commerce Commission has just issued a preliminary abstract of the statistics of common carriers for the year ended June 30, 1915. This report includes tables showing the revenues and expenses in detail, income statement, profit and loss statement, balance sheet, operating statistics, particulars of equipment, etc., for railroad companies having, with a few exceptions, annual operating revenues above $1,000,000. The compilation also includes abstracts from the annual reports of the principal express companies and the Pullman Company.

Papers Read at Lancaster

Conclusion of Pennsylvania Association Spring Meeting Report—Papers on Rush-Hour Traffic, One-Man Cars, Accident Reserves, Training of Platform Men, and Freight and Allied Service

IN the ELECTRIC RAILWAY JOURNAL of May 13, page 904, there was published a report of the proceedings of the Pennsylvania Street Railway Association at the spring meeting in Lancaster, Pa., on May 9 and 10, with the papers that were presented on labor, the Engineering Manual and physical examination for employees. This issue contains the remainder of the papers dealing with miscellaneous topics concerning the operation and management of electric railways.

Rush-Hour Traffic

BY P. T. REILLY

Superintendent of Transportation, Scranton (Pa.) Railway

In our city, where labor unions are so strong that they are establishing their own working hours, the rush-hour problem is being solved rather nicely. This problem has been helped somewhat by a law passed by the recent Legislature creating a shorter work day for women. Thus instead of having the rush hour confined to one hour in the morning and another hour in the evening, as formerly was the case, it is in a measure divided into several hours, both morning and evening. One set of workmen commences at 7 a. m., another at 7.30 a. m., others at 8 a. m., while the clerks and others go to work from 8.30 a. m. to 9 a. m. The time for quitting work varies from 4 p. m. to 6.30 p. m. In the mining industry, in which there are a large number of workmen, employees are constantly going to and from work. As a rule each man employed in or around a mine lives in close proximity to it so that we have no particular rush to or from work by employees of this industry.

While we have no very large manufacturing plants located at some distance from the center of traffic, like all street railways we have our rush hours. At the beginning of the rush-hour period we make an effort to see that all regular cars are running on scheduled time. This is accomplished by closely checking the cars at a given point and by placing inspectors at important junctions to assist crews and traffic. We operate twenty-seven lines of cars, and on lines where this rush period occurs regularly every evening we meet it by placing extra cars in service operated by extra men. We also run what are called noon or half-day cars. These cars go out from 10 a. m. to 11 a. m. and operate till from 8 p. m. to 9 p. m. They either shorten up the headway of the regular cars or run as a separate line, doubling up the service as the schedule provides. The number of extra trippers operated between 4 p. m. and 7 p. m. represents 20 per cent of the regular service.

We always make it a practice to see that our largest cars are placed on lines where the traffic is heaviest. Each line is watched carefully and checked occasionally, and when it seems to require extra service we either add trippers or shorten up the headway as seems most desirable. We find that it is more satisfactory to do this voluntarily and bring the attention of the people to the increased service we are rendering than to wait for some citizens' committee to call or send in a petition or to wait for public criticism.

One of the interesting things we learned in the handling of tripper service on lines that have fairly frequent headway is that better results are obtained by running trippers a few minutes ahead of the regular car and going to the end of the line rather than splitting the service and running only a portion of the trip. Men employed running trippers are paid platform time except when the cars are operated by regular men, who are paid at the rate of time and one-quarter.

A careful checking and study of our lines convinces me that too many trippers can easily be placed in service. Particularly is this true where a reasonably frequent and regular service is maintained on the line. Years ago when cars were small and tracks were bad and service was slow and irregular, it was more of a hardship to ride in a crowded car in rush hours than it is now considered to be because the cars are so much faster that one is rarely crowded for more than ten minutes. Trippers are expensive to operate. They usually carry passengers in but one direction, and they are not regarded with much favor by employees. If too many are operated, dissatisfaction usually exists among crews. It seems well, therefore, to make the regular service handle this so-called rush business so far as it can reasonably do so.

I find the best method next to adding a small number of trippers is to impress conductors with the habit of being good-natured. This is a mental attribute which costs nothing and covers a multitude of sins. The public, whether in a crowded car or in spacious, comfortable surroundings, appreciates good-nature. The conductor who is trained to smile instead of to frown and who will take an interest in his passengers goes pretty far into the solution of the crowded car. One of the difficult problems of the rush-hour traffic is the person who stands in the middle of the aisle of the car and refuses to move so that passengers can pass. This fellow is somewhat of the impression that no seat means no fare. He does not stop to think there is a seat for him in the car directly following. He has a grouch. This grouch is often contagious and spreads among the other passengers. In handling this well-meaning passenger, much depends on the conductor. The stern command to move up front will not move him. He only becomes more stubborn. Politeness, however, will usually do the trick. The conductor who can say diplomatically, "Will the gentleman in the aisle be kind enough to move forward?" will usually put him in motion and permit passengers to move more freely.

Another helpful agent is the public press. We must recognize the fact that newspapers are the teachers of the people. An article now and then relative to manners on the street cars helps a great deal. The effect of their work in this respect is shown by the fact that in a few seasons they made the so-called "end-seat hog" on open cars so unpopular that it is now hard to find one. The people will not be driven, but they will follow gentlemanly treatment and advice. Occasional newspaper articles telling about the good service and improvements contemplated will put people in a pleasant frame of mind, and when they believe they have good service and are boosters of their local road, many of the difficulties of rush-hour service are overcome without additional expense.

My experience has been that passengers properly treated during the day with a regular, reasonably frequent service do not complain much against the strap. By giving the public the best you have with due economy of operation, and truthfully assuring them that it is the best at your disposal, they are willing now and then to put up with a little inconvenience, but do not inconvenience them too much or keep at it too long. Show them by increased service occasionally that you are glad to have them in the cars and have it known that they will be properly treated as passengers. See that the conductor attends to business, calls streets intelligently and accurately, that he and his car are neat, clean and tidy, and have him understand that he is employed to serve the people.

The street railway company is like the merchant who wants friends. When you call on a merchant who is your friend, if he is busy, you are glad of it. You do not tell him he ought to build another store, just to accommodate you. The people who are the friends of a street railway—and every man, woman and child ought to be won as a friend of the company—will not kick if they find the company busy and prospering. It is usually some employee who is the cause of making enemies for the company. The untidy conductor disgusts lady passengers. A loud, talkative and inattentive conductor disgusts men. It is no hardship on the crew to insist that they do the work for which they are paid and that they give extra attention to their passengers when the car is crowded. I think we will all agree that next to providing some extra cars and good equipment with wide aisles and a reasonably fast schedule, a neat, tidy, courteous crew, who know their business and attend to it, is the most important factor in the solution of the rush-hour traffic.

One-Man, Light-Weight Cars

BY W. E. MOORE

Consulting Engineer, Pittsburgh

The one-man, light-weight car is not new. John Stephenson more than fifty years ago built such cars for New York City, and at the same time he embodied conveniences for fare collection and handling the car by the driver. These early cars, seating from twenty to twenty-five passengers, weighed less than 2 tons. They were often of the "bob-tail" variety without rear platform but with a center rear door and step, the door being controlled by a strap running forward to the driver on the front platform. A fare box was located in the front bulkhead within convenient reach of the driver, in some cases supplemented by a slotted top, inclined nickel chute or carrier.

These cars exemplified in their design, choice of material and construction a high degree of skill and good judgment on the part of the builder. The bodies of the first cars were framed of ash carlines and stanchions with poplar cove and convex panels, glued and "scrimmed." The sash were often but 3/8 in. thick. The trucks were of trussed construction, framed of light iron forgings, with malleable-iron journal boxes, spring seats, etc. The springs were of the coil pattern, cushioned on rubber buffers. The axles were usually 2¼ in. to 2½ in. in diameter, with 24-in. to 30-in. wheels, and weighing 140 lb. to 180 lb. each.

With the advent of electric traction numerous house carpenters entered the car-building business and offered their clumsy, ill-proportioned wares, painted in gay colors, lettered in gilt and ornamented with numerous brass trimmings, to the trusting and unsuspecting street railway magnates, who vainly vied with each other for the largest and the heaviest cars, weight even having been made a strong talking point by the car builders. Many cars were put upon the market weighing 35 tons to 55 tons, a weight per passenger seat ranging from 1200 lb. to 2000 lb.

Thomas Elliott, then mechanical engineer for the Atlanta (Ga.) Railways, seems to have been the first fully to appreciate and preach the fatal results which were sure to come from such ill-conceived and useless extravagances. Some eighteen or nineteen years ago he developed that type of car, now so popular, which does away with the hog chain and over truss and wooden boarding on the sides. He substituted therefor a sheet of steel of a length extending from end to end of the car and around the corner posts to the door openings and of a depth from the window rail to the bottom of the car sill, thus embodying a complete girder side construction and sheathing for the car. Notwithstanding the fact that a number of such light-weight steel-side cars were operated and were described in the technical journals, it required more than a dozen years before street railway men and car builders began to note the advantages of this light-weight, durable construction.

Now the financial tide has turned adversely for electric railway enterprises, and street railway managers are compelled to abandon many things not absolutely necessary. The light-weight, one-man car, while it cannot be said to be a panacea for all of the street railway man's ills, nor a remedy for lost returns on money wasted for heavy equipment, does, however, offer great hope for reducing expenses, increasing travel and knocking out jitney competition in many localities. Its popularity is attested by use on one hundred railways in the United States.

Keeping pace with the call for reduction in weight, low cost of construction and operation has required innovations and advances in the design, material and construction of car bodies, trucks and electric motors. The light-weight, one-man car is generally smaller than the ordinary single-truck car, although it usually seats more passengers than did the single-truck car with 20-ft. body. It usually seats twenty-five to thirty passengers and is from 25 ft. to 30 ft. long over bumpers. It should weigh, ready for operation, not more than 10,000 lb. Such a car can be bought, complete with trucks and motors, for $2,500. The weight is distributed about as follows: Body, 5500 lb.; truck, 2300 lb.; two motors each developing about 30 hp., 800 to 900 lb. each. Chilled-iron carwheels are now available at a weight of approximately 200 lb. each.

The entire equipment has been refined, even down to the brakeshoes, which weigh 13 lb. and cost 25 cents each as compared to those of the old type, which weigh 30 lb. and cost 60 cents each.

The truck design of the new cars has been worked out with coil springs operating in series with semi-elliptic springs, so that the riding qualities are superior to any single trucks heretofore marketed. Teetering is practically absent, due partly to the long wheelbase, generally made 9 ft. or 10 ft. This is permissible because the submergence of flange of the 24-in. wheel in the guard-rail grooves is shortened to the extent that the 10-ft. wheelbase truck will round short-radius curves about as easily as the old 8-ft. truck with 33-in. wheels. The improved riding qualities of these trucks are remarkable; in fact, these cars ride practically as well as the jitneys.

Steel-side car construction has reduced the thickness of the car side to 1 in. or less, giving a corresponding increase in the aisle width ranging from 6 in. to 8 in. Coupled with the savings in power, track maintenance, wheel and brakeshoe wear by reduction of weight, the economy of the light-weight, one-man car has been greatly increased by the simplification of the body and wearing parts. For instance, the doors have been so designed that no mechanism is required for their operation, and the old-style hinges have been replaced by continuous, durable hinges of "piano-box" construction, incidentally keeping out cold air and excluding dirt. The trucks have been so designed that the wearing parts are unusually accessible. An axle with wheels may be removed by simply loosening U-bolts from the journal box, while the brakeshoes may be readily replaced and adjusted by means of a single nut.

The light-weight cars for many cities or suburban routes are equally as fast in loading and schedule as the two-man cars. For instance, with 500 volts at the trolley wheel, and a load of twenty passengers, an acceleration of 1½ m.p.h. per second can be assumed. With a braking rate equal to that obtained on air-brake cars and assuming ordinary grades and six-second stops, the following schedule speeds can be obtained: Five stops per mile, 11.4 m.p.h.; five and one-half stops, 11 m.p.h.; six stops, 10.7 m.p.h.; six and one-half stops, 10.3 m.p.h.; seven stops, 10 m.p.h.

The greatest economy of these cars is due to their light weight and the elimination of the conductor. In other words, the platform labor has been divided by two where one-man cars have been installed as a rule. There are, however, exceptions in some cities where the travel is unusually heavy on one end of the line for certain hours of the day. In such case it is customary at such heavy hours to put on a "swing" conductor, who rides out to the first passing point and collects the fares, swinging over to the next car and returning to the starting point for another swing run. In some other cases where the car line runs through a city with a fare zone in the city and other fare zones at either end it is occasionally essential to put on a conductor to take up the fares in the middle zones, leaving the motorman to collect the fares from the passenger boarding the car in the outer zones.

In the case of some eighteen cars operated under the direction of the writer on four street railway lines, there was an approximate saving of $5 per car per day in platform expense. Under ordinary conditions one-man, light-weight cars require a maximum of ¾ kw.-hr. per mile as against 1¾ to 2½ for the ordinary single-truck, two-man car, weighing 10 tons to 15 tons. This saving in power, at 1½ cents per kilowatt-hour at the trolley wheel, and a mileage of 180 per day, usually amounts to $2 or $3 per day.

It has been found that the 200-lb., 24-in. chilled car-wheels have two-thirds the life of the 600-lb. 33-in. wheels, as a rule. That is, the wheel cost is reduced to approximately one-half, with a corresponding saving in rail wear and joint maintenance. Many recent improvements in light-weight motors have reduced the cost of motor maintenance to less than one-half the former cost per motor-mile. The 25-cent brakeshoes have been giving an average life of 7500 miles.

Actual records of the claim department show the percentage of miscellaneous accidents to have been materially reduced, while boarding and alighting accidents have been practically eliminated. Collisions with vehicles seem to have been reduced by reason of lighter weights and more quickly operated high-efficiency brakes. New trucks have been developed with hand brakes which require practically no more labor to operate than air brakes, as the brakes are applied with only half a turn of the crank handle and a moderate pull on the brake handle is sufficient to skid the wheels.

The introduction of the steel-sided car, with the elimination of the bulkhead and double sliding doors, together with the simplification of the trucks and wearing parts, has reduced car maintenance fully one-half. In other words, the light-weight, one-man car can be said to cost approximately one-half to operate, less than one-half for power, about one-half for platform expense, one-half for maintenance, one-half for track wear, all with a smaller proportion of accident expenses per passenger. With such cars it is feasible to double the number of trips, thus increasing the convenience to the public, with a resulting increase in traffic and at the same time keeping within the present limit of operating costs. This makes most effective competition for jitneys, as there is nothing equal to frequency of service for building up travel, especially in those cities where the traffic density is such that it is impracticable with the old two-man, heavy-weight car to operate less than a 15-min. headway.

These cars, like other advances in the arts, have their drawbacks. The labor unions object to them, and in some cases incite remonstrance on the part of the public, because each car eliminates the necessity for one man's labor. Such objections can usually be overcome when putting on the new cars by doubling the headway. Where this is not necessary, it may be best to give the motormen on the one-man car a cent or two per hour more than the other motormen.

It is not claimed that the light-weight, one-man car is a "cure all." It nevertheless is a remedy for many of the railway man's troubles which come from over-investment and high operating expenses. Some new railway projects which were not feasible otherwise will become so with these cars, for 50-lb. rail can be used where 70-lb. rail has been required. There will be a corresponding difference in bridges, power stations, lines, etc. It is believed that these cars will be the salvation of many properties which are now in a precarious financial condition.

Training Platform Men

BY W. A. HEINDLE
General Superintendent Southern Pennsylvania Traction Company, Wilmington, Del.

The method in vogue for training platform men is hardly worthy of the name. Good motormen and conductors are born and not made. Some men take to it naturally and are fitted for the job. It is a true statement in that selecting proper men 50 per cent of the usual training is accomplished.

The question of how to secure such trainmen is a very important problem in every street railway operation. The grade of men available and offering for such employment is rapidly deteriorating. This may not be true in isolated sections, but is certain in the larger industrial territories where diversified employment is offered. In the early days of electric railways, motormen and conductors were hired with the prospect of permanency. Now, however, social unrest, the labor agitators, unionism and the scarcity of employees in the homes of the "war brides" are strong factors affecting the problem of the operators of our cars. Competition and search for men has been extremely keen. Agents of the munitions companies have boarded our cars and solicited motormen and conductors to file application for employment with promise of several years' work and much higher wages than our standard. The magnetism of high wages proved irresistible to numbers of men who had been with the company for years.

An applicant to our company is required to fill out blanks giving the usual information as to age, training, home address, reference, etc. If he appears suitable for the job, forms are sent to parties referred to, and should the replies be satisfactory the man is employed. All papers are filed and a card record is kept of each employee, giving date of appointment, badge number, record of accidents, reprimands, penalties, checks, etc. Upon being hired, the student after receiving the company's book or rules and a short general talk by the division superintendent, is then assigned to certain motormen or conductors for breaking in. Learners are given fifteen days on the various lines, being paid 75 cents per day. The instructing motormen or conductors receive 25 cents per day in addition to their regular wage. After being pronounced O. K. by the regular, the student is put through the school of instruction and made familiar with all the equipment of a model car. He is examined on the rules by the general instructor or division superintendent and is finally assigned to the extra list.

The new men are carefully watched by the inspectors for several months, particularly with regard to reckless running, the taking of chances and the handling of the public. At each car barn the company has provided club rooms for the use of the men. These are maintained by the Employees' Relief Association and are fitted with pool tables and games and supplied with current literature. At intervals all men, old and new, are called together for an hour, at regular pay, and are addressed by the heads of the departments, superintendents, claim agents and occasionally by one of their own number on topics of interest, such as "safety-first" matters, prevention of accidents, fares and collection of same, car operation, schedules, operation of signals, courtesy and kindred subjects. These meetings serve a dual purpose: (1) in giving the management an opportunity of talking direct to the men, and (2) in making the men mix. Moreover, a healthy discussion of the operating difficulties clears up many questions which may arise.

A bi-weekly bulletin is written by the superintendent of transportation and posted so that all may read. This bulletin always records the number and nature of accidents on the various divisions, how they might have been avoided, articles on various phases of operation, instructions for particular cases, commendation for meritorious service, etc. That the meetings and bulletins are productive of good results is shown by a reduction in the payments for accidents and damages from 5 per cent and 6 per cent of gross to 2 per cent in five years.

I sometimes think that men of middle age, of settled habits, are preferable to the younger men for car operation. The older men will be more careful and perhaps will hold their jobs longer. I am also a believer in giving the employee the benefit of the doubt in all cases. The discharge should only be resorted to for good and sufficient reason. In some cases, if he is retained in service, a serious accident will make a careful man of one who was formerly reckless. This day of many automobiles and trucks takes the strictest attention and carefulness on the part of the trainmen. We endeavor to instill in the minds of our men that "safety-first" begins at home. That it is up to us to look out for the ninety-nine out of every 100 who will not stop, look and listen for their own protection.

We should devote more attention to personal contact with the men. The too-often used manner of some inspectors and superintendents in bawling out orders, humiliating the men before the public, should give way to a quiet word with the reason for such orders carefully explained. Make the men feel that they are of as much importance in their place as the general manager is in his, and that the company is worthy of their loyalty and best endeavors, for loyal employees will oftentimes in a large measure counteract any adverse criticism of the service. If the motorman or conductor appreciates his job, feels that he is the company's agent and what he does adds to its weal or woe, he is an efficient and loyal employee.

Handling Accident Reserves

BY H. D. ANDERSON

Assistant Comptroller American Railways, Philadelphia, Pa.

By establishing a reserve to care for the expenditures in connection with accidents and damages, an equalization of operating expenses for the current year is effected. If no amounts have been set aside within the year measured upon such unit as may be gained from the experience of past years, the true operating expenses of that year will not be correctly stated in the income account. If payments representing claims which have accrued during past years are charged to the operating account in any one year, it is an unfair burden on the income account for that year.

As there is unquestionably a direct relation between the number of accidents occurring and the number of passengers carried to operating revenue from transportation, it is the practice of the American Railways to base its accrual to the reserve account on a percentage of the operating revenue from transportation, having first determined from an examination of the accounts for the previous year the exact percentage of payments made. As a case in point during 1915 the percentage of expenditures in connection with accidents to transportation revenue on one of our companies was 0.64 per cent. The company had been setting aside during 1915 1 per cent. After considering the balance in our reserve account and examining a schedule of unsettled claims and suits filed (such a statement always being prepared for this purpose at the close of the year), it appeared that for 1916 it would be necessary to accrue monthly 0.5 per cent of transportation revenue. In the case of another company it was necessary to accrue 4 per cent. The percentage varies in our different companies in connection with the physical character of the territory; the class of equipment used; the class of men that the company is able to obtain as trainmen, and the result of systematic effort on the part of the management to reduce accidents.

A study of the income accounts of the several subsidiary companies for past years shows that this method has been satisfactory. This method is apparently fairer and more satisfactory than setting aside at the beginning of the year an arbitrary amount and charging it up in twelve equal installments. This latter method does not show a curve, whereas in the method outlined the accruals are of course largest during the summer months when earnings are the greatest. Thus the large earning months thus receive a fair proportion of the yearly charge, and it is invariably the case that during these same months the largest number of accidents occur.

Some may object to this method on the theory that if during any one year the company should be so unfortunate as to sustain a large number of very serious accidents, then the accruals for that year having been based on the previous year would not truly show operating conditions. For those who wish to draw a finer line and attempt to fix in each month the approximate liability for that month, probably a better method would be to compute the total amount of claims entered against the company during the month and the actual payments made on account of such claims. The ratio thus obtained could be used as a unit for each month during the fiscal period, but this method also has its weakness in that the ratio would very probably in some months be considerably out of line owing to the recovery of large amounts by claimants. It may be said in this connection that it has been the experience of the American Railways that the final cost of claims settled is about 10 per cent of the total amount of claims filed.

After the reserve account has been established the question may arise as to the disposition of the balance. Should the money represented be invested in securities, set aside as a special cash fund or retained by the company to be used as a part of its working capital? The very nature of this account is that it is active, debits and credits constantly being made, and it would seem that the average company would find it more advantageous to retain the money and use it as working capital rather than to possibly at times be forced to borrow cash and pay interest thereon.

After all the vital point for the companies' consideration is that at all times the balance in the reserve account plus current accruals is enough to provide a sufficient amount for the reasonable settlement of all outstanding claims and possible future accidents within the year to a reasonable extent. The fact that a large credit balance may appear in the reserve account is not always proof that sufficient provision has been made or is being made. The balance may be apparent but not real, and this condition may be brought to light by a study of the schedule of the claims filed and of the claims unsettled.

Freight and Express Service and Mail Service Rates

BY J. E. WAYNE
Superintendent York (Pa.) Railways

The freight and express organization of the York Railways consists of a general freight agent, whose duties are soliciting and collecting, as well as clerical work at the York warehouse. This agent, together with two men employed as freight handlers, completes the force at York. Warehouses are operated at Red Lion, population 3000, 9 miles from York; at Hanover, population 10,000, 20 miles from York, and Spring Grove, population 1500, 10 miles from York. At each of these warehouses one man is employed as agent, doing soliciting and collecting as well as general work about the warehouse. At times it is necessary to employ extra help, but under ordinary conditions one man is able to transact the business in a satisfactory manner. Reports are made daily by each agent of the business done that day, and all money collected is forwarded to the auditor.

SERVICE AND EQUIPMENT

We operate one trip daily except Sundays on four suburban lines, on regular scheduled runs, and on one line two trips daily except Sundays. The average daily mileage is about 160, and the car hour average is 40.

We do not render pick-up and delivery service with auto or wagon, for this could not be operated profitably at the present rates. We do, however, give this service with express cars where the shipper and consignee are located directly along the track.

Between York and Red Lion, a distance of 9 miles, an auto-truck line was started by outside interests, making one round trip per day, picking up shipments in Red Lion and delivering these in York and intermediate points, and vice versa. This service lasted about two weeks, and was discontinued as unprofitable. There is, however, a stage line running over this same route and carrying shipments as low as 5 cents, which takes considerable business away from us. Although the owner of stage acknowledges an unprofitable business, he continues to operate.

The equipment consists of four double-truck box motor cars, capacity 20 tons; two double-truck flat motor cars, capacity 20 tons; three flat trailers, capacity 20 tons, and one dump car, capacity 20 tons.

Sidings have been installed at various points where the customer has given some assurance of a large volume of business, the company installing the necessary special work and the customer bearing the balance of the expense.

RATES AND CLASSIFICATION

The steam road rates in our territory were used as a basis for rates, and with a few exceptions our rates are similar to theirs. L. C. L. shipments with a few exceptions are classified according to the official classification used by the steam roads. We do not classify any commodity less than fourth class.

C. L. shipments are not classified, all such shipments being forwarded at the same rate, regardless of the commodity, and charged for on a mileage basis. One day is allowed for loading and unloading C. L. shipments on trail cars. C. L. shipments consist mostly of crushed stone, lime, brick and lumber. L. C. L. shipments consist of groceries, hardware, feed, flour, beer, milk, cigars and tobacco.

MILK

For shipment of milk we sell 20 tags for $1.50, each tag good for transportation of one can with maximum capacity of 6 gal., regardless of the actual number of gallons contained therein. Double tags are required for each 6-gal. can of cream. This makes a rate of 1.25 cents per gallon for milk and 2.5 cents per gallon for cream. When shipped without tags, the charge is 2 cents per gallon for milk and 4 cents per gallon for cream. These rates apply between any two points on one line. One-half of each tag is lifted by conductor and forwarded to the auditor, the other half, bearing the name of consignor and consignee, remaining on the can.

Transporting milk at our present rates is not very profitable, and to make any profit it is necessary to handle shipments on regular passenger runs, with the exception of one line, on which we operate a milk car. While we think rates should be higher, raising them at present would encourage the use of motor trucks, two of which are now being operated for this purpose. Daily shipments consist of about 250 6-gal. cans.

Handling milk on passenger cars of course reduces the seating capacity, and often causes cars to run late. Several claims have been paid resulting from milk being spilled on passengers. On our heaviest milk run it is necessary to employ an extra man for three hours each morning to assist in handling milk cans. On the arrival of a car carrying milk at Centre Square, where all suburban lines terminate, milk is either transferred to a freight car or the car is run to a warehouse several blocks away causing it to leave late on next trip.

EXPRESS ON PASSENGER CARS

Express shipments are accepted on suburban passenger cars at a minimum rate of 15 cents. Shipments must be delivered to the car and prepaid, consignor receiving a receipt therefor bearing a 1-cent revenue stamp, a duplicate of the receipt being retained by the conductor to be turned in to auditor. The company does not assume any liability for these shipments after they have been placed beside the company's tracks at the point of delivery as designated by the shipper. Claims have been made for damage to goods after such delivery, but were always refused.

On city lines we accept packages for 4-cent ticket or 5 cents and do not issue receipt. The acceptance of all shipments on passenger cars is left to the judgment of the crew when no inspector is present, and only such shipments are accepted as can be carried without interference with passengers or operation of cars. We are now considering a plan whereby all shipments on passenger cars will have the weight plainly marked thereon, charge being made in accordance therewith.

NEWSPAPERS

Local newspapers are delivered to residents along suburban lines, by being thrown off by the motorman while the car is in motion. Frequently these papers are attended to by employees, who happen to be riding on the front platform. Rates of 25 cents per 100 lb. and 50 cents per week per line are charged for this service. This method of delivery is a great convenience to the newspapers and patrons of suburban lines, but, on account of the attention of the motorman being diverted from his work, we have considered discontinuing it.

Out-of-town newspapers are charged for at the same rate per 100 lb., but all shipments are made in bulk and delivered to various points like express matter. Owing to newspapers being delivered direct to passenger cars, the weight is checked by our men only four times per year for a period of one week, the company depending on notification from the newspaper of any change in weight. Average weight of newspapers is 200 lb. daily, except Sunday, when about 4000 lb. are forwarded.

COMPETITION

The low rates and convenience of the parcel post have seriously affected our express business. We are at present carrying very few small parcels compared with the number transported before the inauguration of this system. A sub-postoffice is located in each large department store where parcels formerly forwarded via trolley are sent by mail direct from store to customer. Many of these packages shipped by parcel post are carried on our cars in mail bags, for which we receive no additional revenue from the government.

The automobile is our most serious competitor. A total of 75 per cent of revenue derived from moving household goods has been taken away by auto trucks, as well as a fair percentage of other shipments. The passenger automobile is also detrimental to the express business, articles formerly sent on cars being carried in this manner.

MAIL SERVICE RATES

Mail service rates should undoubtedly be increased. On our Hanover line we are now carrying mail with an average daily weight of 1250 lb. Before the parcel post system went into effect this weight was 400 lb. The average weight per mail has increased from 100 lb. to 325 lb., and the number of bags or sacks from nineteen to fifty-eight per day. As many as twenty-seven bags are carried on one trip. On another line, average daily weight has increased from 55 lb. to 400 lb., and weight per mail from 9 lb. to 60 lb. We are still receiving 3 cents per mile, regardless of the number or weight of bags.

The employees of the Chicago, Ottawa & Peoria Railway, a subsidiary of the Illinois Traction System, Peoria, Ill., will have free use of cottages for their summer vacation at a pleasant camping spot on the banks of Au Sable Creek, 15 miles from Joliet, Ill. The summer colony will be known as the "C. O. & P. Camp" and over the entrance will be the words, "Come and Play." The cottages are being erected now and will be ready for the use of the employees by June 1.

Jitneys in Rochester to Be Stopped

Up-State Public Service Commission Declares Electric Railway Must Constitute Backbone of Dependable Transportation in City and Its Development Must Not Be Retarded

HOLDING that the operation of 136 jitney buses on the streets of Rochester will not meet the demands of public convenience and necessity as well as will improvements in the street railway service, the Public Service Commission of New York, Second District, on May 19 denied the application of some threescore individual operators for jitney bus certificates, covering fourteen routes substantially parallel to the trolley lines in that city. The dismissal of the jitney applications is coupled, however, with recommendations for extensions and improvements in the electric railway service which the commission says must be made or another application for jitney operation may meet with more favor. The case is the first in which the jitney and the electric railway have come before the commission on a square issue of public convenience and necessity on a large scale. All the commissioners concur in the opinion. A report by Charles R. Barnes, electric railroad inspector of the commission, on the transportation system in Rochester, forms a part of the order.

The opinion, which was delivered by Commissioner Emmet, reviews the history of the policy of the State toward competition in the public utility field, pointing to the change in this policy with the enactment of the public service commissions law in 1907 from one of encouragement of competition to a policy of regulated monopoly. This policy of regulated monopoly, the report says, is not one designed to show favoritism to extant interests but to protect the public itself, experience having shown that unrestricted competition in this field invariably results in disaster to the competitors, in which disaster the public has a prominent share. The function of the jitney, according to Mr. Emmet, is to supply service to streets and neighborhoods which now have no electric railway readily available. He believes that the time is not yet ripe to abandon the electric street railway as the standard means of urban transportation in this climate and finds that the operation of jitneys in direct competition would so impair electric street railway revenues and progress as to result in defective service and the eventual death of the older means of transportation.

MR. EMMET'S OPINION

Mr. Emmet says in part as follows:

"Possibly this would have appeared more clearly if a single responsible company, instead of a number of individuals whose only bond in common is that they have been represented in this proceeding by a single attorney, had applied for leave to operate enough improved motor buses to take care of the same volume of business that the individually-owned touring cars included in this application would be capable of handling over streets substantially identical with those occupied by the street railway company. The granting of a certificate to such a competitor would at once be recognized, we suppose, by every thoughtful person, as equivalent to a decision that the commission saw nothing further to be gained by encouraging the further development of the electric railway system in Rochester. And since arrested development, in the case of any business enterprise, usually means slow death, such a decision could only be taken to mean that in our opinion the traffic needs of Rochester would best be served by a gradual replacement of the old by the new method of transportation. Now, as a matter of fact, the commission believes nothing of the sort. On the contrary, we are of the opinion that the electric railway must for many years be regarded as the backbone of any dependable transportation system in such a city. To arrest the development of electric railways in Rochester would be to injure greatly the city's growth and future prospects. And the situation seems to us to be in nowise changed, assuming the volume of competition to be the same in either case, by the fact that the competition comes from individual, and perhaps in some cases irresponsible, owners of automobiles, instead of from a single well-managed company. In either case the volume of competition contemplated by the present application would certainly be large enough to interfere seriously with any further immediate growth of Rochester's electric railway system. And, in our opinion, no dependable form of transportation, good alike in winter and in summer, has yet been devised to take the place of what Rochester would lose if further development of its electric railways was to be discouraged and interfered with by the State.

"What, then, is the proper function of the jitney? Our answer is that, except in cases where the existing street railway system obviously cannot or will not supply the reasonable requirements of a community, the use of jitneys, for the present at least, ought to be confined to streets and neighborhoods which now have no electric railway readily available. Further than this, we seriously question, as a general proposition, the propriety of extending formal recognition at this time to automobiles of the touring-car type, as a suitable form of vehicle for carrying large numbers of passengers at a low rate of fare over regular urban routes. Such use cannot be otherwise regarded than as unnatural and freakish. Without actually holding that under no circumstances will the use of cheap second-hand touring cars be countenanced by the Public Service Commission of the Second District as a regular means of transporting passengers for a low rate of fare in a great city like Rochester, we feel that we ought at this time at least to suggest that only in cases of extreme urgency should such cars be employed in this way. Certainly we have not been impressed with the belief that any such urgency exists in Rochester at the present time.

"We realize, of course, that in every large city people will be found who would enjoy making occasional use of the jitneys, and in so far as our present order interferes with the pleasure of these people, we regret being compelled to make it. The problem before us would, of course, be a very simple one if we were not required to give any particular consideration to the effect of unrestricted jitney competition upon the general problem of transporting passengers in a large city, if all we had to do was to assist in establishing transportation facilities which would cater to the widest range of individual tastes. But if that was intended to be our only function, it must be perfectly obvious to everybody that Chapter 667 of the laws of 1915 would never have been placed upon the statute books at all. The present policy of the State with regard to this matter is plain, and it is our duty to carry out this purpose until the law under which we are acting is repealed. This would be our duty even if, as individuals, we disapproved of the purpose of the present law. As a matter of fact, we approve of it and regard it as absolutely essential, from the standpoint of securing dependable transportation facilities in our larger cities, that the law should be enforced in such a case as this.

"It should be understood, however, that this commission is by no means of the opinion that a corporation like the New York State Railways should never, under any conceivable circumstances, be subjected to competition from other groups of investors who are willing in a businesslike way to risk their money in supplying better transportation facilities to the people of Rochester. A situation may yet arise which will require the bars to be let down and the railway to be left to struggle for existence without further State protection against wasteful competition. Protection is being extended to it now because we feel that, on the whole, the existing street railway system of Rochester—viewed not as a mere money-making machine operated for the benefit of its stockholders but as a public agency—is distinctly worth saving in the interest of the people of Rochester. It has performed very valuable services in the upbuilding of Rochester and seems now to be in a position where, with the help of the State instead of its hostility, it will be able to solve the Rochester transportation problem satisfactorily. A further effort should be made to get the very best results possible out of such a system before condemning it as outworn or contributing toward its eventual undoing. If that effort fails, we will, as our order states, be prepared to give further consideration to alternative methods of supplying Rochester with a proper transportation system.

"In reaching this conclusion, we have acted in strict accord with what we understand to be the purpose of the statute from which our powers have been derived, and we hope that our decision will, on the whole, be approved by the thoughtful citizens of Rochester."

MR. BARNES' REPORT

Mr. Barnes' report stated that while the transportation system of Rochester is not excelled by that in any other city in the public service district the system is not being used to the highest degree of efficiency. He recommended, among other things, the basing of the schedules on fifteen-minute periods, traffic checks to be made at the beginning of each season. He suggested the installation of the company's own telephone system, certain changes in the track layout, and a number of lesser improvements. He stated that traffic checks showed on the whole system 2.9 per cent more seats furnished than passengers carried during the evening rush hours and 8 per cent in the morning rush hours. The respective percentages of standing passengers were 17.8 and 10.5.

Mr. Barnes also included in his report a study of the jitney traffic from two angles, one supposing that the jitneys only supplement the trolleys, taking off the passengers who now stand, and the other supposing jitneys to be substituted for trolleys entirely.

Under the former supposition Mr. Barnes showed that the present applicants would have barely enough cars for this purpose in the morning rush and not quite enough in the evening rush. This service would require that 304 jitneys an hour would have to be run through Main Street between State and St. Paul Streets during the evening rush hour. As checks show that vehicles at present use this street at this time to the number of nearly 450 an hour, the increase of this traffic by 70 per cent would be a serious problem. If jitneys were substituted entirely for the trolleys, it would require something like 2000 cars operated at headways of from 5.4 to 37.8 seconds. This would mean more than 6500 jitney movements through Main Street in an hour, which, Mr. Barnes says, is palpably impossible.

ASSOCIATION NEWS

Power Plant Construction, Labor Matters and Rapid Transit Were Discussed at Section Meetings—Motor Vehicle Committee Met on May 19—At New Haven C. H. Chapman Described the Ideal Employee

OPERATION OF MOTOR VEHICLES

The meeting of the committee on the operation of motor vehicles of the American Electric Railway Association was held at the New York office of the association on May 19. Those present were Britton L. Budd, Chicago; William A. House, Baltimore; Henry G. Bradlee, Boston; C. L. S. Tingley, Philadelphia; Frank Silliman, Jr., Philadelphia, and Secretary E. B. Burritt. Recent developments in the jitney situation in different cities were discussed and the general conclusion was reached that it confirms the claim of the committee made in the past that, as a substitute for electric railway service, the jitneys were a failure. At the meeting, the president and secretary were authorized to extend their study of motor vehicles to include that of motor-bus lines, whether operated as competitors to or as feeders of electric railway lines.

CAPITAL TRACTION SECTION

A meeting of the Capital Traction Company section, No. 8, was held in Washington on May 11. The principal speaker was J. H. Hanna, vice-president of the company, who described the construction and operation of the Georgetown power station, which furnishes power for the entire system of the traction company. A description of this station appeared in the issue of the ELECTRIC RAILWAY JOURNAL for May 4, 1912. Mr. Hiltebeitel of the Westinghouse Electric & Manufacturing Company, who supervised the erection of the turbines in the power station, also explained some of the details of the turbine construction. By way of entertainment G. F. Esputa gave a number of imitations, and at the close of the meeting light refreshments were served.

In his address Mr. Hanna stated that the planning and supervision of the building of the power plant were carried on entirely by the company's engineers. The plant was built in 1910 and 1911 at a cost of considerably more than $1,000,000. It is equipped with four horizontal steam turbines, having a total capacity of 11,000 kw., the output during 1915 being more than 24,000,000 kw.-hr. Mr. Hanna stated that the substitution of double-truck cars for single-truck cars had had much to do with the necessity for the construction of this plant, the power required per car-mile for the heavier equipment being approximately 50 per cent greater than that for the lighter cars.

CONNECTICUT COMPANY SECTION

As stated briefly in last week's issue, a paper on "The Greater Responsibility of Railway Labor," by C. H. Chapman, manager Bridgeport division, was delivered at the May meeting of the Connecticut Company section.

In his paper, which was of more than local interest, Mr. Chapman stated that the greatest problem before the industry is to educate employees and the public to the responsibilities of labor. Present conditions in this respect reminded him of a story of the schoolboy who when asked to name the mountains in Holland, replied "There ain't none." He said that labor is extremely backward in accepting any degree of responsibility.

The transportation utility must deliver safety and good service and must maintain reasonable and pleasant relations with the public. Labor has the first of these directly in its control; loyalty, courtesy and intelligent co-operation of labor solve one-half of the good-service problem, and employees are the best advertisers in promoting good relations. Labor is proud, and rightfully so, but it would have more pride and dignity if its representatives should come to the company saying: "We bring you safety, loyalty and economy. From now on, every member of our organization is to frown on all recklessness and carelessness. Every member willfully concealing matters of danger because of careless acts of fellow employees will be expelled from our ranks. Loyalty to your interest is for our interest also, because we believe that courtesy to the public and intelligent co-operation will help us in every way. We deem it an advantage to ourselves as employees to have our company well thought of and spoken of by the public. This increases our pleasure in life. By the exercise of care, we can save you accident claims, while by crying down and exposing recklessness, we can save you repair bills. Our motormen, by saving power, expect to reduce your expenses materially, and our members in exposing and discrediting dishonest conductors, expect to swell your gross receipts."

In commenting upon this imaginary manifesto, Mr. Chapman expressed the belief that serious accidents are not often caused by the first omission or act of carelessness. It is rather probable that the first time a man runs by a signal or gets into a tight place, he is "scared to death." Generally nothing happens, he is not even reported, he "gets away with it," as the saying goes. This has a tendency to make him more careless in ignoring danger until some day the inevitable occurs. He has a bad accident. Mr. Chapman also assumed that on a certain division of the local company all the employees on a given date commenced and continued a concerted effort to attract public attention. From the switchman to the manager, everyone was banded in a conscientious and painstaking effort to promote pleasant public relations.

Under these conditions, Mr. Chapman believed that the words "rotten service" would be entirely forgotten, and that the division would hold an enviable position in the street railway world.

PUBLIC SERVICE SECTION

Company section No. 2 met in Newark, N. J., on May 18 to hear a lecture on the history and present status of the dual subway system of New York City by J. V. Davies, of the consulting engineering firm of Jacobs & Davies, which has had much to do with the development of rapid transit in and around New York.

The names of three new members were read and the suggestion contest awards for February and March were announced. Seventy-three suggestions were considered in February, including some carried over from January, and twenty-four were received in March. There is promise of sustained interest through this monthly consideration of, and reward for, meritorious suggestions. After the formal exercises of the meeting a monologist entertained the company with impersonations.

Mr. Davies first endeavored to impress upon his audience the magnitude of the rapid transit program in and around New York. Including the steam railroad electrifications and the subway and elevated work completed and in progress a capitalization of roughly $700,000,000 is involved. This is nearly twice as great as the cost, to date $357,000,000, of the Panama Canal, and the work has been ten times as difficult. The rapid transit history in the city began in 1868 with a temporarily unsuccessful elevated road, but ten years later the construction of a general elevated system was begun and soon completed. Electrification of the system was begun in the year 1902.

The process of electrification of railways had gone far enough to warrant the projecting of a subway system during the late nineties, and in 1899 and 1900 "contract No. 1" was let to John B. MacDonald. This covered the present subway system from City Hall Square northward, and involved construction and operation for fifty years. The contract was divided by the contractor into a construction contract and an operating contract, the latter being let to the Interborough Rapid Transit Company. Shortly thereafter the line was extended under the East River to Brooklyn and a thirty-five-year operating contract was entered into with the Interborough Company.

Mr. Davies then explained the tri-borough project for extension of the subways, which was not successful, and the dual project, now rapidly approaching completion. This utilizes the East River bridges and gives the Interborough East Side and West Side lines in Manhattan and extends the Brooklyn service of the same company. It also gives the Brooklyn Rapid Transit Company a central line in Manhattan under Broadway and provides for the outlying boroughs by extensions of elevated lines. Something like $350,000,000 will be invested by the city and the two companies, the former putting in more than one-half of the money.

The operating contract provides first for operating costs, maintenance and depreciation; next for a limited return to the companies; next for a return to the city, with final distribution of remaining profits. It will be many years before the city will reap direct financial returns on its investment. When the dual system is completed it will be possible to ride 26 miles on the Interborough system or 21 miles on the B. R. T. system for a nickel.

One-Motor, Coupled Cars a War-Time Emergency

Possibly of all of the tramway companies in England the Newcastle Tramways have experienced the most difficult conditions arising from the war, according to the *Tramway & Railway World*. The reason is that all of the industrial section in the city is concentrated along the River Tyne and it can be served by only one route running practically parallel to the river side, thus causing considerable congestion. Although the introduction of trailers as a means of relieving the congestion of traffic and the shortage of motormen would have been desirable, the war rendered it practically impossible to obtain deliveries of trailers and suitable couplers, owing to the overcrowding of factories with munition work. Another consideration which presented itself was that when the present conditions came to an end with the termination of the war, the provision of trailers might not be necessary.

The solution of the problem consisted in the adoption of coupled motor cars, after taking away one motor from the inside axle of each car. Two single-truck motor cars are coupled together, the trolley standard on one being removed. Each car is equipped with one motor on the leading axle, the other being removed. The controllers on the center platform have also been removed, leaving a controller at each end of the units only. The power circuit of the cars are completely rewired. One motorman controls the two cars, and each car has a woman conductor. The coupler consists of a rigid bar spring connected to each car platform, and the power cables are attached through tubes fixed on the top and bottom of this coupling bar. To protect passengers the cars are equipped with side-guards, consisting of telescopic rods and tubes. When running at dusk there are lights just under the brake handle in the center which are fitted with ruby lamps to call the attention of passengers to the fact that there is a car immediately following.

While the coupled cars are a little slower than a single car with the same equipments the double units can easily keep up to the scheduled time of the many heavy truck cars with four-motor equipments that are running on the same route, while the combination units have the advantage of consuming less energy. On curves their action is easy as each car is a motor car, there being no drag on the leading car as when followed by a trailer. By the use of the coupled cars it is unnecessary to switch cars at each end of the line, as is the case with trailers when there is no loop on which to turn around.

Recent Electrolysis Discussion in Atlanta

The safety code conference which was held in Atlanta, Ga., early in May was reported briefly in the issue of the ELECTRIC RAILWAY JOURNAL for May 6, page 859. An abstract of the paper on electrolysis mitigation, by Burton McCollum of the United States Bureau of Standards, was appended to the report. The discussion of Mr. McCollum's paper brought out the need for co-operation of affected interests in applying mitigating expedients. Elam Miller, American Telephone & Telegraph Company, supported the recommendation that the trouble be attacked at the source. Cable drainage as necessarily practiced by the telephone company in some cases has proved less satisfactory. Pipe drainage is still less effective due to the presence of the joints. He said that in Europe there is little or no call to apply pipe drainage because return feeders are generally used.

G. J. Yundt, Southern Bell Telephone & Telegraph Company, suggested that as all utilities perform public services the greatest good to the greatest number demands co-operation in protecting gas and water pipes and cable sheathing. The enormous recent growth of Southern cities, the higher potential drops in railway returns due to the longer lines and the demand that all utility plants be placed underground are factors in the growth of the electrolysis problem.

A. F. Ganz, Stevens Institute of Technology, commented favorably upon the fact that the bureau did not suggest the elimination of electrolysis, on account of the great cost, but rather proposed a reasonable degree of mitigation. He deprecated the making of a certain type of electrolysis surveys by engineers recommending pipe drainage in which readings of voltage between rails and pipe are made and charted. In some of these cases, he said, the trouble is reported as ended when the large currents which have been induced to flow in the pipes are causing joint electrolysis, and more total damage than before.

Other speakers emphasized the importance of good bonding, and the general sentiment seemed to favor the recommendations of the Bureau of Standards.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

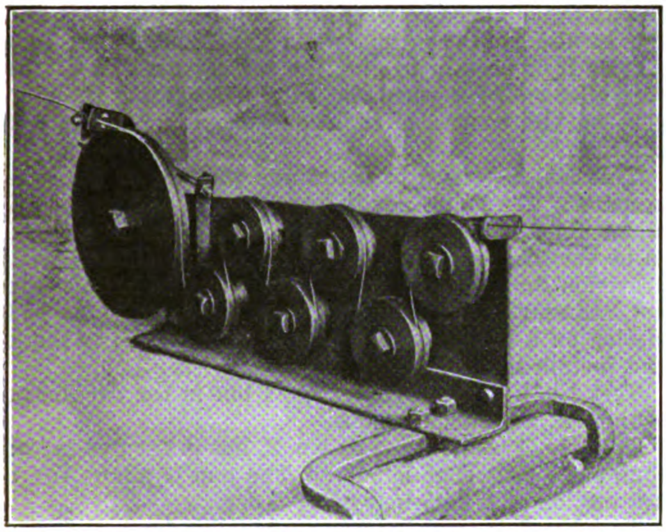
Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Home-Made Armature Banding Tensioner

BY M. F. FLATLEY
Master Mechanic Terre Haute, Indianapolis & Eastern Traction Company, Lebanon, Ind.

The correct tension in armature banding wire is an important requisite to low armature maintenance. To supply this demand a home-made tensioner was designed and manufactured in the shops of the Terre Haute, Indianapolis & Eastern Traction Company at Lebanon, Ind. This tensioner is a portable device requiring only to be anchored to permit its use with any lathe, and it can be adjusted to any desired tension for the different types of armatures.

As shown in the accompanying illustration, the tensioner is relatively simple in design, yet it possesses features not included in more complicated types. Essentially, this device consists of one 11½-in. steel pulley and six 4¼-in. steel pulleys mounted on a plate which in turn is riveted to a base angle and yoke for anchoring it to a track rail.



HOME-MADE ARMATURE BANDING TENSIONER USED BY T. H., I. & E. TRACTION COMPANY

In the banding operation the wire is passed around the six small pulleys, thence over the large pulley, and through a spring-jaw clamp to the armature. The clamp prevents the wire from unwinding from the tensioner pulleys when the end is cut at the armature. One side of the 11½-in. pulley has a projecting hub, 8½ in. in diameter, to which a friction brake mechanism is applied. With this brake and the combination of pulleys the required tension can be obtained. The proper tension for each armature is determined by a dynamometer attachment.

As is evident from the above, the cost of manufacturing this device is relatively small, and it has proved very satisfactory, particularly in small shops where the standard equipment for armature banding is not available.

Maintenance of Controller Handle Bushings

BY E. D. RANSOM, B.E.

A certain percentage of equipment troubles can be traced directly to mishandling of apparatus by motormen. This is strikingly true of hand-operated and non-automatic apparatus, the most common example of which is the platform controller. Unless some such device as the automotoneer is used, which many do not believe advisable, the life of the equipment is, to a great extent, in the hands of the man operating the controller. Overloads on equipment are prevented or caused by his good or bad judgment and training.

Even when the controller itself is in the best possible condition there are two elements which affect its operation. One of these is the operator, as already stated, and the other is the handle, which is detachable. The conditions with respect to the operation of the controller may be any one of the following:

The motorman may use average judgment in operation, and the handle connection to the controller shaft may be tight, as it should be. This is the proper condition.

The motorman may use good judgment, but may have a defective handle with which he cannot get the desired results.

The motorman's judgment and the handle may both be defective, in which case much injury is done to the equipment.

The importance of this subject is indicated by the statements made in the following paragraphs, all of which are based upon actual experiences on a large street railway system, where the advisability of changing from a bushed-casting handle to some satisfactory form of clamping attachment is under consideration. All of the conditions mentioned above have to be met, and it is a regrettable fact that the number of cases coming under the first head are greatly in the minority. It is as necessary properly to maintain controller handles, if they are of a replaceable bushing type, as it is to instruct the motormen, and it is proportionately easier to do so as the element of man-failure does not have to be contended with.

This article deals with troubles resulting from worn handles of the bushing type, with suggested methods of determining proper removal periods, and with improvements found to be helpful in prolonging the life of handles. Methods of manufacturing and repairing handles are also described.

The troubles directly attributable to worn handle bushings, as found by experience, are chiefly overheated resistance grids and controller flashing. On the railway in question an epidemic of overheated resistance grids started at certain carhouses. The overheating in many cases proved to be due to badly-worn handle bushings.

Worn Bushings and Overheated Resistance Grids.—In some cases where overheating was found the handle, which was of malleable iron with renewable brass bushings, had been in service so long that the bushings were worn almost round, there being nearly 30 deg. of lost motion. On investigation of the damage it was found that on throwing the controller to the full multiple position, or until the handle was against the stop, in every case the controller cylinder was found to be on the last resistance point instead of being in full multiple, as would have been expected from the position of the handle. The result was, of course, that although the motorman operated the controller correctly, it was never beyond the last resistance point. One panel of resistance grids was, therefore, always overheated and considerable damage was sometimes done to the car body from this overheating. Careful inspection and rebushing of handles at the carhouses resulted in a marked reduction in the trouble except in places where it could be accounted for on other grounds. There were still cases of setting fire to car flooring from overheated resistance grids, but this was found to be due to failure to remove all charred wood. A bed of charcoal was thus left which was easily ignited by ordinary resistance grid radiation, and in all such cases the controller and resistance grids did not show the indications significant of worn bushings.

Worn Bushings and Controller Troubles.—It was also noticed with worn bushings that, on account of the uncertain contact on the last position due to lost motion, the controller cylinder segment was always burned away at the edge. As a result the gap in the contact became so great that it often resulted in the production of an arc which flashed to the nearest ground in the controller. The greater the wear in the bushing the more was the lost motion, and consequently the greater was the gap in the cylinder contact. Contrary to first impressions, the handles that were worn but slightly more than the allowable amount often gave more controller trouble than those more badly worn. The simple reason for this was that where lost motion was only slight the gap in the controller contact was proportionately small and created an arc, whereas with more lost motion the gap was so great that the arc was broken in the natural functioning of the controller. It must be remembered that this applies only to the last position which is determined by the controller handle stop. On the other positions the cam gives each notch its proper contact.

Manufacturing and Testing Handles.—The general statements made above will serve as an introduction to a description of the methods of making and testing controller handles on one large property. The malleable-iron casting as received is first smoothed down and finished in the machine shop. The rolled brass bushing, made in two sections, is then placed in the handle base and pinned through the hub with No. 6 gage soft steel wire riveted at both ends. The bushing is shown in section in Fig. 1, bushing No. 1 being for controllers on four-motor equipment, and bushing No. 2 for those on two-motor equipment. These bushings have given very short service and at present nickel-bronze bushings are being tried on 100 sample handles. It is expected that these will have a much longer life.

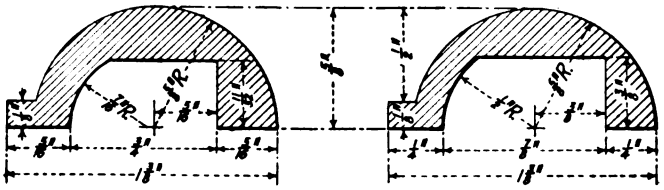

No. 1 No. 2

FIG. 1—CROSS-SECTION OF CONTROLLER HANDLE BUSHINGS FOR TWO-MOTOR AND FOUR-MOTOR EQUIPMENTS

Before handles are placed in service and, in fact, during the process of manufacture, they are checked by means of a test board like that shown in Fig. 2, to insure absolute correctness as to gage. The tests performed on the board are indicated by numbers and have the purposes outlined below. The test board consists of a row of standard controller cylinder shafts of machined steel on which the newly-bushed handles can be placed and checked for correctness both of bushing fit and location of handle stop.

Test No. 1 is for handles used on four-motor equipment, and is as follows: The newly-bushed handle is placed on a template shaft, thus checking the fit of the bushing. If the bushing is properly lined up, the handle stop will fall directly in the opening *A*. This checks the distance between the center of the shaft and the handle stop, so that when the handle goes into service it is certain to give the correct position of the controller cylinder when the handle is against the stop post on the controller top, corresponding to the last position.

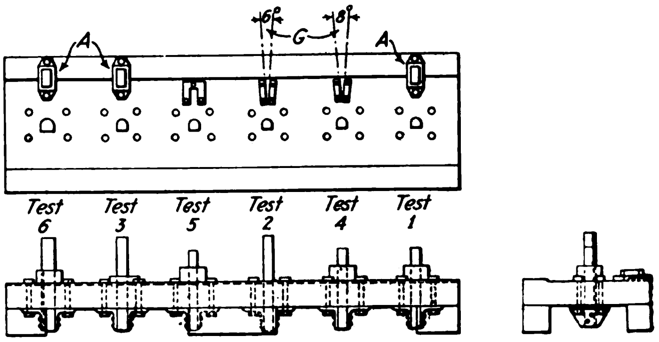


FIG. 2—TEST BOARD FOR CHECKING CONTROLLER HANDLE ADJUSTMENTS DURING MANUFACTURE

Test No. 2 is used to determine whether or not it is necessary to rebush partly-worn handles. The gap *G* allows for a lost motion of 6 deg., which has been found to be the maximum variation that can be allowed with provision for a safe margin. Newly-bushed handles are not necessarily tried on this gage as there is no lost motion on a handle with a new bushing, properly made and installed.

Test No. 3 is the same as No. 1 but is for two-motor equipment controller handles.

Test No. 4 is the same as No. 2, but is for two-motor equipment controller handles. The gap *G* allows for a lost motion of 8 deg. instead of 6 deg.

Test No. 5 is used for reverse handles for both types of controllers, being a check similar to that made in tests Nos. 1 and 3, which determine the proper distance between the center of reverse cylinder shafts and reverse handle stops, at the same time furnishing a gage for the handle bushing fit on the shaft.

Test No. 6 is for air-brake handles, and gives the same results as No. 5 for reverse handles.

All of the above tests are made during the course of manufacturing bushings and installing them, so that at all times the gages furnish a check upon the accuracy with which the work is being done. When the handle is finally placed in service it is as perfect a fit as if it were a part of the shaft, provided that the shafts are properly maintained. The maintenance of these shafts is so closely related to the subject under discussion that it merits some attention in this article.

Maintenance of Controller Shaft Ends.—The replacement of controller shafts is an expensive piece of work. The following method has proved successful in bringing old shafts up to standard gage and thus avoiding the necessity for replacing them.

The length of shaft allowed for the handle fit was originally 1½ in. and this has been increased to 2 in. by means of the addition of a repair sleeve of No. 16

gage steel, mounted on the end of the shaft as shown in Fig. 3. This sleeve not only gives the increase in length, but also brings the shaft up to gage dimension. The top of the shaft is drilled and tapped to take a ⅝-in. No. 14-24 round-head machine screw, which is screwed into the shaft ⅜ in., leaving the head about ¼ in. above the top of the old shaft. The shaft sleeve is then slipped over the top of the shaft and is pinned in place by means of No. 6 gage soft wire passing through countersunk holes in the sleeve and having both ends riveted over and filed flush. The space in the top of the sleeve is filled with babbitt metal, forming a firm anchorage around the head of the screw. The first sleeves were pinned with steel pins, but these were found to wear loose on account of their brittleness.

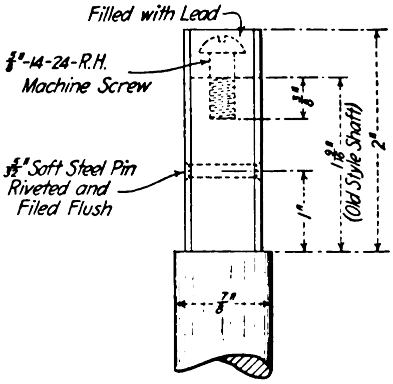

Filled with Lead
⅝"-14-24-R.H. Machine Screw
5/32" Soft Steel Pin Riveted and Filed Flush
⅜"
1⅞" (Old Style Shaft)
2"
1"
⅞"

FIG. 3—SLEEVE FOR REPAIRING CONTROLLER SHAFT

Shafts equipped with sleeves fastened with soft steel wire pins are just now being returned with their controllers for repairs after ten months of service. In all cases the sleeves are found as tight as when originally installed. All shafts are now gaged by test handles and any found badly worn are repaired by the addition of sleeves. The shafts are thus kept up easily to gage and there is a substantial saving over the cost of new shafts.

Service Tests.—In addition to the tests made during manufacture, as described above, the company whose practice is covered therein provides for service tests in the carhouses. After the handles have been completed and tested in the shops, they are sent to the carhouses where they are placed in service. At each of these is a test board arranged as shown in Fig. 4, designed for tests similar to those already described except that they are limited to checking the effect of wear. All handles are tested on these boards at stated intervals, the lengths of which vary with the location of the carhouse and the class of service of the cars assigned thereto. The tests for wear are as follows:

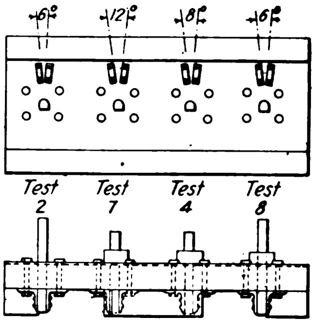


FIG. 4—TEST BOARD FOR CHECKING CONTROLLER HANDLE ADJUSTMENTS IN SERVICE

Test No. 2 indicates the degree of lost motion due to bushing wear on the handles used with four-motor equipment. The gap *B* allows for a swing of 6 deg. on a radius from the center of the shaft to the handle stop. Any handle showing lost motion up to or beyond this limit is returned to the shop for rebushing.

Test No. 4 is the same as test No. 2 except that it is for handles used on two-motor equipment.

Test No. 7 checks reverse handles and test No. 8 checks air-brake handles.

By the proper use of these boards in the carhouses, it is possible to remove worn bushings from service before they have caused severe trouble. The whole value of the method depends upon timely removal. In order to insure testing at proper intervals the present practice is to hold motormen responsible for their own controller handles after they have been instructed as to the proper use of the test board. They are penalized if the handles are found to be worn beyond the gage limit. By placing the responsibility on each individual motorman, and providing sufficient spare handles to permit the prompt replacement of those requiring rebushing, the removable bushing type of handle can be used effectively.

In competition with the bushed handle there is the type in which the handle is rigidly attached to the shaft. The principal difficulty with this type results from the fact that the clamping of the handle is left entirely to the motorman. The writer has found that, since the handle is placed on the shaft at the last minute, sometimes sufficient care is not used to insure a tight fit. In addition, there are failures due to the inherent design of attachable car devices which are bound to get out of adjustment if not carefully inspected.

In conclusion, the writer would express the conviction that if the inspection and maintenance of the equipment are thorough, the renewable bushing type of controller handle is probably superior to the clamping type.

Measuring Yardage of Granite Blocks by Weight Instead of Count

BY CHARLES H. CLARK
Engineer Maintenance of Way, Cleveland (Ohio) Railway

There has always been more or less controversy between the manufacturers of stone paving block and the buyer as to the number of yards contained in a steam railroad car. A railway company obliged to pave its tracks necessarily has to buy new paving blocks. These blocks are sometimes bought by the thousand, but more often by the square yard, which is the only way in which they should be purchased, as one then knows what charge should be made for a unit of pavement.

Specifications generally specify that there shall be a certain number of blocks per square yard and that a test of each car shall be made. But even then the count of the blocks can be wrong by one side or the other, and after the blocks are thrown into a common pile there is no way of obtaining a recount if there is a difference of opinion between shipper and receiver.

WEIGHTS AND COUNTS OF CARLOADS OF STONE PAVING BLOCKS, CLEVELAND RAILWAY, APRIL, 1916

Car	Marked Weight, Pounds	Corrected Weight, Pounds	Gross Weight, Pounds	Net Weight, Pounds	Number of Blocks in Frame (8 yd.)	Weight of Blocks in Frame, Pounds	Shipper's Count
A.....	40,700	*.....	142,400	101,700	240	4,440	5,200
B.....	42,400	42,050	121,900	79,850	224	4,300	4,200
C.....	37,400	37,600	117,500	79,900	229	4,320	4,200
D.....	34,400	34,650	113,300	78,650	230	4,220	4,200
E.....	48,100	48,650	147,150	98,500	223	4,340	5,200
F.....	47,300	48,550	151,300	102,750	240	4,150	5,500
G.....	31,600	32,000	115,600	83,600	222	4,500	4,200
H.....	46,800	48,800	141,400	92,600	230	4,300	5,000
I.....	31,900	32,750	111,200	78,450	228	4,260	4,200
J.....	33,700	34,000	110,900	76,900	228	4,280	4,200
K.....	41,100	43,100	142,600	99,500	226	4,260	5,200
L.....	82,500	33,500	117,800	84,300	222	4,300	4,400
M.....	39,000	38,000	136,000	98,000	227	4,260	5,000
N.....	32,300	33,680	119,100	85,420	225	4,360	4,500
O.....	39,200	39,500	135,450	95,950	231	4,320	5,200
P.....	40,900	42,100	140,000	97,900	227	4,350	5,200
Q.....	33,900	33,650	114,200	80,550	220	4,300	4,200
R.....	33,600	37,100	110,000	72,900	236	4,360	4,200
S.....	34,300	38,400	120,200	81,800	218	4,280	4,200

*Not taken.

When one is paying $2.58 per ton freight on blocks in addition to their original cost, a difference of 5 or 10 yd. in the count or measurement in one car will amount to a considerable sum of money when figured for the entire season. In view of this fact the Cleveland Railway decided to make a test, establish a pound-per-yard basis and weigh the cars. From the data for nineteen cars shown in the accompanying table we established a weight of 535 lb. per square yard.

Corrugated Culvert Pipes Tested Under a Sand Bed*

BY GEORGE L. FOWLER
Consulting Engineer, New York, N. Y.

After the completion of the hydrostatic tests of "Armco" iron corrugated culvert pipe described in the ELECTRIC RAILWAY JOURNAL for May 13, it was decided to make tests of the same range under a bed of sand. Kiln-dried sharp sand was used in these tests in order that the conditions might be kept as uniform as possible.

It was supposed that the sand would arch under a load and be self-supporting to a certain extent, but there were no data available to indicate the extent to which this would occur. Some preliminary laboratory tests, therefore, were made to determine this arching quality, and the data obtained were used in testing the corrugated pipe. The tests showed that, on a slightly yielding bottom like the top of a corrugated culvert, the sand arches and the bottom is relieved of the load. Further, when the sand is confined the lateral thrust does not increase, but the vertical load is carried by the frictional resistance of the sand against the sides of the confining structure.

With the data obtained from the preliminary tests, a box like that shown in the accompanying illustration was built. The box was made of heavy planks supported in a structural steel frame. One side was made movable so that any desired width up to 7 ft. could be obtained, and the box had a height sufficient to take in a pipe 8 ft. long and 48 in. in diameter, and to allow for 2 ft. of sand above it and 1 ft. below it. Three jacks, each of 100 tons capacity, were provided for imposing the load on the sand, which was done by means of three platens 25 in. wide and reaching the full length of the box. Floating planks, 12 in. wide and 30 in. long, carried on ball bearings, were inserted in the fixed side of the box and held in place by levers resembling those of a platform scale, as shown in the drawing. Diaphragm dynamometers were connected with the floating planks to indicate the magnitudes of the forces acting upon them.

The movable side of the box was so adjusted that when the pipe under test was in place there would be 1 ft. of sand between it and each side of the box. Sand was then put into the box and tamped down to a depth of 1 ft. The pipe was then put in place and the sand was rammed about and beneath it and was carried up above the top of the corrugation to a depth of 14 in.

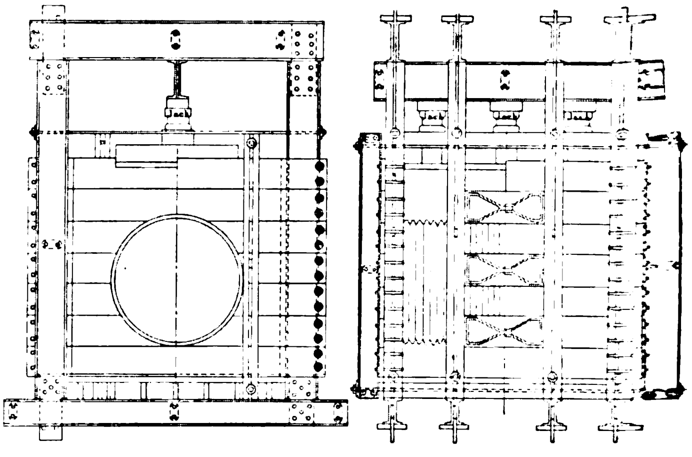
After the pipe had been put in place it was calipered at each corrugation on both vertical and horizontal diameters. The pressures were then applied in varying increments until the vertical diameter had been shortened by 1 in. The floating-plank dynamometers were read to determine the arching properties of the sand.

Tests were also made of smooth pipe 12 in. in diameter, and these showed that, under the conditions of the tests, the pipe with ½-in. depth of corrugation was about twice as strong as the smooth pipe, and that one with ¾-in. depth of corrugation was about three times as strong.

In measuring the pressure on the top of the pipe under a bed of sand from 12 in. to 14 in. thick it was found that on the 12-in. pipe the pressure was higher than the average pressure exerted by the platens on the sand. With the 24-in. pipe it was also slightly higher, but with the 48-in. pipe it was very much lower. This was due to the relative diameter of pipe and width of platen.

These tests, while exhibiting the general features of the conveyance and distribution of sand pressures, were not extensive enough to warrant the development of a formula for calculating the pressures exerted under beds of sand. It has been shown that the amount of pressure put upon buried surfaces with a given load, depends upon the depth of sand above them, as this pressure decreases with an increase in the depth of sand. As to what may be the proportional effect of depth of sand on the increase or decrease of pressure, there are not sufficient data to determine. The lateral pressures, when measured in pounds per square inch, were low as compared with the vertical pressures, but no definite ratio could be determined.

When the 24-in. pipe was being tested the lower floating plank was a little more than 2 ft. below the surface of the sand and the top of the upper plank was about 4 in. below the surface. The pressures on the top of the sand and on the two planks averaged as follows: Surface, 38½ lb. per square inch; upper floating plank, 3.74 lb., and lower floating plank, 8.2 lb. When the 48-in. pipe was being tested, the top of the lower plank was about 4 ft. below the surface of the sand and the top of the upper floating plank was about 2 ft. below the surface. The average pressures on the three points were: Surface, 10.09 lb. per square inch; upper floating plank, 3.66 lb., and lower floating plank, 2.42 lb.



ELEVATIONS AND PARTIAL VERTICAL SECTIONS OF SAND BOX FOR USE IN TESTING CORRUGATED CULVERT PIPE

J. C. Meem found that in an excavation the lateral pressure increased very rapidly from the top down, reaching a maximum at a point dependent upon the "angle of repose" of the material and then decreasing. This, together with what has preceded, seems to show that after a certain, as yet undetermined, depth has been reached there can be no further load put upon a culvert pipe by an increase in the depth of cover, and that such an increase of depth serves directly to protect the pipe against an increase of burden due to an increase of surface loading.

While this condition seems to be pretty thoroughly demonstrated, it was felt that there might be a question in the mind of some engineers as to the action of the culverts under a loading similar to that applied in railway service. There it is applied through ties of limited width and separated by intervals in which no load is applied to the material. Accordingly the principal tests were made to determine this point. For these three pipes of 24 in., 36 in. and 48 in. diameter respectively were taken, each having ½ in. depth of corrugation. The 24-in. pipe was of No. 14 gage iron and the others of No. 12 gage. The load was applied through 8-in. ties spaced 22 in. between centers, and by means of jacks bearing on the centers of rails laid to a gage of 4 ft. 8½ in. across the ties. It was assumed that a normal covering was a thickness of sand equal to the diameter of pipe. As this was the condition in the case of the earlier 12-in. pipe tests, it was considered unnecessary to duplicate these. Under the wooden platen and 1 ft. of sand the 12-in. pipe of No. 16 gage metal had carried a load of 262,125 lb. before showing a deflection of approximately 1 in. The depth of sand over the pipes was about equal to the diameter for the 24-in. and 36-in. sizes, and 3½ ft. for the 48-in. size, the latter being necessitated by the size of the frame.

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With the load applied through broad platens the increase in loading was stopped when the pipes had been deflected approximately 1 in. The increase was stopped automatically in the later tests by the ties sinking into the sand and thus refusing to carry more load. The result was that the distortion of the pipes under the greatest pressure obtainable was very slight. This pressure however, was considerably more than that applied through the platens, being, in the case of the 24-in. pipe, 237,800 lb. Had this load been applied on the platens with 12 in. of cover over the pipe, the latter would probably have been very seriously crushed, but under a cover of 24 in. it is also probable that the crushing would not have exceeded that obtained under the ties, because of the arching properties of the sand already discussed.

The point to be emphasized here is that under the heaviest load that can be applied to the ties of a railway track by the wheels of any existing locomotive or car, a 24-in. corrugated culvert pipe having the depth of corrugation and thickness of metal of the one tested, and buried under a cover of 24 in. of dry sand, cannot be deflected beyond its elastic properties of complete recovery of shape when the load is removed. The results of the tests of the 36-in. and 48-in. pipe corresponded very closely with those of the 24-in. pipe. It seems reasonable to conclude that under existing railroad loading corrugated culverts of 36-in. and 48-in. diameter are uncrushable when under a cover equal to their own diameter.

Some incidental facts that have been developed by these tests show that a given area will support a greater weight on a bed of sand if concentrated in one whole than if divided into smaller units. For example, in the preliminary tests the load was applied to platens measuring 2 ft. x 7 ft. 6 in. With any load that was applied there was no pushing of the platens down into the sand other than that due to the compacting of the sand, and in no case was there any real upward flow. The sand was elastic under the platens, and when the load was released it would spring back nearly to its original bulk. When the load was applied on three ties with the same total bearing surface as before, the division of the surface had the very marked effect of materially reducing the sustaining capacity of the sand. A limit was soon reached beyond which the ties were simply pushed down into the sand and without the development of any increase of resistance.

On the basis of the data afforded by these tests, and also of practical experience, it is evident that unusual depth of a ditch in which a corrugated culvert is installed does not involve any especially severe conditions. Indeed, such an installation is better protected from superimposed loads than one with a shallower cover. But it should be remembered that the weight of a cover consisting of a wide loose fill or embankment is not so well supported laterally as in a narrow ditch, and that thus extremely high embankments may bring about conditions of unusual severity which should be provided for by the use of heavier gages.

The conclusions that seem warranted by the investigation described above are as follows:

The full collapsing strength of corrugated culverts, as determined by the hydrostatic test, described in last week's issue, can probably not be fully realized under an earth covering because of the impossibility of securing an even pressure upon all sides of the pipe. Under ordinary conditions of loading under a bank or fill, the maximum pressure will be exerted vertically, and the pipe will be distorted by a shortening of the vertical and a lengthening of the horizontal diameter.

The value of end support extends farther from the end of the pipe under an earth load than under a hydrostatic pressure. How much farther was not determined.

The greater the depth to which a pipe is buried, the less is the variation in the loads to which it will be subjected.

The maximum pressure upon a pipe is reached under a certain depth of cover which was not determined.

At depths greater than the maximum above referred to, the pressures due to surface loading decrease. This and the above conclusion apply also to lateral pressures.

The 12-in. pipe of No. 10 gage would be practically uncrushable under a cover of dry sand 3 ft. deep. This probably holds for all other granular materials.

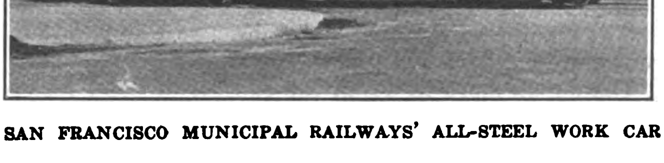
It is estimated that a depth of cover equal to three times the diameter of a pipe will suffice to protect it from any increase of pressure due to surface loading.

There are no data as to the depth of penetration of concentrated surface loads, but it is safe to calculate that the intensity is dissipated as the depth increases.

A Work Car that Can Be Used as a Flat Car

The Municipal Railways of San Francisco recently built the all-steel work car shown in the accompanying illustration, which can be used as a flat car or for conveying material that requires bunkers. It is equipped with two bunkers each of 8 cu. yd. capacity, one on each end of the cab and which are so arranged that the ends and sides can be removed or swung out of the way, to permit use of the unobstructed deck for other purposes. The cab is set in the center of the car, and a 2½-ft. space is allowed on either side so that the full length is available for loading long timbers or rails. The length of the car over all is 40 ft. and its width is 8½ ft. The total weight, unloaded, is 20 tons, with capacity for a load of 4300 lb.

The car is equipped with standard HL control, Brill



SAN FRANCISCO MUNICIPAL RAILWAYS' ALL-STEEL WORK CAR trucks, and four 306-CA Westinghouse motors of the same type as used on the passenger cars of this system. The reverser, which on the passenger cars is mounted under the car floor, is installed in the cab of the work car. This arrangement makes it unnecessary to employ any mechanical equipment for throwing the reverser by hand for emergency usage. The wiring of the reverser is so arranged that at a later date it will be possible readily to install a drum switch which will permit operation of all four motors in series when the car is used for heavy hauling.

The floor of the cab is 26½ in. above the deck of the car, and in the intervening space are the air compressor and governor as well as a small tool box and considerable storage space. Larger steel tool boxes are built adjacent to the cab on both ends. Control for double sanding equipment is provided in the cab, and this is so arranged that the sand travels from the cab in either direction in a single duct which is divided on the truck, a branch leading to each rail. At the point where the duct branches a wedge-shaped plug is used to divide the flow so that each rail receives an equal amount.

"Golden Glow" headlights are used, adjusted so that the beam of light strikes the track 50 ft. ahead of the cab. Under each corner of the car deck is located a lamp socket which can be used for an extension when the car is engaged on night street work, but which ordinarily carries 23-watt lamps protected by strong globes and metal guards. All lighting circuits are in conduit and, as shown in the accompanying illustration, a line of lamps surmounting the cab is used for general lighting in night work. These lamps have earned for the car the nickname of the "tower of jewels."

The work car was built by the Pacific Car & Equipment Company, South San Francisco, Cal., at a cost to the city of about $7,000. The car was designed in the city's engineering department under the direction of M. M. O'Shaughnessy, city engineer, and has been put in regular work service in charge of T. A. Cashin, superintendent, and W. C. Bendel, master mechanic of the Municipal Railways.

Bonds and Bonding Practice

At the April meeting of the Denver Tramway Company section of the American Electric Railway Association, George H. Eveland read a paper on the above subject. After outlining the electrical principles involved in the return circuit of the electric railway and tracing briefly the history of the rail bond, he discussed the effects of careful attention to bonding maintenance. He considered the subject from three standpoints: operation, power economy and electrolysis mitigation.

Mr. Eveland summarized the above three phases of the subject somewhat as follows: From the standpoint of operation, poor bonding results in lowering the voltage beyond the defective bonds, making it more difficult for the motorman to make his run on time and thus reducing his coasting time. He had measured drops around joints as high as 6 volts and he told of an ingenious druggist who connected a doorbell across a strip of poorly-bonded track so that he would be notified of the approach of cars. From the standpoint of power economy, one poor bond can waste $5 worth of energy in a year whereas to rebond this joint would cost less than $1. From the standpoint of electrolysis, high resistance at a joint forces current into near-by water and gas mains with resultant troubles, as 1 amp. of current can take with it 40 lb. of metal in a year.

Taking up more in detail the subject of bond resistance Mr. Eveland divided this resistance into three parts; that of the conductor, that of the joint between the conductor and the terminal, and that of the contact between the terminal and the rail. Of these all but the last are negligible in amount. The resistance is usually expressed in terms of feet of rail. To make this definition concrete a bond having a resistance of 20 ft. of 70 lb. rail was taken for example, such a bond being defective enough to warrant renewal. Assuming that the joint is rebonded so that its resistance is that of 3 ft. of rail, the difference between the resistances of the two joints is 17 ft., or 0.000255 ohm. With 100 amp. of current in the rail the power loss is 2.55 watts, and if this power is wasted continuously the energy consumption will be 22½ kw.-hr. per year. This at 1 cent per kilowatt-hour amounts to 22½ cents per year. If rebonding costs 75 cents, the saving of 22½ cents is a return of about 30 per cent per annum on the investment. With one-half of this current in the rail the return will be 7.3 per cent. To save time in calculating, charts showing the resistances of bonds which justify replacing are very useful. Sometimes it is necessary to bond more heavily than the energy economics indicate to be desirable on account of local conditions regarding electrolysis mitigation.

Mr. Eveland concluded his paper with a discussion of bond testing. Defective condition of bonds may be indicated by the melting of light snow around joints with very bad bonds in fairly warm weather. Inspection from the rear of a car at night sometimes results in detecting very bad bonds from the arcs formed between the terminals and the rail. Motormen say that they can sometimes tell when a car is passing over a very bad bond from the jerk which the car gets. In Denver the following apparatus, locally designed, is used in bond testing. The instrument used is a double-scale millivoltmeter with a differentially-wound armature. This is used in connection with a contact bar provided with points which make contact across the joint and across a certain known length of rail. The scale for the winding connected across the length of rail has a range of 25 millivolts. This circuit is closed as soon as the contact bar is placed on the rail. The winding connected across the bond is in series with an arrangement of contacts and resistances so that the full scale reading may be made either 25 or 250 millivolts. This arrangement permits the measuring of the resistance of very bad bonds and also protects the meter.

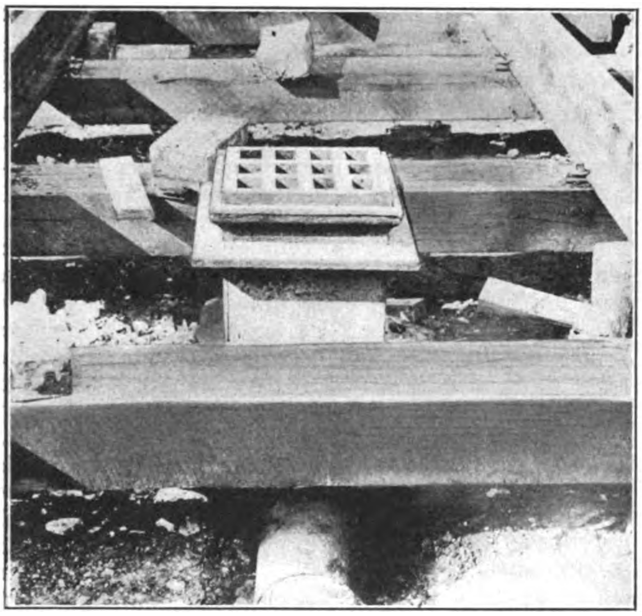
In testing, the contact bar is placed on the rail so that the rail and bond windings are across the length of rail and the bond respectively. The bond contact is open, and the deflection shows the voltage drop across the length of rail spanned by the rail contact. The bond contact is then closed and the deflection noted. From the two readings the equivalent resistance of the bond in feet of rail is calculated. The resistance of every bad bond is noted on the test record so that the total resistance of the bad bonds in any section of track may be easily determined.

In poorly bonded track or toward the end of a line there is little or no current in the rail during the greater part of the time. It is thus impossible to test with the current drawn by the cars. In Denver the testing current, in such cases, is provided by a dry storage battery carried by the man who is making the test. An extra pair of contacts on the contact bar are used to connect the battery to the rail through a key switch. The battery furnishes about 30 amp., which is sufficient for testing purposes.

The Third National Exposition of Safety and Sanitation under the auspices of the American Museum of Safety will be held in the new Grand Central Palace, New York, from May 22 to 27, 1916.

Catch Basins in Kansas City

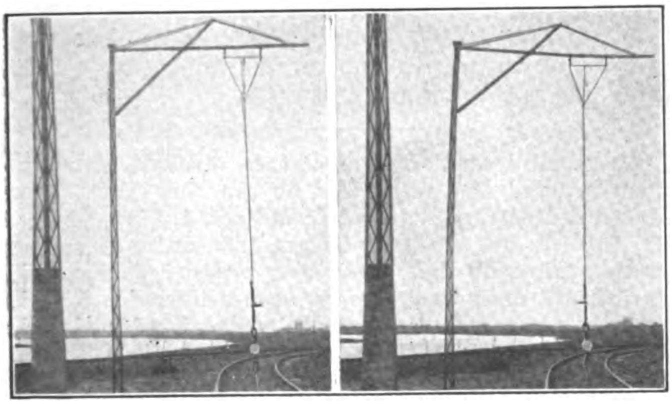
Under all tracks now being constructed or reconstructed the Kansas City Railways are installing a 10-in. tile, centered under the track and connected with the sewers. Catch basins, located at low points in the streets, discharge excess surface water to the tile drains. The catch basins are iron boxes having flanges between which the granite paving blocks are inserted. The blocks are flanged as for the rails, and cement grouting fills the interstice between the short upper edge of the blocks and the edge of the top of the catch basin. There has been much trouble heretofore at points where streets are low. As water cannot be carried away by the city catch basins, the resulting flooded streets often caused damage to motors and hampered traffic.



CATCH BASINS USED AT LOW POINTS IN RAILWAY TRACK IN KANSAS CITY

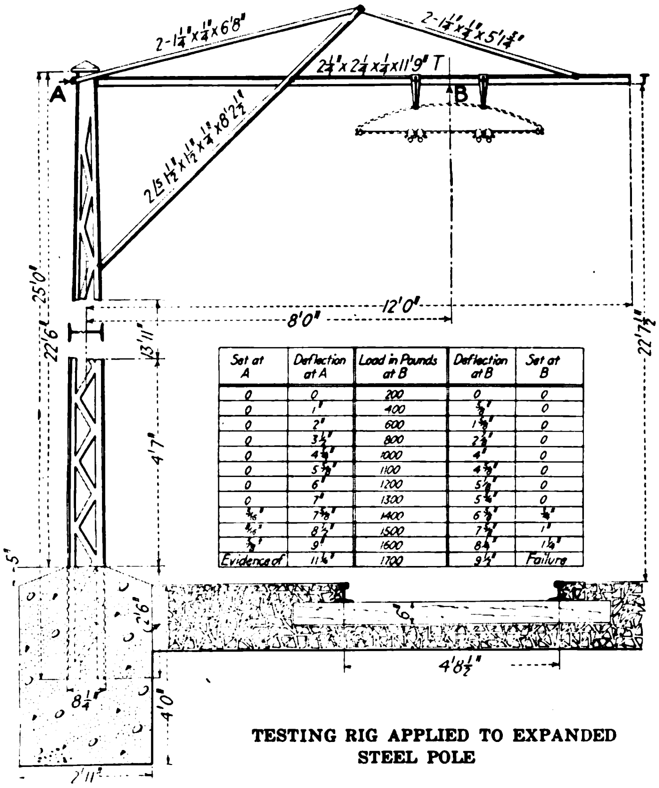
Bates Trolley Pole Tested to Failure

In order to test the efficacy of its expanded steel poles, the Bates Expanded Steel Truss Company, Chicago, Ill., subjected one of them, which was designed for catenary trolley construction, to a test to the point of failure. This pole was a 25-ft. expanded 4-in. section, to which a trolley wire supporting bracket, 11 ft. 9 in. long, had been applied. The design details of this pole and the manner in which it was set in the ground for testing are shown in one of the accompanying illustrations. The pole was embedded in concrete only 2 ft. 6 in., while the concrete foundation was 2 ft. 11 in. square and 4 ft. deep. Previous tests had demonstrated that the thorough mechanical bond between the pole and the concrete made it unnecessary to encase it the entire depth of the concrete foundation block.



EXPANDED STEEL POLE READY FOR TEST AND AT THE POINT OF FAILURE

The pole was set 8 ft. from the center of the track and the bracket was 22 ft. 7½ in. above the top of rail. Cables were attached to the bracket 8 ft. from the center of the pole as shown in another one of the accompanying illustrations. The lower end of the cable was anchored to a tie, and a dynamometer for measuring the load was fastened to the cable. Just above the dynamometer a standard pull jack was secured to the cable suspended from the bracket and to the dynamometer. This pull jack applied the loads, which varied from 200 lb. to 1700 lb. The results of this test are shown in the table forming a part of the illustration of the pole design details. As indicated there, the loads applied are shown in the center column, the deflection at the top of the pole in the first column to the left, and the set at the top in the second column to the left. The deflection in the bracket at the point in line with the cable on which the load was applied, is shown in the first column to the right of the one indicating the load, and the set in the bracket at this point is shown in the second column to the right.



Set at A	Deflection at A	Load in Pounds at B	Deflection at B	Set at B
0	0	200	0	0
0	1"	400	⅝"	0
0	2"	600	1⅝"	0
0	3½"	800	2½"	0
0	4⅝"	1000	4"	0
0	5⅝"	1100	4⅝"	0
0	6"	1200	5⅛"	0
0	7"	1300	5¾"	0
5/16"	7⅝"	1400	6⅝"	¾"
9/16"	8½"	1500	7½"	1"
¾"	9"	1600	8¼"	1¼"
Evidence of	11¼"	1700	9½"	Failure

TESTING RIG APPLIED TO EXPANDED STEEL POLE

In each instance and immediately following the application of the load and recording the deflection, the load was released to allow the pole to recover. This was done in order to determine the elastic limit of the pole and to measure the set. As shown in the table, the pole and arm fully recovered upon releasing the loads up to 1300 lb. At 1400 lb. the top of the pole took on a set of 5/16 in., and the bracket in line with the pulling cable showed a set of ¾ in. When a 1700-lb. load was applied the pole began to fail. The compression in the flange on track side of the pole caused it to twist or rotate under the load, and the bracket bent slightly in the member where the cable was applied. The pole in the failed position is shown in one of the accompanying illustrations. It will also be noted that the deflection is uniform throughout the height which is an indication of the correct distribution of the metal.

Gasoline Motor Cars Supersede Steam Trains in Cuba

The advent of up-to-date motor car service will be pioneered in Cuba by the Jucaro & Moron Railway Company on its line between these points via Ciego de Avila, a distance of 37.2 miles. Both towns are centrally located on the island, Jucaro being on the Caribbean Sea, while Moron is directly opposite on the Atlantic side. Steam trains which now operate over this line will be discontinued upon the arrival of the motor cars, which are expected at an early date.

Details of the construction of the motor car, which is manufactured by the McKeen Motor Car Company, Omaha, Neb., are shown in the accompanying table.

Weight of car in working order	74,000 lb.
Length between pulling faces of couplers	72 ft. 3¾ in.
Length over end sills	70 ft. 0 in.
Length of engine compartment	13 ft. 8 in.
Length of mail compartment	2 ft. 6 in.
Length of baggage compartment	8 ft. 6 in.
Length of passenger compartment, first class	14 ft. 4⅝ in.
Length of passenger compartment, third class	32 ft. 5⅝ in.
Width inside	9 ft. 4¾ in.
Width over side sills	9 ft. 8 in.
Width over sheathing	9 ft. 8¼ in.
Width over all	10 ft. 2¾ in.
Height, top of rail to top of car (light)	11 ft. 9 3/16 in.
Height, floor to ceiling at center of car	7 ft. 5⅝ in.
Seating capacity	80

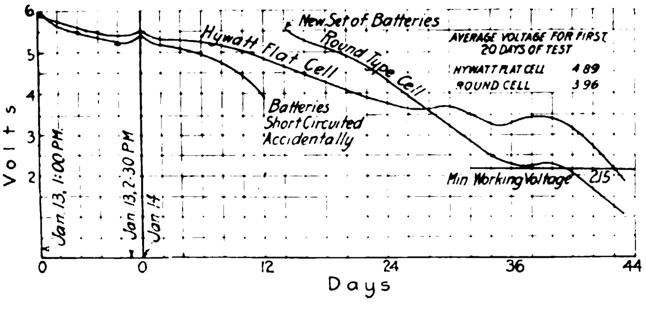
The data given in the table refer to the latest (1916) model, type C, 200-hp., 70-ft. all-steel motor car. The body conforms generally to motor-car standards except that two doors on each side were necessary to afford separate entrances for passengers of the first and third classes. In addition to the engine room, the cars contain three compartments; namely, first class, with a seating capacity of twenty; third class, with a seating capacity of sixty, and the baggage compartment, which is 8 ft. 6 in. in length.

Delivery of each car will be effected by running it to the seaboard under its own power in charge of a railroad conductor and motorman from the factory, who is a motorman duly examined and approved on operating department train rules and regulations.

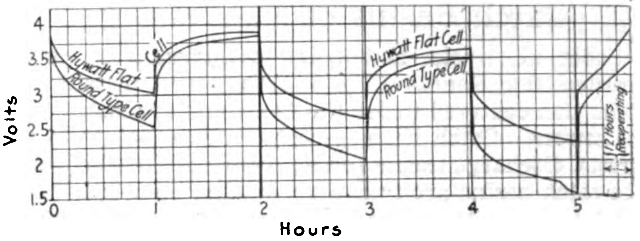
Recent Endurance Tests of Dry Batteries

Some tests recently conducted by the Cleveland (Ohio) Railway on the life and recuperation of dry cells, resulted favorably for the "Hywatt" flat type of cell made by the Cleveland Battery & Electric Company. In the tests, the flat type of cell was compared with a round type, with the results shown on the accompanying curves.

One set of curves shows the result of a life test in which the batteries were subjected to the discharge current which four cells connected in series would send through a resistance of 12.2 ohms. The discharge was continued for one and one-half hours out of every twelve. In the recuperation test, three cells connected in series sent current through a resistance of 1.1 ohms during alternate sixty-minute periods. The intervening sixty-minute periods were allowed for recuperation. Readings were taken at five-minute intervals.



RESULTS OF LIFE TESTS OF FLAT AND ROUND-TYPE DRY BATTERY CELLS



RESULTS OF RECUPERATION TESTS OF FLAT AND ROUND-TYPE DRY BATTERY CELLS

The "Hywatt" battery is rectangular in form, and is made up in units of from two to eight cells each. These have a uniform capacity of 60 amp.-hr. and the voltage is 1½ per cell. The face of all units is of the same size, 4½ in. x 6½ in., and the thickness varies from 2⅝ in. for the two-cell unit to 8⅝ in. for the eight-cell unit. Each unit has but two binding posts.

In designing this form of battery, the manufacturers desired to avoid the use of the zinc container, which is a feature of the round type of cell. With the flat type they claim that the zinc sheet can be entirely consumed, delivering current up to the last, whereas in the round type the cell is rendered useless when the container is eaten through in spots. The ability of the "Hywatt" cell to maintain voltage under loads is attributed to the great depolarizing area of the electrodes.

Output of Treated Timber

According to statistics just compiled jointly by the American Wood Preservers' Association and the Forest Service at Washington, D. C., there was treated at 102 plants in the year 1915, a total of 141,858,963 cu. ft. of timber, as compared with 159,582,639 cu. ft. by ninety-four plants in 1914, a decrease in quantity of about 11 per cent in 1915. Of the 1915 output, cross-ties contributed 78.4 per cent of the total; construction timbers, 8.3 per cent; paving blocks, 5.4 per cent; piling 4.4 per cent; poles, 1.7 per cent, and the remainder consisted of cross-arms, lumber, etc. With the exception of the two years, 1913 and 1914, the volume of timber treated in 1915 was the largest on record.

To treat the 1915 timber required 80,859,442 gal. of creosote, 33,269,604 lb. of zinc chloride and 4,899,107 gal. of all other preservatives, which included crude oil, coke-oven tar, refined coal tar, carbolineum oils, etc. Of the creosote used in 1915, 54 per cent, or 43,358,435 gal. was domestic, and 46 per cent, or 37,501,007 gal., German and English oil. In 1914 the larger consumption of creosote was met by imports, the falling off in 1915 being due to the European war.

The total amount of expenditure involved in equipment ordered and authorized by the New York, New Haven & Hartford Railroad from Sept. 1, 1913, to Dec. 31, 1915, is $10,500,000. Of the 1236 units of rolling stock equipment that have been ordered during this period, 477 units have already been delivered. Of this equipment forty-four units are primarily for electric operation, including three electric locomotives, fifteen multiple-unit motor cars and twenty-six multiple-unit trail cars.

NEWS OF ELECTRIC RAILWAYS

COMMISSION SUGGESTIONS FOR REHABILITATION

Recommendations by California Commission Contain Suggestion for Regulation of Auto-Bus Traffic

The California Railroad Commission issued an order on May 9 suggesting plans for the partial reconstruction and the operation of the lines of the San Diego & South Eastern Railway, parts of which were destroyed in the floods of last January. The suggestions are as follows:

1. That the petitioner reconstruct the Coronado Belt Line across the Sweetwater Valley from Eighth Avenue and Twenty-third Street, National City, to F Street, Chula Vista.
2. That the petitioner construct a connecting track along F Street, Chula Vista, from the Coronado Belt Line to the existing track on Third Avenue, Chula Vista.
3. That the petitioner electrify the lines to be constructed under suggestions 1 and 2.
4. That the petitioner operate freight service between San Diego on the north and Salt Works and Third Street, Chula Vista, on the south.

The San Diego & South Eastern Railway asked the commission for instructions as to the restoration of its lines, and for authority to reduce the number of trains operated. The company's line, prior to the floods which began on Jan. 27 was operated south from San Diego to Tia Juana, Otay and Sweetwater Dam, and east from San Diego to Foster. The motive power was partly steam and partly electricity. The floods completely washed out the line to Foster for 5½ miles, with the exception of short isolated portions. The damage was done by floods in the San Diego River and San Vicente Creek.

The flooding of the Sweetwater River washed out the entire Sweetwater branch below Sweetwater Dam, a little less than 5½ miles, also the interurban electric line between National City and Chula Vista, where this line crosses the river bottom, a distance of 1350 ft., and the Coronado Belt Line between National City and Marmarosa, where this line crosses the river bottom, a distance of 4700 ft. Floods in the Otay River washed out the track between Otay and Palm Avenue in the bed of the river 6500 ft.; the major portion of the track between the Salt Works and South San Diego, a distance of 6600 ft., and the connecting track between these two lines, a distance of 1 1/5 miles. Floods in the Tia Juana River washed out two portions of track between Schnell and Tia Juana, a distance of 2420 ft.; also two portions of track of the Coronado Belt Line at South San Diego, 2300 ft.

In addition to these main tracks, totaling nearly 15 miles, sidings and other tracks, about 5½ miles on various portions of the company's line were destroyed.

Of the main track a trifle less than 20 per cent was wiped out, and of the other tracks nearly 28 per cent.

The company's net deficit for the year ended June 30, 1915, was $86,287. This was before the floods. In addition to the losses in revenue from the communities isolated by the floods, the company suffered further losses from auto buses operated between National City and San Diego. During the first ten days of April of this year the company operated its electric interurban railway business between San Diego and National City at a daily operating loss of more than $50.

The Railroad Commission investigated thoroughly all these conditions and sought a plan under which the company could continue operations to the best advantage of all parties. This plan assumes a reduction in passenger fare between San Diego and National City points, from the present 10-cent cash fare to a 15-cent round-trip ticket bought in strips of ten for $1.50, to be used during the calendar month, and transferrable to anyone. The commission says that the suggestions, if carried out, will insure to National City and Chula Vista good service at reasonable rates by a strong, responsible, well-qualified agency, but as the San Diego Electric Railway has definitely refused to undertake the service, the commission cannot recommend to that concern that it engage therein, unless National City and Chula Vista regulate the auto-bus traffic so as to give the company some profit. The plan contemplates temporary suspension of service from the Salt Works to Tent City, Coronado over the Coronado Belt Line, as there is no necessity for it, and from Palm Avenue, Tia Juana over the old National City & Otay Railway's main line. The abandonment also includes the entire Sweetwater Branch, the National City & Otay Railway's main line from Twenty-fourth Street, National City, to Coronado Junction.

COMMISSION DISCUSSES PUBLIC RELATIONS

Section of Recent Report of Missouri Commission Devoted to Company Attitude Toward Public

The third annual report of the Public Service Commission of Missouri, for the year ended Dec. 31, 1915, contains an interesting statement on public relations. The commission says, in part:

"The public service corporations operating in this State are fast learning that the common principle of doing business in the open, giving it the fullest possible publicity, taking the public into their fullest possible confidence, should be adopted by them as the wisest and best policy. We believe that full and frank publicity should be the policy of every public service corporation with its patrons, to the end that all proper information to the investor and the public in general may be had. All public utilities are learning that the only way to gain the confidence of the public is first of all to merit it by square and frank dealing with the public. All public utilities should give full publicity to all dealings with the public; tell the public how much the company is earning, and how it represents only a fair return on the value of the property devoted to the service of the public, and whenever there is a dispute over any matter of service, resolve the doubt in favor of the public and do even more than is strictly required under its duties as a public service corporation.

"We believe the public is now becoming ready to meet the public service corporations, at the half-way station with fair and just treatment. If the integrity of investment, vital alike to rich and poor, employee and employer, is to be properly maintained, such should be the attitude of the public toward such public service companies.

"We think the attitude of the public toward the public service companies as to being on better terms is shown by the number of informal complaints. During the year 1914 this commission received 651 informal complaints, while during the year 1915 it only received 481 of such complaints. This desirable condition has been largely the result of broader and more liberal policies upon the part of public utilities and their dealings with the public. The adoption by the commission of uniform service rules for gas, electric and water utilities has doubtless tended to reduce the number of informal complaints.

"We also desire to state that the conditions between the public utilities and their employees are being greatly improved. The street railways in St. Louis and Kansas City have adopted the policy of issuing monthly bulletins giving information not only to the public, but to the employees of the company, as to the operating and other conditions of such utilities. A better feeling of loyalty is being cultivated by all the public utilities companies with their employees.

"Few complaints have been made to the commission during the year just ended as to any unfair or discourteous treatment of the public by agents or employees of the various public utilities operating in this State. We are gratified to be able to report that conditions are improving all along the lines above indicated."

CINCINNATI VALUATION FIGURES ANNOUNCED

Company and Commission Differ by $11,000,000 on Tentative Cost Less Depreciation Figures

A tentative valuation of the property of the Cincinnati Traction Company was announced by the Ohio Public Utilities Commission on May 13. On some items the commission placed a higher valuation than the company did, and a number of items were allowed on which the company placed no valuation. However, the majority of items were valued at a lower figure than the company's engineers placed upon them.

The cost of the property new is placed at $41,022,717 by the company, while the commission has fixed it at $30,141,102. Depreciation was allowed by the company as $5,185,672, and by the commission as $5,801,354. The cost of the property, less depreciation, was placed at $35,837,044 by the company, while the commission fixed the amount at $24,333,947, a difference of almost $11,000,000.

Both the city and the company will have thirty days in which to file additional statements and claims, after which a date will be set for a public hearing. Neither city nor company officials would comment on the report until they had had time to study it thoroughly. The figures of both the company and the commission, showing the cost new and depreciation, are as follows:

	Company		Commission	
	Cost New	Depreciation	Cost New	Depreciation
1. Grading	$84,396	....	$95,991	....
2. Track	7,182,417	$1,896,369	7,342,925	$1,968,731
3. Bridges	67,182	13,841	60,482	11,239
4. Inclines	345,668	99,177	332,918	103,893
5. Paving	872,773	277,218	910,159	304,848
6. Electrical distributing system	2,033,529	457,546	1,861,988	385,345
7. Rolling stock..	4,982,227	1,096,108	4,798,446	1,183,271
8. Power - plant equipment ...	2,422,522	754,149	2,415,242	696,620
9. Substation equipment	267,890	23,945	289,375	23,616
10. Shop equipment	214,444	41,585	209,730	43,636
11. Buildings	2,269,979	525,734	2,085,137	474,119
12. Furniture and fixtures	49,264	....	51,192	6,252
13. Stores, tools, etc.	628,504	....	662,060	48,135
14. Frontage consents	609,609	....	117,486	....
15. Real estate...	783,179	....	630,699	....
Profit of general contractor	....	....	1,323,441	333,912
16. Contributions imposed by ordinances, etc.	192,876	....	85,237	....
Fire insurance, property damage, expense incurred by incorrect plans.	....	....	867,293	217,737
17. Administration — organization and legal	533,550	....	452,050	....
18. Taxes during construction ..	288,000	....	534,225	....
19. Interest, discount, hidden costs, etc.	3,812,481	....	2,252,776	....
	$27,640,490	$5,185,672	$27,378,851	$5,801,354
TABLE "B."				
*Horse-car lines, dummy lines and incline planes...	$2,277,995	....	$2,000,000	....
*Cable lines......	2,503,051	....	....	....
Track construction destroyed 1901-1913	615,365	....	576,138	....
Paving destroyed from 1901-1913 .	142,404	....	136,740	....
Changes made necessary by rerouting cars	19,262	....	19,262	....
TABLE "C."				
Cost to reproduce paving laid by city	$1,488,493	....	....	....
Cost to reproduce paving, material furnished jointly by city and company	660,421	....	....	....
Franchise value...	5,675,236	....	....	....
			$30,110,991	$5,801,354
Add one-tenth of 1 per cent for incorporation fee.	....	....	30,110	5,801
Grand total val.	$41,022,717	$5,185,672	$30,141,102	$5,807,155

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*In tentative valuation the commission has allowed $2,000,000 for this superseded property, subject to change on further hearing in fixing final valuation.

$220,000,000 OF RAPID TRANSIT CONTRACTS

New York's New System the Greatest Single Municipal Undertaking in the History of the World

For convenience of construction and supervision the New York rapid transit work now under way was divided into routes and sections, there being eighty-nine sections in all. On May 15 seventy-six sections were under contract, and the Public Service Commission during the latter part of this month will open bids on five other sections, leaving only eight yet to be advertised for bids. These eight are mainly in the Boroughs of Manhattan and Brooklyn. These contracts are now in the course of preparation, and it is hoped that bids may be called for on all of them before the expiration of the present year.

On city-owned lines up to the present time the Public Service Commission has completed or under contract construction work on the new lines aggregating about $180,000,000. In addition to this the two companies, the Interborough Rapid Transit Company and the New York Municipal Railway Corporation, have let contracts to upward of $40,000,000. The total amount of construction contracts already awarded, therefore, aggregates about $220,000,000. With respect to the sum involved the rapid transit subway construction now under way exceeds any other single municipal undertaking in the history of the world.

The new roads in Queens Borough are approaching completion, and it is expected that they will be in operation before the close of the coming summer. Queens heretofore has been a borough without rapid transit facilities.

The first line to be opened for operation in the Bronx will be the White Plains Road extension of the Lenox Avenue branch of the first subway. This line will run as far north as 241st Street, near the northern city line. It is expected that it will be in operation also before the close of the coming summer.

By the opening of the Fourth Avenue subway the Borough of Brooklyn has already enjoyed some of the benefits to be derived from the dual system. This line is now in complete operation, and by taking the Sea Beach trains it is possible to ride from the Municipal Building, Manhattan, via the Fourth Avenue subway to Sixty-fifth Street and thence via the Sea Beach cut directly to Coney Island over entirely new construction. The New Utrecht and Gravesend Avenue lines are both under construction, and the former should be ready for operation within a few months. Work has just fairly begun on the Gravesend Avenue line.

Under the new contracts the lower end of Manhattan Island is to be almost honeycombed with subway lines. For instance, below City Hall there will be the Seventh Avenue line in Greenwich Street, the Broadway line in Church Street, the present subway in Broadway, the Centre Street loop extension in Nassau Street, and the Brooklyn extension of the Seventh Avenue line in William Street. All are now under construction, with the exception of the Nassau Street line. Bids will be called for on this line within a short time.

The commission is now advertising for bids for the construction of four sections of the Fourteenth Street-Eastern district line, two in Manhattan and the other two in Brooklyn. This line is for operation by the New York Municipal Railway Corporation. The contract for this has already been let, and work is now under way.

The first operation in the Borough of Queens will be by trains of the Interborough system, although the New York Municipal has trackage rights over the Queens lines. By the change from the use of the Queensboro Bridge to the East River tunnel, Section No. 3, has construction of the Sixtieth Street tunnel for trains from the Broadway subway, which is for operation by the New York Municipal, it will not be possible to complete the tunnel in shape for operation by the time the rest of the Broadway subway will be ready. This change was made by the commission at the request of the Board of Estimate & Apportionment.

It is probable that the initial operation of the Broadway line will be by trains coming over the Manhattan Bridge and running through Canal Street to Broadway, and thence up Broadway to either Fourteenth or Twenty-sixth Street. This operation, it is expected, will be begun in the fall.

FORT WAYNE EMPLOYEES TO RETURN

An agreement was reached on May 11 at Fort Wayne, Ind., by which the Fort Wayne & Northern Indiana Traction Company gained all the points for which it has contended since a strike was called on its city lines on Sept. 27, 1915. Actual operation of the lines was interrupted only during the first day or two of the strike, the company filling all the positions of the striking employees with other men. Since that time, affiliated labor unions have sought by boycott and other methods to force the company to reinstate in their old positions those of the employees who had not voluntarily returned to work shortly after the strike.

The company several months ago offered to take back as new men on the extra list all old employees who had gone on strike, provided they would sign the company's individual contract. This offer was refused by the members of the union, but after the conference on May 11 between the executive committee of the Federation of Labor, a committee of the carmen's union and officials of the Fort Wayne & Northern Indiana Traction Company, an agreement was reached by which the "strike" was officially called off. This agreement provides for the re-employment of between forty and fifty of the old employees before June 6 at the former scale of wages, these men to go on the extra list, and for the re-employment of other old employees as fast as vacancies may occur. It is also provided that the company will not discriminate against any man who may be a member of a labor union, but the company recognizes no organization, and buttons must not be worn by the men when on duty. All of the reinstated employees must also sign the individual working contract of the company. Under the agreement just reached, in consideration for the company agreeing to settle its differences with the striking employees, the Federation of Labor agrees "to do everything in its power to further the interests of the company, and will urge its affiliated organizations to do the same."

PRIVATE OPERATION OF MUNICIPAL LINE URGED

The City Council of Seattle, Wash., has been petitioned by residents in the Lake Burien District to arrange for the operation of the Lake Burien Line, Division "C" of the Seattle Municipal Railway, by the Puget Sound Traction, Light & Power Company, preferably under lease. Several years ago these same property owners raised sufficient funds to build and operate the line, but late in 1913 they presented the property to the city as a gift. Since May 30, 1914, it has been run by the city. As Division "A" of the Municipal Railway, which operates in the northern section of the city does not connect with the Lake Burien line, Lake Burien passengers are forced to change cars at Riverside. The petitioners express the hope that under a lease of the property to the Puget Sound Traction, Light & Power Company they will have a continuous ride from the Seattle business district to the end of the Lake Burien line, or at least there will be a transfer arrangement between the municipal line and the lines of the traction company.

Division "C" is 9 miles long, 4½ miles of which are in the city limits. Passengers are required to pay a 5-cent cash fare to the city limits and an additional 5 cents to continue to Lake Burien. The utilities department of the city, however, sells 4-cent tickets, entitling passengers to ride without the city limits or within city limits, or a continuous ride on two tickets. A special commutation ticket is sold at the rate of sixteen tickets for $1. This is equivalent to a through ride from terminus to terminus for 6¼ cents.

The city has failed to obtain necessary common user rights to bring Division "C" cars to the business section, or to operate a municipal railway from the south terminus of the Lake Burien railway to the north terminus of Division "A." Hence, Lake Burien passengers who desire to come to the business district after disembarking from Division "C" at Riverside, are compelled to pay a 5-cent fare to the Puget Sound Traction, Light & Power Company. The petition says in part: "We desire to initiate proceedings looking to a service over the traction company's line into the business center without change of cars, and do not intend any disparagement of the management of the line by the city, nor of the conduct of its employees."

BALTIMORE COMPANY WINS PAVING SUIT

The Supreme Court of the United States has denied the application of the city of Baltimore, Md., for a review by it of the decision of the Maryland Court of Appeals, which condemned the act of the State Legislature imposing a part of the cost of the new paving in Baltimore upon the United Railways & Electric Company.

The Legislature, by the act of 1914, attempted to cast the cost of repaving, between and on either side of tracks, upon the company whenever any street in the bed of which its tracks were laid was paved or repaved with improved paving. The Court of Appeals declared the law void, saying: "The Legislature had no power under the constitution and laws of this State to charge the railways company with the cost of doing the work sued for in this case. . . . After the most careful consideration of the case we do not find it necessary to pass upon the federal question—that is, whether the law was in conflict with the provisions of the United States Constitution, . . . but we rest the decision solely upon the constitution (of Maryland) and the decision of our court." The court then decided that a special paving tax such as was imposed by the law of 1914 would not stand unless the person assessed was benefited by the proposed improvement, and that electric railway tracks in the street bed were not so benefited.

The sum at stake was variously estimated at from $1,000,000 to $1,500,000.

PUBLIC SERVICE RAILWAY INCREASES WAGES

Announcement was made by the Public Service Railway, Newark, N. J., on May 16 of an increase of wages for employees which is to take effect on July 1. The raise will mean about $262,000 a year on the basis of present business. Not only will motormen and conductors profit by the raise, but other employees of the transportation department will figure in the company's action. July 1 was fixed as the date for the new scale becoming effective because it marks the beginning of the company's half-year. Only two and a half years ago, on Jan. 1, 1914, a wage scale ranging from 23 cents to 30 cents an hour and involving an addition of $200,000 a year to the payroll was put in effect. The new rate will give the men from 25 to 32 cents an hour, the minimum being paid to beginners and the rate increasing with length of service. An increase was also authorized in the minimum wage to be paid extra motormen and conductors. The rate has been $12 a week. After July 1 the extra men will be enabled to earn $14 a week if they report for rollcalls and perform such duties as may be assigned to them.

Change in Cleveland Operating Allowance to Meet Wage Increase. — The increase of 9 mills per car-mile in the operating expense allowance of the Cleveland (Ohio) Railway under the Tayler grant to provide for the additional wages to be paid motormen and conductors was approved by the Cleveland City Council on May 15.

N. A. M. Urges Fairer Railway Regulation.—Correction of the defects in the system of railway regulation with the view toward restoring the energy and initiative of the transportation companies was urged in a resolution adopted on May 16 at the three-day convention of the National Association of Manufacturers at the Waldorf-Astoria Hotel, New York.

Thompson Committee Considers Wire Tapping.—On May 12, the Thompson legislative committee called Timothy S. Williams, president of the Brooklyn Rapid Transit Company. who told why the connection between the Centre Street loop and the Brooklyn elevated system at Park Row was not in operation. Since then the hearings that have been held have been devoted to inquiry into telephone wire tapping.

Electrification of Short Lines for Passenger Service.—Confirmation has been secured in New York of the report from Fairmont, W. Va., that an arrangement has been made by the Monongahela Valley Traction Company with the Western Maryland Railway by which the latter will electrify its lines leading to Helens Run and Wyatt Mines of the Consolidation Coal Company. The Monongahela Valley Traction Company will carry all passengers and express traffic over these lines, while freight shipment will be moved by steam power.

New York's Horse Cars to Go.—During the week ended May 13 the Public Service Commission for the First District of New York authorized the preparation of an order which will, in effect, direct the elimination from Manhattan Island of its last horse-drawn street car by Dec. 1, 1916. The New York Railways had contracted for seventy car bodies of a new type to replace the horse cars, and the company is experimenting with equipment for the new cars. The lines concerned are the Chambers Street-Madison Street, and the Avenue C. These are the only horse car lines in New York.

Many Converts Still Untouched.—The conscience fund of the Kansas City (Mo.) Railways is growing markedly, following the opening of the Billy Sunday revival. One woman wrote that she had ridden four or five times without paying. She had attended two of the meetings, wanted to get right with God, and, as a first step of cleansing her conscience, inclosed 30 cents. One man wrote that he had stolen his way into one of the dances which the company gave for its employees. He inclosed 50 cents. The sums received are small, but their number indicates an appreciable reduction of the usual drain on revenues due to purloined rides and evasions of the conductors and the transfer regulations.

Philadelphia Primaries Vote Transit Loan.—The Philadelphia transit loan was passed on May 16 by the voters at the primaries by a majority estimated at approximately 100,000. Mayor Smith expressed gratitude to the newspapers for their assistance in winning the victory, and especially to A. Merritt Taylor, director of city transit during the Blankenburg administration, who drew up the plans for transit improvement and returned recently to conduct the campaign favoring the program of construction as laid down by him. The transit bill must now be passed in the Common Council and then at a separate meeting of Select Council. The bill cannot be ratified by both branches until the second week in July, and the money for the appropriation will not be available before Aug. 1.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Accountants' Association

The meeting of the Central Electric Railway Accountants' Association, arranged to be held in Toledo, Ohio, on June 6 and 7, has been postponed to June 13 and 14.

West Virginia Public Utilities Association

The executive committee of the Public Utilities Association of West Virginia met at Charleston on May 8 and arranged a program for the regular annual meeting of the association to be held at Parkersburg on July 13-15.

New England Street Railway Club

In accordance with the plan of State meetings adopted for this year the meeting of the New England Street Railway Club on May 25 will be Rhode Island night, with Vice-President A. E. Potter in charge of the arrangements. The speaker will be Frederick W. Doolittle, New York, consulting engineer and director of the bureau of fare research of the American Electric Railway Association. His subject will be "Some Problems of the Electric Railway Industry."

Oklahoma Association

The annual convention of the Gas, Electric & Street Railway Association of Oklahoma will be held May 23, 24 and 25 in Oklahoma City. Headquarters will be at the Lee Huckins Hotel. The following papers of direct interest to electric railway operators will be presented: "Safety First," by J. J. Johnson, assistant general manager of the Oklahoma Railway; "Taxation of Public Service Corporations," by Prof. J. W. Scroggs, director of Extension Division of the University of Oklahoma; "Publicity Toward the Promotion of Harmonious Relations Between Public Utilities," by W. R. Molinard, manager of the Oklahoma Gas & Electric Company; "Fuel Efficiency," by A. J. Neff, of the American Public Service Corporation of Abilene, Tex.; "Report of the Rate Research Committee," by S. D. Irelan of the Bartlesville Interurban Railway Company.

Financial and Corporate

ANNUAL REPORTS

Washington, Baltimore & Annapolis Electric Railroad

The comparative statement of income, profit and loss of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., for the calendar years 1914 and 1915 follows:

	1915	Per Cent	1914	Per Cent
Railway operating revenues....	$845,682	100.0	$816,938	100.0
Railway operating expenses..	469,572	55.5	449,625	55.0
Net revenue railway operations.	$376,110	44.5	$367,313	45.0
Net revenue auxiliary operations	14,870	1.7	14,925	1.8
Net operating revenue.........	$390,980	46.2	$382,238	46.8
Taxes assignable to railway operations	42,582	5.0	37,814	4.6
Operating income	$348,398	41.2	$344,424	42.2
Non-operating income	12,465	1.5	13,071	1.6
Gross income	$360,863	42.7	$357,495	43.8
Deductions from gross income.	258,689	30.6	255,767	31.3
Net income	$102,174	12.1	$101,728	12.5

The company during 1915 had better receipts than in the preceding year, the increase in railway operating revenues amounting to $28,744, or 3.52 per cent. This was in marked contrast to the year 1914, when the showing was a loss of $15,001, or 1.8 per cent from the 1913 results. The operating expenses, however, also increased in 1915 over 1914, and in a slightly greater ratio than the revenues, so that the operating ratio showed an improvement, a rise from 55 per cent to 55.5 per cent. Taxes and fixed charges both increased, with the result that the net income was only slightly better than in 1914.

During 1915 the company expended $81,101 for additions and betterments, this being divided $20,354 for road, $59,371 for equipment and $1,376 for power. Miscellaneous comparative statistics follow:

	1915	1914
Revenue passengers carried..............	1,879,790	1,794,672
Earnings per car mile (cents)...........	40.47	38.65
Earnings per mile of single track..........	$8,550	$8,274
Earnings per mile of road..............	$15,390	$14,866
Earnings per passenger (cents)...........	35.97	36.71

Delaware & Hudson Company

The 1915 report of the Delaware & Hudson Company, Albany, N. Y., states that the business depression during the first half of 1915, together with heavy rainfall, especially on Saturdays and Sundays, and cool weather on holidays, adversely affected the revenues of its affiliated electric railways. Indeed, there were greater decreases than in any other year since the control of the electric railways by the railroad.

The operating revenues of the United Traction Company, Albany, N. Y., showed a decrease of $134,638, while the expenses showed an increase of $186,091. The net operating income showed a decrease of $306,084. Operating expenses were unusually high, especially those for maintenance of way and structures and equipment, both principally due to heavy paving and other requirements by municipalities and the Public Service Commission. During December, 1915, the unusually heavy snowfall compelled extra efforts for maintenance of car operations and removal of snow from the streets. The estimated cost of the latter was $11,564. Paving requirements were about nine times the normal amount, the year's work aggregating 34,250 yards, with an estimated cost of $105,039. The total payments for paving amounted to $135,347, of which $107,886 was for work done during earlier years. These figures are exclusive of charges for ordinary paving maintenance, which amounted to $45,193 in 1915, an increase of $10,385 over 1914.

During 1915 the United Traction Company constructed 1.929 miles of additional tracks in Albany and Troy at an estimated cost of $71,953. A total of 11.529 miles of track was reconstructed at a cost, exclusive of paving and ordinary maintenance, of $163,682. Of the 11.529 miles, 6.379 miles were necessary only because of paving required by the municipalities. There was expended during the year for improvements to the company's substation equipment and power lines, $175,071, exclusive of ordinary maintenance amounting to $48,821. These improvements were mainly to secure more economical power distribution and more efficient car operation. The company's net loss from the strike on Sept. 6-9, 1915, was $11,500, and the employees lost $12,000 in wages—both exclusive of additional expenses incident to the strike.

The operating revenues of the Hudson Valley Railway, Glens Falls, N. Y., showed a decrease of $50,321 and operating expenses an increase of $11,034. The net operating income, therefore, suffered a decrease of $62,764.

The operating revenues of the Plattsburgh (N. Y.) Traction Company decreased $1,976 and operating expenses $244. The net operating income showed a decrease of $1,827. Two of Plattsburgh's largest industries, employing 550 men, were not operated in 1915. The depression in this neighborhood was partly offset by the military instruction camp held during the summer.

The operating revenues of the Troy & New England Railway, Troy, N. Y., showed a decrease of $2,569 and expenses an increase of $5,421. The net operating income decreased $7,897. The requirements met by this company during the year were abnormal, notwithstanding the great decrease in earnings. The expenditures for improvements and ordinary maintenance of way and structures totaled $8,812, of which $3,408 was for work ordered by the Public Service Commission. The renewal of about 5 miles of right-of-way fence cost $1,365, all charged to maintenance. The power supply was greatly augmented through the construction of additional feeders by the United Traction Company.

JANUARY AND FEBRUARY EARNINGS

Returns Show Continued Depression in West, but Advance in Operating Revenues and Net for Other Sections

A comparison of electric railway statistics for January and February, 1916, with figures for the corresponding months of 1915, made by the information bureau of the American Electric Railway Association and shown in the accompanying tables, indicates an improvement in the electric railway business in the United States. Returns for January, representing 7328 miles of line of companies scattered throughout the United States, show an increase in operating revenue of 5.57 per cent, in operating expenses of 4.09 per cent and in net operating revenue of 8.10 per cent, while returns representing 5495 miles of line indicate an increase in taxes of 1.65 per cent and in operating income of 12 per cent.

Similar returns for February, representing 4710 miles of line, or only about 64 per cent of the January mileage, show increases in operating revenue of 9.07 per cent, in operating expenses of 7.55 per cent and in net operating revenue of 11.44 per cent. Returns for about 69 per cent of this mileage indicate an apparent decrease in taxes of 1.28 per cent and an increase in operating income of 12.31 per cent. It must be borne in mind in this connection that data from the Western district does not indicate any participation in this measure of prosperity. Of the three groups the Western, represented by 1588 miles of line, show a decrease during January of 2.35 per cent in operating revenues, an increase of 2.29 in operating expenses and a 10.50 per cent decrease in net operating revenue. Data for 1424 miles of line in this group show a 12.20 per cent decrease in operating income—this in spite of an apparent decrease in taxes paid of 2.43 per cent. The Southern group, represented by 822 miles of line, indicates a continued reduction in operating expenses and though taxes went up about 3 per cent, a gain in operating income of 15 per cent. The Eastern group, represented by 4916 miles of line, has gained 7.85 per cent in operating revenues, 5.04 per cent in operating expenses and 12.57 per cent in net operating revenue. All of the districts except the Western show a decrease in the operating ratio, the United States as a whole indicating a decrease from 62.97 per cent in January, 1915, to 62.08 per cent in January, 1916. The operating ratio of the Western district has increased from 63.75 per cent in 1915 to 66.78 per cent in 1916.

The returns for February indicate a slight improvement over those for January. It must be pointed out, however, that the apparent decrease in taxes for the United States as a whole and for the Western district in particular is almost entirely due to a considerable reduction in the gross revenue of a large Western city company. This company is taxed on the basis of its gross receipts, and any reduction in gross must be necessarily followed by a considerable reduction in the amount of taxes paid. Jitney competition, it is said, has played no inconsiderable part in bringing about this state of affairs.

TABLE I—REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR JANUARY AND FEBRUARY, 1916

	January		February	
Account	Amount In 1916	Per Cent Increase Over 1915	Amount In 1916	Per Cent Increase Over 1915
*United States**				
Operating revenues	$15,861,431	5.57	$8,109,761	9.07
Operating expenses	$9,847,593	4.09	$4,877,015	7.55
Net operating revenue	$6,013,838	8.10	$3,232,746	11.44
Operating ratio, per cent:				
1915	62.97	...	60.98	...
1916	62.08	...	60.13	...
Miles of line represented	7,328.35	...	4,710.44	...
*Eastern District**				
Operating revenues	$12,016,856	7.85	$5,589,472	12.10
Operating expenses	$7,346,798	5.04	$3,267,366	7.86
Net operating revenue	$4,670,058	12.57	$2,322,106	18.65
Operating ratio, per cent:				
1915	62.76	...	60.75	...
1916	61.13	...	58.45	...
Miles of line represented	4,916.88	...	2,749.40	...
*Southern District**				
Operating revenues	$817,725	4.59	$588,106	5.31
Operating expenses	$479,466	*d* 2.34	$327,405	*d* 0.83
Net operating revenue	$338,259	16.28	$260,701	14.20
Operating ratio, per cent:				
1915	62.79	...	59.11	...
1916	58.63	...	55.67	...
Miles of line represented	822.64	...	637.64	...
*Western District**				
Operating revenues	$3,026,850	*d* 2.35	$1,932,183	2.20
Operating expenses	$2,021,329	2.29	$1,282,244	9.13
Net operating revenue	$1,005,521	*d* 10.50	$649,939	*d* 9.18
Operating ratio, per cent:				
1915	63.75	...	62.14	...
1916	66.78	...	66.36	...
Miles of line represented	1,588.83	...	1,323.40	...

NOTE.—Letter *d* denotes a decrease.

*Groupings are as follows: *Eastern District*—East of the Mississippi River and north of the Ohio River; *Southern District*—South of the Ohio River and east of the Mississippi River; *Western District*—West of the Mississippi River. The *Eastern District* does not include the Interborough Rapid Transit Company, New York, N. Y.

TABLE II—REVENUES AND EXPENSES OF ELECTRIC RAILWAYS REPORTING TAXES FOR JANUARY AND FEBRUARY, 1916

	January		February	
Account	Amount In 1916	Per Cent Increase Over 1915	Amount In 1916	Per Cent Increase Over 1915
United States				
Operating revenues	$12,547,377	5.46	$5,283,394	8.72
Operating expenses	$7,902,867	2.97	$3,203,183	8.22
Net operating revenue	$4,644,510	10.01	$2,080,211	9.51
Taxes	$824,559	1.65	$385,996	*d* *1.28
Operating income	$3,819,951	12.00	$1,694,215	12.31
Operating ratio, per cent:				
1915	64.51	...	60.91	...
1916	62.98	...	60.62	...
Miles of line represented	5,495.76	...	3,287.86	...
Eastern District				
Operating revenues	$9,175,541	8.36	$3,046,002	13.45
Operating expenses	$5,716,978	3.85	$1,804,183	10.67
Net operating revenue	$3,458,563	16.75	$1,241,819	17.74
Taxes	$560,680	3.04	$216,862	2.63
Operating income	$2,897,883	19.84	$1,024,957	21.53
Operating ratio, per cent:				
1915	65.01	...	60.71	...
1916	62.30	...	59.23	...
Miles of line represented	3,414.43	...	1,523.91	...
Southern District				
Operating revenues	$615,303	1.69	$533,639	5.01
Operating expenses	$348,539	*d* 3.34	$298,943	*d* 1.51
Net operating revenue	$266,764	12.63	$234,696	14.68
Taxes	$53,362	3.97	$27,110	6.69
Operating income	$213,402	15.02	$207,586	15.82
Operating ratio, per cent:				
1915	60.85	...	59.72	...
1916	56.64	...	56.01	...
Miles of line represented	656.60	...	580.95	...
Western District				
Operating revenues	$2,756,532	*d* 2.40	$1,703,753	2.23
Operating expenses	$1,837,350	1.98	$1,100,057	7.18
Net operating revenue	....	*d* 10.14	$603,696	*d* 5.71
Taxes	$210,519	*d* 2.43	$142,024	*d* *7.95
Operating income	....	*d* 12.20	$461,672	*d* 5.00
Operating ratio, per cent:				
1915	63.78	...	61.58	...
1916	66.65	...	64.56	...
Miles of line represented	1,424.73	...	1,183.00	...

NOTE.—Letter *d* denotes a decrease.

*See last paragraph of comment.

PROTECTING UTILITY SECURITIES

Newspaper Urges Utility Investors to Unite in Protection of Their Interests in Regulatory Cases

The part of the financial pages of the Chicago *Tribune* devoted to advice to investors recently contained a pertinent statement concerning the need of protection for utility securities. This suggests a line of publicity which should be encouraged by electric railways, who up to the present time have been more or less apathetic about this vitally important problem. The statement follows:

"Investors in utility stocks and bonds everywhere ought to join in an effort to have due consideration given to their interests by the commissions which fix rates and supervise the operation of utility corporations. At present such securities generally are allowed adequate protection, but the tendency is to yield to the demands of patrons and politicians and let the investor bear the burden as best he can. Continual exactions of one kind and another gradually reduce the profits of operating, cut down dividends and decrease the margin of safety protecting bond interest, thus undermining the value of securities and making sales of future issues more difficult.

"In Chicago there is nearly $500,000,000 invested in utilities, not counting the telephone company. The gross earnings of these properties are not far from 15 per cent on the capitalization, and the net is not far from 6 per cent. The 6 per cent, however, does not all go to security holders. Some of it is directly paid to the city and smaller amounts are used up by other charges, so that the average return on the money invested is a fraction over 5 per cent.

"It thus appears that about two-fifths of the money spent for street car fares and lighting goes directly to pay for the use of the money invested in the plants. If the investors are assured of a permanent revenue they will be satisfied with a low rate of return, and an important item in the cost of utility service will be reduced to a minimum. If, on the contrary, the securities are continually menaced, no one will buy them except on a speculative basis, yielding a high income. Whether utility bonds shall rank among the most conservative investments or among speculative issues, rests chiefly with the rate-making and regulating authorities.

Ardmore (Okla.) Railway.—Application for a charter has been made by the Ardmore Railway to succeed the Ardmore Electric Railway, the property of which was sold under foreclosure as noted in the ELECTRIC RAILWAY JOURNAL of April 22, page 797.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill.—The Aurora, Elgin & Chicago Railroad has arranged with the Central Trust Company, Chicago; the Bankers Trust Company, New York, and the Citizens' Saving & Trust Company, Cleveland, to purchase the fifteen year 5 per cent consolidated first mortgage gold bonds of the Elgin, Aurora & Southern Traction Company, payable on June 1, 1916.

Barcelona Traction, Light & Power Company, Barcelona, Spain.—It is announced that the Barcelona Traction, Light & Power Company has recently sold securities in Spain yielding the company the $1,200,000 of capital required to complete the tramway between Barcelona and Larrasa and Sabadelle, Spain.

Cities Service Company, New York, N. Y.—Publication of the call of Cities Service Company 7 per cent notes of 1918, at 102 per cent of the face value plus accrued interest to the date of presentation, was begun on May 12. The notes will be payable on or before July 12, 1916, at the office of the company in New York.

Dry Dock, East Broadway & Battery Railroad, New York, N. Y.—The Public Service Commission for the First District of New York has denied the application of the Dry Dock, East Broadway & Battery Railroad for permission to issue $2,800,000 in bonds. This action was without prejudice to the renewal of the application for an issue of $1,828,385. The commission had previously denied the application and the company took the matter to the Appellate Division of the Supreme Court. The present action of the commission in permitting the renewal is in accordance with the decision of the court, which held that bonds could be issued in an amount not exceeding previous expenditures on capital account.

Edmonton (Alta.) Radial Railway.—The audited report for the year ended Dec. 31, 1915, presented to the Edmonton City Commissioners, showed total receipts of $520,322, with expenditure as follows: Transportation expenses, $294,534; maintenance, $11,374; equipment, $33,996; general, $30,362; interest and redemption charges, $259,836; depreciation, $25,551; altogether showing a deficit of $135,758. At Dec. 31, 1914, the total deficiency was $630,955, this being increased now to $644,431. From this amount has to be taken $198,585.20, the readjustment of the depreciation reserve as recommended by the investigation committee and approved by the Council. The total number of passengers carried in 1915 was 10,658,219 as compared to 14,081,564 in 1914. The traffic dropped considerably until September, when a rerouteing of the cars was instituted and the soldiers returned to the city. In December 48,996 more passengers were carried than in December, 1914, and the expenses were reduced from 25.8 cents per car-mile to 19.8 cents. The running expenses for 1915 were 12.3 cents per car-mile, exclusive of power charges, as compared to 16.6 cents per car-mile in 1914.

Hagerstown & Frederick Railway, Frederick, Md.—The Fidelity Trust Company, Baltimore, Md., is offering at 100 and interest a block of first and refunding 6 per cent thirty-year sinking fund gold bonds of 1914 of the Hagerstown & Frederick Railway. The authorized issue of these bonds is $10,000,000, of which $850,000 is outstanding at the present time.

International Railway, Buffalo, N. Y.—The Public Service Commission for the Second District of New York has approved an issue of $500,000 of International Railway 5 per cent refunding and improvement mortgage bonds. They must be sold at not less than 88 per cent of par to net $444,400. This sum, with $171,139 remaining from the proceeds of a previously authorized issue of the same bonds, making in all $676,000, will be used to refund $55,000 of car trust certificates due this year and to pay for the company's extension and improvement program for the calendar year 1916.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The Youngstown & Sharon Street Railway has been authorized by the Ohio Public Utilities Commission to issue its improvement and refunding mortgage bonds of the total principal sum of $39,135 to be delivered to the Mahoning & Shenango Railway & Light Company in payment, at par, for advances made by it for the construction of additions, extensions and improvements to the facilities of the company from Nov. 1, 1915, to March 31, 1916. The Youngstown & Niles Railway has been authorized by the commission to issue its common capital stock of the total par value of $100,500 to be delivered to the Mahoning & Shenango Railway & Light Company, $60,500 in payment for advances made for the construction of a line from Youngstown to Warren, and $40,000 in payment of advances, by it, for the construction and completion of a line to Niles, Ohio.

Northern Ohio Traction & Light Company, Akron, Ohio.—The Northern Ohio Traction & Light Company has sold to N. W. Halsey & Company, New York, N. Y., and Hayden, Miller & Company, Cleveland, Ohio, subject to approval of the Ohio Public Utilities Commission, $4,000,000 of first-lien and refunding forty-year 5 per cent bonds. The proceeds of these bonds will care for all capital expenditures of the company and all maturities over the next three years.

Otsego & Herkimer Railroad, Cooperstown, N. Y.—The Public Service Commission for the Second District of New York has approved the proposed change of the name of the Otsego & Herkimer Railroad to the Southern New York Power & Railway Company.

Seattle (Wash.) Municipal Railway.—According to figures compiled by A. L. Valentine, superintendent of public utilities of Seattle, Division "A" and Division "C" of the Seattle Municipal Railway were operated during April at a loss of $2,322. The actual operating loss of Division "A" amounted to $395, to which is added $1,593 interest on outstanding bonds, making a total loss for that line of $1,989. The loss on Division "C" amounted to $333.

Southern Iowa Railway & Light Company, Albia, Iowa.—Alfred B. Mueller, receiver, on May 3 sold at Albia all the property of the Southern Iowa Railway & Light Company. The purchaser was Guy M. Walker, New York, N. Y., representing the bondholders. His bid was $150,000. This is the second time the property has been offered for sale since January. The previous sale held on Jan. 20 was not confirmed by the court.

Standard Gas & Electric Company, Chicago, Ill.—The Standard Gas & Electric Company is inviting tenders on approximately $2,000,000 of its convertible 6 per cent sinking fund gold bonds, and intends to pay $1,478,000 of three-year 6 per cent notes which mature on June 1. The Philadelphia Trust Company, trustee for the bonds, has announced that it has on hand $2,016,000 for the purpose of redemption and has called for sealed tenders of bonds at a price not exceeding 105 and accrued interest, to be received until May 26. Payment of the 6 per cent notes will retire all of the outstanding short-maturity securities of the original issue of $3,000,000 made three years ago. Dividend scrip issued while the preferred stock cash dividends were discontinued is being rapidly exchanged for the company's 6 per cent twenty-year gold notes.

United Railways, St. Louis, Mo.—The Missouri Public Service Commission has authorized the issues of bonds by the Merrimac River Railroad and the St. Louis & Suburban Railway for refunding purposes, referred to in the ELECTRIC RAILWAY JOURNAL of April 29, 1916, page 838.

Youngstown & Southern Railway, Youngstown, Ohio.—Judge C. M. Wilkins in the Common Pleas Court at Youngstown on May 13 ordered the sale of the Youngstown & Southern Railway, which has been in the hands of David Tod as receiver. The action was taken on petition of the New York Trust Company in foreclosure proceedings.

DIVIDENDS DECLARED

Central Mississippi Valley Electric Properties, Keokuk, Iowa, quarterly, 1½ per cent, preferred.

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent, preferred.

Citizens' Traction Company, Pittsburgh, Pa., $1.50.

Norfolk Railway & Light Company, Norfolk, Va., 3 per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

ATLANTIC SHORE ELECTRIC RAILWAY, KENNEBUNK, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., April, '16	$23,575	*$20,703	$2,872	......	......
1 " " '15	23,855	*23,304	551	......	......

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$32,533	*$20,087	$12,446	$11,046	$1,400
1 " " '15	29,914	*17,198	12,716	10,918	1,798
3 " " '16	93,355	*56,769	36,586	33,158	3,428
3 " " '15	82,886	*50,861	32,025	32,817	†792

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., April, '16	$3,243,929	$1,210,258	$2,033,671	$1,187,776	‡$890,509
1 " " '15	2,926,690	1,090,775	1,835,915	1.085,452	‡806,364
10 " " '16	29,702,743	11,605,286	18,097,457	11,370,597	‡7,194,351
10 " " '15	27,839,526	10,781,264	17,058,262	10,866,772	‡6,684,502

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$114.646	*$78,281	$36,365	$36,356	$9
1 " " '15	102.222	*70.439	31.783	35,990	†4,207
3 " " '16	334,522	*231,759	102.763	108,791	†6,028
3 " " '15	289,759	*210,984	78.775	107,908	†29,133

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '16	$392,206	*$245,276	$146,930	$50,646	$96,284
1 " " '15	280,779	*178,948	101,831	51,901	49,930
3 " " '16	1,118,751	*669,887	448,864	157,637	291,227
3 " " '15	822,069	*525,913	296,156	153,014	143,142

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., April, '16	$2,272,272	$1,244,460	$1,027,812	$816,043	$211,769
1 " " '15	1,971,599	1,140,510	931,089	816.022	15,067
10 " " '16	21,135,004	11.810.169	9.324.835	8,161,907	1,162,928
10 " " '15	19,776,806	11,486,176	8,290,630	8.101.462	189,168

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

PENNSYLVANIA CRITICISED CONSTRUCTIVELY

Review of Results Achieved by Circular Asking Patrons for "Kicks"

Some months ago the Pennsylvania Railroad asked in bulletin No. 9 this question: "What causes lack of confidence in railroads?" The management of the railroad announced that it wanted to get at the causes wherever they existed and remove them and that the starting point was to get the people who lacked confidence in the railroad to say so and tell why. The company said that it asked these questions because it needed the confidence of its patrons, wanted their co-operation and asked for their friendship. It said frankly that to serve its patrons properly without these was almost an impossibility, and that its patrons would help the company to serve them by giving serious thought to the solution of its problems. It suggested that patrons, when they thought of something the railroad could do to improve the service and make people think better of it, should tell the management about it.

The story of the result of the campaign is contributed by Henry A. Beers, Jr., to *Printers' Ink* for May 11. Mr. Beers says when the publicity department of the railroad early in January published and posted 40,000 of its now famous Bulletin No. 9, it was virtually pinning to its own back the never-failing source of juvenile mirth, carrying the direct invitation, "Kick me." In response to this bona fide communication a pent-up public burst forth in such a fury of rhetoric that it might be said in paraphrase that the Pennsylvania Railroad had literally sown the wind and reaped a gas tank. It must not be gathered from this, however, that the full sweep of the thousand or more letters received in answer to Bulletin No. 9 were out-and-out "kicks," so-called. Many of the letters contained interesting suggestions, and where criticism was made it was more than often in a temperate and helpful spirit of co-operation. Incidentally where such suggestions and criticisms were well founded, as investigations showed, wherever practical the proper remedy was applied or steps are under way to remove the causes thereof.

The author says that of the letters examined very few on their faces betrayed marks of the so-called "crank," although many revealed a decidedly dyspeptic outlook on things as they are. In seeking to find "what my neighbor thinks of me" the Pennsylvania Railroad labored under no illusions. It did not expect a flood of compliments. One of the letters in particular is quoted as a fair example of what the railroad suspected was being said behind its back and what it preferred to have said to its face. Another letter was regarded as a keynote letter. It handled the subject in a really constructive way and was written in a genuinely good-humored and readable style. It dealt with the same principle that George J. Whelan has been applying unremittingly in the service of the United Cigar Stores, namely, the broad question of what constitutes real service and just where does a company's obligation to a purchaser of its commodities begin and where does it cease. The writer of this letter said that it was true that the company was as near perfect as human element could make it, but asked if it ever occurred to the man higher up that the vast system was something which the every-day man or woman could not grasp. It asked whether the officers appreciated and understood what the great world-war meant, whether they could grasp it and realize its vast operation. The opinion was expressed that the officers of the company could not, and the statement was made that the general public did not understand the railroad. The general injunction was to be more human.

Every complaint sent in was examined and delegated to the heads of the various departments of the road for further investigation and recommendations as to action. To many of the more important and significant communications, President Rea replied personally. In securing a thousand odd communications along these lines from the many millions who use the road the Pennsylvania feels that it has been able to draw off, to a certain extent, the bad blood that festered its corporate side. Mr. Beers says in conclusion that having now some basis on which to judge the standard of criticism against the road, the company is in a position to know more definitely just where it stands with its patrons. In short, it has a tangible basis on which to frame its future plans.

DAILY BAY STATE FARE SESSIONS

Daily sessions in the Bay State Street Railway fare case before the Massachusetts Public Service Commission were resumed on May 15 at Boston. There is little prospect of the board's taking the case under advisement before July 1. Localities affected will have an opportunity to discuss the effect of the proposed changes in rates after the present cross-examination of R. M. Feustel, valuation expert of the company, is completed. It is probable that rebuttal testimony will be offered by the remonstrants soon after the return of Alton D. Adams, advisory engineer for the various cities and towns. The commission's own consulting engineer in the case, B. J. Arnold, Chicago, has not yet been placed upon the stand, and it is probable that additional evidence may be submitted by the company.

Mr. Feustel was cross-examined by counsel for the remonstrants. The inquiry followed the preparation of the data submitted by Sloan, Huddle, Feustel & Freeman on behalf of the company. The failure of many of the company's lines to earn a 7 per cent return on their allocated investment cost received much attention. It was brought out that the establishment of through service from Scollay Square, Boston, to Revere Beach by the Boston Elevated and Bay State lines working through the East Boston-Orient Heights district was under consideration. R. S. Goff, vice-president and general manager of the Bay State company, said that no steps toward the establishment of a single fare for this service had been taken, and that if the proposed tariff of the Bay State company went into effect, the rate would probably be 11 cents. Chairman McLeod said that the inauguration of such service depended in large measure upon adequate provision .for handling traffic through the East Boston tunnel, and involved the possible use of motor-trailer trains.

Several attempts were made by Counsel Wadleigh of the remonstrants to secure a statement from Mr. Feustel to the effect that one-man cars would be successful on various branch lines of the company, but the witness, while recognizing the possibility of such service, contended that he had not made a sufficient study of the local operating problems to commit himself. The point was brought out that service on branch lines is often in considerable measure influenced by the volume of transfer traffic and that the receipts of such lines are not an accurate index of the service requirements.

The witness agreed that the non-paying lines of the system must to some extent be carried by the profitable portions. The Newburyport-Ipswich route was such a line. It is now operated at a deficit of $52,165 yearly. The investment on this route was $380,919. There were 16.48 track-miles involved and hourly service was rendered. Under the new rate the fare from terminal to terminal will be 30 cents instead of 20 cents and an extra zone has had to be added.

The comparatively low average speed of the Bay State cars was attributed in large measure to the fact that the company included layover time in its figuring. The point was made that it would be of doubtful economy to purchase extra rolling stock simply to handle the Sunday and holiday peaks in the summer. The Bay State company's traffic was more dense in the summer months, that in nine representative districts ranging from 26.9 per cent to 48.00 per cent of the yearly total of the groups of lines involved in the months of July, August and September. Regarding analyses of traffic distribution, the point was established that the study of day cards was an unsatisfactory method of attacking this problem. A special and elaborate series of observations for even an approximate determination was necessary in this connection.

RAILWAY CAPITALIZES BILLY SUNDAY

Front-end Collectors Assist in Moving 16,000 Persons in Twenty Minutes

The Kansas City (Mo.) Railways, which has aided in advertising the Billy Sunday meeting at Kansas City, was remembered in the prayer of the evangelist the evening of May 12. The next day he gave to the Kansas City *Post* an interview complimenting and thanking the company for its service. In this interview he said:

"It's the best I've ever seen in any city where I've had meetings. I've not heard a single grumble or knock. There's psychology in giving the people good transportation service. It keeps the people of a city in good humor. And when people can come to the tabernacle in good humor they at least have a smattering of Christian spirit. If the street car company and its men can get the people to the tabernacle and home afterward without spoiling their humor the company is doing all in its power to help the Lord. I've noticed how quickly the crowds are carried away after a meeting. I've noticed how quickly the tabernacle fills sometimes. At times it is almost empty and all at once the people will begin streaming in through all doors and it will be packed. I'm glad for this spirit of co-operation of the street car company and all others that are helping."

The Kansas City Railways used the interview the next day, Sunday, in a half page of display space, adding and interpolating references to its service, and the part it plays in the welfare of the community. Above and below the advertisement were the lines, "Brighten the City Where You Are."

The Billy Sunday meetings have brought an increase of about 20 per cent in the gross business of the company, producing the largest week's business in its history, though not any record day. The attendance at the meetings has been from 20,000 to 40,000 a day, and on May 14 the attendance at the various meetings conducted by Sunday and his assistants was estimated at 80,000. The seating capacity of the pavilion is said to be 15,000, but frequently more than 5000 additional visitors fail to get in. W. C. Harrington, superintendent of transportation, uses about 130 extra cars for the service to and from the tabernacle, storing them on dead tracks and in carhouses. The meetings begin soon after the hall is filled. This makes the time of closing uncertain. Mr. Harrington therefore had a push button installed on the platform, and one of Mr. Sunday's assistants pushes the button when the last hymn is announced, thus warning Mr. Harrington. The extra cars are run in on four parallel lines within five blocks of the tabernacle in a few minutes. A crowd of 16,000 persons has been moved away within twenty minutes. Front-end collectors are used on all streets where cars are held for the meetings.

One-Man Car Hearing Postponed.—The hearing before the Public Service Commission of the State of Washington in regard to the operation of one-man cars in Spokane, referred to in the ELECTRIC RAILWAY JOURNAL of March 11, page 520, was postponed from May 8 to some time between June 5 and 10. Complaint against the operation of the cars by the Inland Empire Railroad and the Washington Water Power Company was made to the commission by the city.

Conviction in Accident Complicity Case.—Ben W. Small was sentenced on May 4 at Kansas City, Mo., to four years in the penitentiary for complicity in alleged fraudulent damage actions. He was also charged with having hired false witnesses. The case in which he was convicted involved two women witnesses against the Kansas City Railways. The women confessed, after receiving part of the judgment money, that they had not been near the scene of the accident to which they testified.

"Puget Sound Electric Journal" in New Dress.—The *Puget Sound Electric Journal* for May, published in the interest of the Puget Sound Traction, Light & Power Company, makes its appearance in the current issue in a brand new dress and a decidedly improved form made possible by gaining official permission to solicit advertising. For the present, at least, there will no other plan put into effect for handling company news and the personal gossip of the departments. The company payroll supports a community of 10,000 people.

Hearings Begun in Albany Suburban Fare Increase Case.—Charles F. Hewitt, general manager of the United Traction Company, Albany, N. Y., was on the stand on May 9 in the hearing before the Public Service Commission for the Second District of New York in connection with the new schedule of the company which would increase the passenger fare between Albany, Troy, Watervliet, Green Island and Cohoes from 10 cents to 15 cents. Included in the company's figures were elaborate studies of increases and decreases of population along its lines and a table showing the number of private automobiles, taxicabs and motor buses that are owned and operated within the company's territory.

Application for Permission to Operate One-Man Cars.—A. F. Haas, of the City Council of Seattle, Wash., on application of the Puget Sound Traction, Light & Power Company, has introduced three bills asking for authority to operate one-man cars on the Greenwood Avenue line at Ballard, the Bellevue-Summit line, and the Twelfth Avenue line. A. L. Kempster, manager of the company, states both the Greenwood and the Twelfth Avenue lines are operated annually at a heavy loss. On that account and in order to maintain a satisfactory service, the use of the new type of car is desired. The request has been referred to the franchise committee of the Council.

Indiana Prize Contest.—H. A. Nicholl, general manager of the Union Traction Company, Anderson, Ind., announced on May 10 its fifth prize contest. Thirty dollars in gold will be distributed in a first prize of $15, a second of $10 and a third of $5 for the best papers on the subject, "Is the Safety Movement Advanced More by the Cautious, Efficient Employee, or by Mechanical Safety Devices?" The contest is open to all employees except department heads and assistants. All papers must be in the hands of the claim adjuster or the division superintendent on or before June 1, 1916. The winners will read their papers at the next safety-first banquet of the company.

California Equalization Board Studies the Jitney.—The State Board of Equalization of California is making an exhaustive study of the jitney question in California with an idea of incorporating in its biennial report, which will be presented to the State Legislature in the fall, some recommendations concerning jitney regulatory measures. In addition to the regular report, the board may issue a special report to Governor Johnson, devoted exclusively to the jitney question, as the State will suffer by the existence of the jitneys to the extent of about $200,000 in tax income this year, this being 5 per cent of the $4,000,000 which is the amount that the railroad companies are estimated to have lost on account of jitney competition. While returns have not been received from all of the roads, fifteen electric railways say that they have suffered income losses that total $1,500,000 in 1915 from jitney competition.

San Francisco Grand Jury on the Jitney Question.—At a recent session of the San Francisco Grand Jury, after a discussion of a report which asserted that jitneys on Market Street are "a menace and danger to life and limb of pedestrians," "an abuse of the public streets," and further declared that failure to abate them constitutes a dereliction of duty, the following resolutions were adopted: "Resolved, That we, the members of the Grand Jury of the city and county of San Francisco, do request the Board of Supervisors, and particularly the judiciary committee thereof, to report and enact immediately, by ordinance, such legislation as will give the police department the permanent right to regulate traffic and provide for the elimination of so-called jitney buses on Market Street, between Seventh Street and the Embarcadero." Prior to this action the matter had been referred to the police and they in turn had ruled that they had no jurisdiction over jitneys. The grand jury committee report states: "Your committee believes it is high time for sworn officers to cease shirking and sidestepping duties which the law imposes on them. The situation, in our judgment, is far too serious to warrant a continuation of the game of battledore and shuttlecock, particularly where human lives are involved. Human lives are hourly endangered because of lamentable inaction and a woeful disregard of public rights. Politics, for once, should be brushed aside."

Personal Mention

Mr. D. W. Snyder, Jr., Jefferson City, Mo., has been appointed superintendent of the Bloomington & Normal Railway & Light Company, Bloomington, Ill., vice Mr. M. G. Linn.

Mr. J. M. Wood has been appointed carhouse foreman and inspector of service of the Detroit (Mich.) United Railway, with jurisdiction over the movement of all cars or trains within the city limits of Flint.

Mr. Wilford Phillips, general manager of the Winnipeg (Man.) Electric Railway, has returned to Winnipeg from California and resumed his duties after a four months' vacation, much improved in health.

Mr. W. C. Miller, formerly in charge of the overhead lines of the Fox & Illinois Union Railway, Aurora, Ill., has been appointed general manager and purchasing agent of the company, to succeed Mr. F. M. Zimmerman, resigned.

Mr. M. G. Linn, formerly superintendent of the Bloomington & Normal Railway & Light Company, Bloomington, Ill., has been appointed general manager of the Des Moines (Iowa) Electric Company, vice Mr. W. H. Thomson, resigned.

Mr. L. H. Lathrop, for the last five years general superintendent of the Menominee & Marinette Light & Traction Company, Menominee, Mich., has resigned to accept a similar position with the Ironwood & Bessemer Railway & Light Company, Ironwood, Mich.

Mr. James G. Haworth has accepted a position as chief engineer at the Anderson, Ind., power house of the Union Traction Company of Indiana, succeeding Mr. Frank Vestal. Mr. Haworth was graduated from Purdue University in 1910 with the degree of mechanical engineer.

Mr. Allan Purvis, superintendent of the Canadian Pacific Railway at London, Ont., has been promoted to general superintendent of the Eastern Division, with headquarters at Montreal, Que. Mr. Purvis was formerly manager of the interurban lines of the British Columbia Electric Railway, Ltd., Vancouver, B. C.

Mr. L. G. Ireland has resigned as general manager of the Brantford (Ont.) Municipal Railway and the Brantford Electrical Commission to become connected with the Ontario Hydro Commission on the new Eastern Ontario power development project. Ireland was with the Hydro Commission for five years before going to Brantford.

Mr. R. F. Palmblade has been appointed acting general superintendent of the Jefferson City Light, Heat & Power Company and the Jefferson City Bridge & Transit Company, Jefferson City, Mo., vice Mr. D. W. Snyder, Jr. Mr. Palmblade will report to Mr. E. D. Bell, superintendent of the St. Louis Electric Terminal Railway, Illinois Traction System.

Mr. Max J. B. McConnell, chief clerk to Mr. Edward J. Cook, general manager of the New York State Railways, Rochester Lines, has been appointed assistant engineer of maintenance of way of the company. For a number of years after his graduation from Ohio State College Mr. McConnell was connected with the engineering department of the Pennsylvania and the Wabash Railroads. In February, 1913, he entered the service of the Rochester office of the New York State Railways.

Dr. J. T. Merz, owing to advancing years and increasing responsibilities, retired from the chairmanship of the Newcastle Electric Supply Company toward the end of last year, but was induced to continue his association with the directorate in the capacity of vice-chairman. At the annual meeting held recently, tributes to Dr. Merz's work on behalf of the company over a long period of years were paid by Mr. J. H. Armstrong, the new chairman, and by Dr. G. B. Hunter. Dr. Merz was one of the founders of the company twenty-seven years ago. He has served as chairman since 1901. The Newcastle Electric Supply Company has played a notable part in the industrial developments of Tyneside.

OBITUARY

Lewis C. Sanford, secretary and treasurer of the Broadway Subway & Home Boroughs Car Advertising Company, a subsidiary of the Brooklyn (N. Y.) Rapid Transit Company, died on May 14 at his home in Brooklyn from heart disease. Mr. Sanford was thirty-six years old. He was appointed to the Brooklyn Rapid Transit Company in 1899 at the Fifty-second Street shops as an electrician's helper. In 1901 he was made receiver at the Unionville depot. In February, 1903, he was made receiver in the general office. In 1904 he was appointed chief clerk in charge of the records in the secretary-treasurer's department. In January, 1908, he was appointed acting assistant secretary of the Brooklyn Rapid Transit Company. In March, 1908, he was appointed assistant secretary. In April, 1915, he was appointed secretary and treasurer of the Broadway Subway & Home Boroughs Car Advertising Company, the new company organized to handle the Brooklyn Rapid Transit Company advertising. Mr. Sanford is survived by his widow and two children.

William Stanley, noted electrical engineer, died at his home in Great Barrington, Mass., on May 14. Mr. Stanley was born in Brooklyn, N. Y., on Nov. 22, 1858. He entered Yale in 1881, but left the university in his freshman year and took up the study of electricity by himself. In 1879 he became acquainted with Hiram Maxim, then chief engineer of the United States Electric Light Company, New York, and subsequently became assistant to Mr. Maxim. Mr. Maxim went to Europe and Mr. Stanley continued for a while as assistant in the Weston Electric Light Company, Newark, N. J., which had absorbed the Maxim Company. During his subsequent connection with the Swan Electric Light Company, Boston, Mass., Mr. Stanley invented and perfected an improved method of exhausting incandescent lamp bulbs. While in Pittsburgh in 1885 he devised the "multiple" system of alternating-current distribution. This was followed by the invention of an alternating-current generator by Mr. Stanley. In 1890 he moved to Pittsfield, and took into association C. C. Chesney. The Stanley Electric Manufacturing Company was formed to manufacture the devices invented, but was later amalgamated with the General Electric interests. In 1894 the alternating-current system of long distance transmission of power by the Stanley invention was successfully demonstrated. In this work Mr. Stanley collaborated with Mr. Chesney and Mr. Kelly, producing the famous "S. K. C. system." Of recent years Mr. Stanley had been engaged in consulting work with the General Electric Company. In 1913 Mr. Stanley was awarded the Edison medal, the fourth to receive this honor.

HOT SPRINGS STREET RAILWAY PRAISED

The Hot Springs *New Era* said recently:

"The slogan of the Hot Springs Street Railway is: 'Service, That's What Counts,' and the management and employees of this company, during the racing season, have given a splendid demonstration of the advantage of having a motto and living up to it.

"For more than three weeks the company was taxed to care for the big crowds that attended the races daily. On one day recently it handled the double crowd at Oaklawn, the circus and the races, and every day the service was the same—safe, sure and reliable.

"Every day the service was carried on over a single thoroughfare, crowded with speeding automobiles, vehicles, trucks and pedestrians, and every minute required careful handling in loading, running and unloading the cars. The equipment was plentiful, and at each end of the line competent employees looked after the loading and departure of the cars. At Oaklawn the visitors were accorded simple and clear instructions as to the manner of entering the grounds and the collection of fares, while every safe expedient was used to load and return the crowds quickly after the races were over.

"If there was a single complaint during the racing season, it has not been heard. On the other hand, there were thousands of expressions commending the service.

"General Manager S. E. Dillon, Superintendent Butterfield and every other employee of the company is entitled to the highest commendation for strict adherence to the company's policy—'Safety First, and Service.'"

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Ardmore (Okla.) Railway Company.—Application for a charter has been made by the Ardmore Railway Company to succeed the Ardmore Electric Railway. Incorporators: I. M. Putnam, Wirt Franklin, S. Appel, Edward Gault and Roy M. Johnson.

FRANCHISES

Pine Bluff, Ark.—The Hot Springs, Pine Bluff & Mississippi River Railway has received a thirty-seven-year franchise to construct a line in Pine Bluff. [Jan. 1, '16.]

Stockton, Cal.—The Tidewater & Southern Railroad has received a franchise from the Council to electrify the tracks of the Western Pacific Railroad on Hunter Street from Eighth Street to Hazelton Avenue, thence east on Hazelton Avenue to a point near Aurora Street.

***Barton, Fla.**—A franchise has been granted for the construction of an electric railway from Bartow to Lakeland and Winter Haven, about 25 miles. Address County Commissioners for further information.

Kankakee, Ill.—The Kankakee Electric Railway has received permission from the Public Utilities Commission of Illinois to remove its tracks on South Washington Avenue between Hawkins and Jeffery Streets.

Chelsea, Mass.—The West End Street Railway has asked the Council for a franchise to relocate its tracks on Central Avenue and Hawthorn Street from Highland Street to Pearl Street, and on Pearl Street from the drawbridge at Chelsea Creek to Park Street.

Detroit, Mich.—The Detroit United Railway has asked the Council for a franchise to extend the Trumbull line both north and south. The company proposes to continue the line south from Michigan Avenue to connect with the tracks of the Fort line. Northbound it is proposed to continue the line to connect with the Grand Belt line, then west to Twelfth Street and north on Twelfth Street to connect with the Oakman Boulevard line.

Kansas City, Mo.—An ordinance has been introduced in the City Council of Kansas City to permit the Kansas City Railways to remove its tracks from McGee Street between Fifteenth and Nineteenth Streets. McGee Street adjoins the city's widest downtown street, Grand Avenue, on which there are tracks. Should the ordinance be passed, the company would be relieved of an obligation in the present franchise to build an extension of its lines on McGee Street southward and thence to the union station.

St. Louis, Mo.—The United Railways has asked the Board of Public Service Commissioners for permission to construct a loop on the Market Street line, near Tamm Avenue, in order to accommodate the crowds visiting the Zoo and Art Museum.

Cincinnati, Ohio.—The Cincinnati, Milford & Loveland Traction Company has asked the Council for permission to erect poles and string wires along Wooster Pike, Plainville Pike and other sections of the country to enable it to convey electric current for lighting and power.

Philadelphia, Pa.—The Philadelphia Rapid Transit Company has asked the Council for a franchise to construct a line on Fifty-sixth Street between Paschall and Lancaster Avenues.

Nashville, Tenn.—The Nashville Traction Company has asked the Board of Commissioners for permission to remove its tracks from Twenty-fifth Avenue.

Dallas, Tex.—The Dallas Southwestern Traction Company and the Dallas Northwestern Traction Company have received a six-months' extension of time on their franchises in which to begin construction of their proposed lines to Glen Rose and Denton respectively. [Nov. 6, '15.]

TRACK AND ROADWAY

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala.—It is reported that this company contemplates the construction of an extension of its Cansler Avenue line from Fifth Street, Alabama City, to the Louisville & Nashville Railroad.

Calgary (Alta.) Municipal Railway.—The city commissioners have accepted the bid of the General Supplies, Ltd., Calgary, for 100 tons of 60-lb. rails in 60-ft. lengths at $30 per long ton of 2240 lb., and 1000 square cedar ties at 30 cents each, to be used in construction of the temporary street railway line to Sarcee military camp.

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company on the construction of an extension to the Childs' tract, Glendale. Ultimately the road will be extended south to the Tropico line and thence to the Pacific Electric main line at Cypress Street.

Municipal Railways of San Francisco, San Francisco, Cal.—Negotiations are under way for an extension of the Municipal Railway line north in Baker Street from Greenwich Street to the bay shore. The new extension will cover the route of the old Harbor View line, which formerly ran down Baker Street, and which was removed before the exposition. The cost is estimated at $50,000.

Connecticut Company, New Haven, Conn.—This company will reconstruct its track on Whiting Street, Plainville.

***Sarasota, Fla.**—Plans are being made for the construction of an electric railway from Tampa to Venice, about 68 miles. A. Evans Townsend, electrical engineer, Sarasota, is interested.

Union Traction Company, Anderson, Ind.—This company has construction forces at work improving its parks over the system. The improvements to Broad Ripple Park and Mounds Park are the most extensive.

Fort Madison (Ia.) Street Railway.—This company reports that its line is being entirely rebuilt.

Salina (Kan.) Street Railway.—This company states that it expects to place contracts within the next few weeks for 2000 ft. of new track.

Shelbyville & Frankfort Realty Company, Shelbyville, Ky.—It is reported that this company plans to construct three bridges in connection with its proposed electric railway from Shelbyville to Frankfort. J. W. Gudgel, Shelbyville, secretary. [April 22, '16.]

Winnipeg (Man.) Electric Railway.—This company is considering the extension of its Academy Street line to the Midland Railway of Manitoba and of its Talbot Avenue line from Roland to Cameron Streets.

United Railways & Electric Company, Baltimore, Md.—Work has been begun by this company on the construction of a 1-mile extension of its St. Paul Street line to Guilford.

***Minneapolis, Minn.**—Plans are being prepared under the direction of the city engineer for a municipal street railway from Thirty-second and Central Avenues to the city filtration plant, to cost about $40,000.

American Traction Company, Minneapolis, Minn.—This company reports that its line connecting International Falls, Ranier and South International Falls, Minn., and St. Francis, Ont., 6¾ miles, will be electrified. Gasoline service is being used temporarily. A. L. Sorter, Minneapolis, president.

Twin City Rapid Transit Company, Minneapolis, Minn.—This company will replace its wooden bridges over the tracks at Deephaven, Tonka Avenue and Fair Oaks with bridges of steel and concrete.

Kansas City, Mo.—Steps have been taken by the City Council of Kansas City, Mo., to ascertain the possibility of purchasing the inter-city viaduct between Kansas City, Kan., and Kansas City, Mo., which shortens the traffic distance materially between the two cities. It is said the owners have made an offer to sell at about $2,000,000, considerably less than the reputed cost. The street railway tracks on the viaduct have not been used for several years. The plans for the new Central Avenue viaduct, also crossing the Kaw River and providing for most of the street car travel between the cities, apparently do not take into consideration any prospect of using the tracks on the inter-city viaduct, which is, however, of much value as a toll bridge for vehicular traffic.

Brooklyn (N. Y.) Rapid Transit Company.—Bids were opened by the Public Service Commission for the First District of New York for the construction of Section 4, a part of the new Eastern District subway. The line extends from Sixth Avenue, Manhattan, under Fourteenth Street, to and under the East River to North Seventh Street, Brooklyn, thence under North Seventh Street, Metropolitan Avenue, Bushwick Avenue and Johnson Avenue to a connection with the right-of-way of the Evergreen branch of the Long Island Railroad, where the line will become an elevated structure and continue over the right-of-way to a connection with the Broadway line, thence to East New York. The two lowest bidders were Mason H. Hanger Company at $1,847,000 and F. L. Cranford, $2,161,000.

Buffalo & Depew Railway, Buffalo, N. Y.—This company will construct an extension to Bowmansville, 2 miles, and to the New York Central station at Lancaster, ½ mile.

New York State Railways, Rochester, N. Y.—It is reported that a new scenic railway to cost about $25,000 is to be erected by this company at Sea Breeze.

Alamance, Durham & Orange Railway & Electric Company, Burlington, N. C.—The bond issue to aid in the construction of this company's proposed line from Ossipee to Durham was defeated at a recent election in Durham and Patterson townships. It is proposed to raise the necessary amount by subscription, several offers to take stock having been made. Junius H. Harden, Burlington, president. [Oct. 9, '15.]

Goldsboro (N. C.) Electric Railway.—This company reports that it will construct a 1½-mile extension to the new fair grounds.

Dayton & Troy Electric Railway, Dayton, Ohio.—It is reported that this company contemplates the construction of an extension from Piqua to Fort Loramie.

Youngstown & Niles Railway, Youngstown, Ohio.—The Public Utilities Commission of Ohio has authorized the Youngstown & Niles Railway to issue $100,500 common stock, which will be given to the Mahoning & Shenango Railway & Light Company for money advanced for improvements. J. P. Wilson, Youngstown, president. [April 22, '16.]

Oklahoma (Okla.) Railway.—A report from this company states that its extension from Edmond to Guthrie, 16 miles, will be placed in operation on July 1.

Sand Springs Railway, Tulsa, Okla.—This company reports that it is building 5 miles of double track. All material for the construction has been purchased.

Port Arthur (Ont.) Civic Railway.—This company will reconstruct about ½ mile of track from Argyle Street to Arthur Street.

Toronto (Ont.) Civic Railway.—This company has under construction a ¾-mile extension on Lansdowne Avenue, off St. Clair Avenue.

Montoursville (Pa.) Passenger Railway.—A report from this company states that it will extend its line 1½ miles, 0.6 mile to be span-wire construction and 0.9 mile bracket construction. The company will be in the market for 56-lb. relaying T-rails.

Philadelphia, Pa.—Work was resumed by the Keystone State Construction Company on May 6 on the Broad Street subway and island station under City Hall.

Eastern Pennsylvania Railways, Pottsville, Pa.—It is reported that this company will expend about $500,000 for improvements to its system. The company will put up about 40 miles of new wire this summer.

Tennessee & Kentucky Railroad, Nashville, Tenn.—Surveys have been completed of this company's proposed line from Nashville, Tenn., to Russellville, Ky., via Springfield, Orlinda and Adairville, 54 miles. It is reported that construction of the line will be begun immediately. It is also planned to construct a branch line from Orlinda, Tenn., to Frankfort, Ky., 14 miles. [Nov. 21, '14.]

Southern Traction Company, Dallas, Tex.—It is reported that this company is considering the construction of an extension from Waco to Taylor, about 70 miles.

Ogden, Logan & Idaho Railway, Ogden, Utah.—It is reported that plans are being considered by this company for the construction of an extension from Preston to Grace.

Emigration Canyon Railroad, Salt Lake City, Utah.—This company reports that it contemplates the construction of a 3-mile extension south to East Mill Creek.

***Williamsburg, Va.**—The city of Williamsburg has invited bids for the construction of an electric line. W. L. Jones, president City Council.

SHOPS AND BUILDINGS

International Railway, Buffalo, N. Y.—It is reported that this company will construct a new fireproof station at West Avenue and Transit Street, Lockport, to replace the old wooden structure. It is estimated that the cost will be about $15,000.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York will open bids on June 1 for the construction of station finish on Sections Nos. 12 to 15 of Route No. 5, the Lexington Avenue subway. The stations to be finished under this contract are 110th Street, 116th Street, 125th Street, Third Avenue and 138th Street, Mott Haven and 149th Street. The commission is already advertising for bids for station finish on Sections Nos. 7 to 11, inclusive, embracing the southern part of the line, to be opened May 25.

Durham (N. C.) Traction Company.—A new office building for the Durham Traction Company is under advisement. This building will be erected in one end of the business section where a suitable location has been found on a corner plot for an excellent display of interior and exterior lighting, good display windows and salesroom. It is planned to equip the top floor for clubrooms with reading, writing and bathrooms and a few bedrooms.

Toronto (Ont.) Civic Railway.—Bids will be received until May 23, through registered post only, addressed to the Chairman, Board of Control, City Hall, Toronto, for the complete construction of a steel-frame, brick-faced tile addition to the St. Clair Avenue carhouse on Christie Street, including heating plant. Specifications and forms of tender may be obtained upon application at Room No. 311, Department of Works, City Hall, on payment of $10, this sum to be refunded upon return of plans.

Salt Lake & Ogden Railway, Salt Lake City, Utah.—New stations will be built by this company at Kaysville and Clinton. The plans for the Kaysville station have been completed and approved by the Council at Kaysville. The building will be 40 ft. x 90 ft., of brick construction, and will cost approximately $5,000. The station at Clinton will be similar to the one now at Layton and will cost about $3,500.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway Company, Ltd., Vancouver, B. C.—This company is completing the construction and equipment of its substation near Horne Payne station on the Burnaby Lake line, which was delayed two years ago.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—The City Council of Brazil has awarded a contract to this company for lighting the streets of the city for a period of three years.

Shelbyville & Frankfort Realty Company, Shelbyville, Ky.—This company contemplates the construction of two power houses in connection with its proposed electric railway from Shelbyville to Frankfort. J. W. Gudgel, secretary.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—Among the improvements being contemplated by this company is the enlargement of its Lake Street substation, increasing the output by 33 1/3 per cent.

Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio.—This company reports that it will build a new substation at Plymouth during the summer.

Ashland Light, Power & Street Railway Company, Ashland, Wis.—This company reports that it is adding a 5000-kw. General Electric turbine to its power station in Ashland.

Manufactures and Supplies

THE CAST-IRON WHEEL INDUSTRY

In view of the congested conditions of the steel market and the consequent increasing interest of railway companies in the use of cast-iron wheels, a representative of this paper recently had an interview with G. W. Lyndon, president Association of Manufacturers of Chilled Car Wheels. Mr. Lyndon was asked to state the situation in the chilled wheel industry. He said that the prices for chilled-iron wheels are practically the same as they have been for a number of years and that the factories are running from 60 to 70 per cent of their output, which is the best this industry has experienced for the past nine years. Continuing, he said:

"It is a singular fact that in this era of invention so much is said of the new things that are developed from day to day and so little attention is paid to the things that have been so conspicuously prominent in the development of the world's progress. This is precisely what is happening in the case of the chilled-iron car wheel. Ever since railroading began, the chilled-iron wheel has been the one important factor in the nation's growth, because without wheels commerce could not be moved, and without the chilled-iron wheel the nation's commerce would be paralyzed.

"The 25,000,000 chilled-iron car wheels in use to-day under freight cars, passenger cars, engine tenders, street cars and on private car lines will give an idea of the magnitude of the business, serving as they do under 97 per cent of the freight cars in use and carrying the local passenger traffic of ninety-five out of every 100 cities in the United States and Canada, which operate 100 street cars or more.

"Twenty-five million car wheels represent about 8,500,000 tons of metal, and it will be interesting to know where this material comes from, its method of delivery and the economy of its use, because unless it was reliable and at the same time economical, it would not have withstood the attacks of other metals for two-thirds of a century.

"Chilled-iron car wheels were originally manufactured direct from pig iron, but as the business grew to such stupendous proportions it became necessary to economize in the use of pig iron and find a market for old worn-out wheels. This is accomplished by remelting the old wheels to the extent of from 40 to 60 per cent of the new wheel, and old wheels are as staple as sugar, commanding a fixed price per ton, and are accepted as part payment for the new wheel. It will thus be seen that when the business becomes established the question of material for the new wheel is partly provided for to the extent of some 40 to 60 per cent, and all new wheels (excepting for new cars) are sold on an exchange basis, which means that for each new wheel sold an old wheel is accepted as part payment.

"In the Association of Manufacturers of Chilled Car Wheels twenty-four manufacturers are represented, and some of these operate branch foundries, so that, taken as a whole, there are in the United States and Canada more than fifty car-wheel foundries located in many of the prominent cities from the Atlantic to the Pacific. These foundries represent a capacity of 20,000 car wheels a day, which is much greater than the demand, except during a heavy car-building season. The business, therefore, is flexible, and increased demands simply require an increase of output, but the manufacturer usually carries a heavy stock of old wheels, and in times such as these anticipates his requirements and contracts for his pig iron and other supplies ahead. Therefore, the chilled-iron car wheel manufacturers can always meet extraordinary demands, and the market conditions are not as subject to extraordinary changes as other materials. There never has been a time when the chilled-iron car wheel manufacturers were unable to meet the demands, and they can do so now even in the fact of the fact that hundreds of thousands of chilled-iron wheels have been shipped to foreign countries within the past year, where they are rapidly supplanting the old European standards.

"Some cities which temporarily abandoned the chilled-iron car wheel for electric car service and experimented with other types have returned to the chilled-iron wheel, because their operation is never hampered by uncertain deliveries, which has been known to be the case with other types of wheels.

"Considered from a scientific productive standpoint, there is no metal in the iron class that is sold so cheaply as the chilled-iron wheel, and there is no metal sold in the iron group that has less fluctuation in price.

"Ever since its introduction in the year 1850 the price has gone steadily downward, and one of the principal reasons for this lies in the fact that the wheels are manufactured and distributed from so many different parts of the country. If there was one central point of manufacture, the price would be partially dependent upon the freight rate, and the freight rate in many cases is more than the profit on a shipment going to a point from 500 to 1000 miles from the factory. Therefore, with fifty car-wheel foundries located in different parts of the country, the factory that is most accessible to the point of delivery secures the business because there are no freight charges. It is thus shown upon what a small margin of profit car wheels are sold, and this economic principle has rendered their use almost universal. Every manufacturer, however, makes a special wheel and is enabled to put this wheel on the market at a higher price than the ordinary wheel. Therefore, special wheels find their way to all parts of the country."

ROLLING STOCK

Princeton (W. Va.) Power Company expects to purchase a freight car.

Citizens' Railway, Clarksville, Tenn., is contemplating the purchase of one or two cars.

Miami (Fla.) Traction Company has ordered two motor cars to be delivered in August.

Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, will rebuild two passenger cars.

Kensington (Md.) Railway is negotiating for the purchase of one standard sixty-passenger car.

Boston (Mass.) Elevated Railway, in a fire on the elevated lines at Forest Hills on May 11, had four cars partially destroyed.

West Chester (Pa.) Street Railway has ordered from The J. G. Brill Company two double-truck all-steel passenger cars to be equipped with 4 Westinghouse 632 B motors and Westinghouse air brakes.

Toronto (Ont.) Civic Railway, through the chairman of the Board of Control, will receive tenders until May 23 for one single-truck double-end car completely equipped, one single-truck double-end car body, electrical equipment for one single-truck car and single truck for one car.

Worcester Consolidated Street Railway, Worcester, Mass., noted in the ELECTRIC RAILWAY JOURNAL of May 13, as having received a sample prepayment car from the Osgood-Bradley Car Company, is reported as having ordered ten cars of the same type from the same carbuilder for delivery by Sept. 1.

Southwest Missouri Railroad, Webb City, Mo., noted in the ELECTRIC RAILWAY JOURNAL of April 15 as having ordered five cars from the American Car Company, has specified the following details for this equipment:

Seating capacity	44
Bolster centers, length	23 ft. 2 in.
Length of body	32 ft.
Length over vestibule	43 ft. 2 in.
Width over sills	8 ft. 5¾ in.
Width over all	8 ft. 11 in.
Height, rail to sills	35¾ in.
Sill to trolley base	9 ft. 4¾ in.
Body	Wood and metal
Interior trim	¼-in. polished bronze
Headlining	Agasote
Roof	Monitor deck
Underframe	Metal
Axles	Brill
Bumpers	Am. Car
Cables	G. E.
Car trimmings	Brill
Control	G. E.
Couplers	West.
Curtain fixtures	Curtain Supply
Curtain material	Pantasote
Destination signs	Hunter
Door-operating mechanism	Am. Car
Gears and pinions	G. E.
Gongs	Am. Car
Hand brakes	Am. Car brake, Peacock drum
Heaters	Simplex Elec. Htg.
Headlights	G. E. arc
Journal boxes	Brill
Motors	4 G.E.-203 Form A, inside hung
Paint	Am. Car
Registers	Ohmer
Renitent posts	Brill
Sash fixtures	Brill
Seats	Brill Winner pressed steel type
Seating material	Rattan
Springs	Brill
Step treads	Feralun
Trolley base	G. E.
Trucks	Brill 27-M-C-B-1
Ventilators	Automatic
Wheels	Am. Car & Fdry.

Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala., will shortly place in service on the Holt line an all-steel semi-convertible center-entrance car built by The J. G. Brill Company.

Toledo Railways & Light Company, Toledo, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of May 13 as having ordered fifty cars from the G. C. Kuhlman Car Company, with an option to increase the number to one hundred, has exercised this option.

Detroit (Mich.) United Railway, noted in the ELECTRIC RAILWAY JOURNAL of April 22 as having ordered eight 58-ft. 3½-in. single-end interurban cars from the Niles Car & Manufacturing Company, has specified the following details for this equipment:

Seating capacity	50
Weight of car body	36,000 lb.
Bolster centers, length	34 ft. 2½ in.
Length of body	45 ft. 11 in.
Length over all	56 ft. 5½ in.
Width over sills	8 ft. 2½ in.
Height, rail to sills	42½ in.
Height, sill to trolley base	9 ft. 3 in.
Body	Wood
Interior trim	Mahogany
Headlining	Agasote
Roof	Monitor, steam coach hoods
Underframe	Steel
Air brakes	West. A M M
Bumpers	Rico anti-climbers
Cables	G. E.
Control	G. E. Type M
Couplers	Tomlinson radial M C B
Curtain fixtures	Forsyth No. 88 ring fixtures Rex all-metal rollers
Curtain material	Pantasote
Destination signs	Hunter
Fenders	Ry. Standard
Gears and pinions	G. E.
Gongs	Ry. Standard
Hand brakes	Peacock
Heaters	Peter Smith hot water No. 1C
Headlights	G.E. D-16-Y
Journal boxes	Standard C-80
Motors	4 West. No. 303, inside hung
Registers	Ohmer
Sanders	Ry. standard with O-B sander valves
Seats	Hale & Kilburn No. 199 E E
Seating material	Main compartment, dark green frieze plush Smoker, dark green leather
Step treads	Mason
Trolley retrievers	Knutson No. 2
Trolley base	U. S. No. 13
Trucks	Standard C-80P
Window fixtures	National L. W. sash locks

TRADE NOTES

Goldschmidt Thermit Company, New York, N. Y., has moved its offices from 90 West Street to the Equitable Building, 120 Broadway.

General Electric Company, Schenectady, N. Y., has received an order for motor equipment for twenty-five cars from the Kansas City (Mo.) Railways.

Ford, Bacon & Davis, New York, N. Y., have been retained as experts to examine the property of the Empire United Railways for certain bondholders.

O. D. Cleveland, Southern traveling representative of the Walter A. Zelnicker Supply Company, St. Louis, Mo., has opened an office at 910 Hennen Building, New Orleans, La.

Roller-Smith Company, New York, N. Y., announces that it has outgrown its present quarters and will move immediately to much larger offices in the Woolworth Building.

M. Welte & Sons Company, New York, N. Y., will move in the next few days to larger quarters at 667 Fifth Avenue, where they will be better equipped to handle their greatly increased business.

Terry Steam Turbine Company, Hartford, Conn., has appointed O. E. Thomas, 626 Washington Building, Los Angeles, Cal., as district sales manager for Arizona and the southern parts of California and Nevada.

W. H. Coverdale and W. W. Colpitts announce that the practice of W. H. Coverdale & Company, Inc., consulting engineers, will hereafter be conducted under the firm name of Coverdale & Colpitts at 66 Broadway, New York.

William R. Garton, New York, N. Y., noted in the ELECTRIC RAILWAY JOURNAL for May 13 as having been elected vice-president of the Lansden Company, Inc., Brooklyn, N. Y., has also been appointed general sales manager in charge of engineering.

Railway Improvement Company, New York, N. Y., has received an order for 132 anti-climbers from the San Antonio (Tex.) Traction Company for use on present equipment, and also an order to equip with anti-climbers the thirty cars which are now being built for this company.

Stephen L. Coles, New York, N. Y., public utilities engineer, has opened an office at 1 Wall Street. He will specialize in the following matters: harmonizing relations between public utility corporations, the public and the press; organizing publicity and advertising departments for central stations, railway companies and manufacturers; establishment of new, and development of existing service policies for public utilities.

Stephen L. Selden has resigned as vice-president of J. G. White & Company, Inc., and has resumed the practice of law. He has associated himself with Hardie B. Walmsley and Francis L. Kohlman, heretofore the firm of Walmsley & Kohlman. The new firm will practise under the name of Selden, Walmsley & Kohlman at 61 Broadway, New York.

H. L. Brownell, public safety engineer of Chicago, formerly in charge of the safety work department of the Chicago Surface Lines, has been retained by the United Railways, St. Louis, Mo., to deliver a course of lectures on "Safety First" to the employees of the company. Mr. Brownell will also deliver a series of lectures in the parks of St. Louis under the direction of Charles M. Talbert, director of streets and sewers of the city.

Philadelphia Toboggan Company, Philadelphia, Pa., has within the last two years made a specialty of constructing for parks and resorts a type of large roller coaster which it has named the "Jack Rabbit." Several of these equipments are now under construction. The name is suggestive of the nature of the ride given the patron in the coaster trains composed of richly upholstered and finished cars. This company has supplied numerous street railways with its standard carousels and coasters. One of its finest carousels is located in Sydney, Australia. Some railway companies arrange with the manufacturer to furnish them with plans, specifications, cars, machinery, etc., and then build the structure themselves, an economical method in some localities.

ADVERTISING LITERATURE

National Transit, Pump & Machine Company, Oil City, Pa., has issued Bulletins 404 and 405, describing its horizontal gas engines.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin E-39, superseding E-36, describing and illustrating its electric grinders.

Ohmer Fare Register Company, Dayton, Ohio, has issued a folder describing the Ohmer efficiency buttons which are designed for use by the railways using the Ohmer system to offer as prizes to the men who make the best records.

American Engineering Company, Philadelphia, Pa., has issued Fuel Burning Reports, No. 1, which gives the results of a number of tests which have been made with the Taylor stoker by several railways and various other plants, using the lowest grades as well as the highest grades of fuels.

J. G. White Companies, New York, N. Y., have issued a booklet entitled "Modern Development in the Sugar Industry," announcing the organization of a sugar engineering department and the complete service which the various departments of these allied companies are prepared to render to this industry.

Hemphill, White & Chamberlain, New York, N. Y., have issued a pamphlet, "The House the Railroads Built." It is, in short, a comparison of the structure of railroad securities to the structure of a dwelling. In their conclusion the bankers say: "First mortgage bonds have been defaulted, but financial history has yet to tell of loss through the default of a properly guaranteed terminal bond."

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a pamphlet which illustrates a tool steel pinion which has given nine times as much life as ordinary untreated steel pinions in identical service and is not nearly worn out. This company has reprinted its advertisement which appeared in the March 6, 1915, issue of the ELECTRIC RAILWAY JOURNAL and is mailing this folder with the above mentioned pamphlet.

Ohio Brass Company, Mansfield, Ohio, in the *O-B Bulletin* for March-April, 1916, prints an illustrated article on the Chicago, Milwaukee & St. Paul electrification, on which many of its materials are used. It also contains a short article on the work done by the Portland Railway, Light & Power Company during the "silver" thaw on Feb. 2 and 3, when all services dependent upon overhead wires, which were ice incased at the time, were tied up.

Railway Improvement Company, New York, N. Y., has issued a folder which contains a list showing the efficiency record obtained by a large number of electric railways through the use of the coasting recorder. The folder also contains illustrations of prizes, consisting of a rolled-gold watch fob, a button and a pin, which were awarded to motormen of the Denver (Col.) Tramway for the highest coasting efficiency records obtained.

Charles I. Earll, New York, N. Y., is now distributing Bulletin M, describing Earll trolley catchers Nos. 7 and 10 and retrievers Nos. 4-A and 5-A. This publication is a model of its kind, for it not only describes the construction of each device in detail, but has many easily understood illustrations and full directions for installation and maintenance. Earll catchers have been on the market for ten years and Earll retrievers for fifteen years, so that those described in this latest publication are the outcome of many years of practical experience on hundreds of roads.

Armstrong Cork & Insulation Company, Pittsburgh, Pa., has issued a book on Nonpareil high-pressure covering for heated surfaces. This book describes comparative tests, as a result of which the heat losses from various sizes of both covered and uncovered pipe have been definitely fixed and tabulated. The book also contains tables, which show, in a general way, the most economical thicknesses of Nonpareil high-pressure covering to use, based on different steam costs. A complete set of specifications, covering the correct installation of the various thicknesses of covering, are also given.

Atlantic Welding Corporation, New York, N. Y., has issued a pamphlet on "Automatic Welded Rail Joints." In this process the plates are welded for their entire length to both the case and the head of the rail, the method differing from all others in the use of a traveling carriage on which the welding electrode moves at a predetermined rate of speed and along exactly the desired points. Reliance on the uncertainties of the human hand and brain is thus eliminated. The welding current is produced by a motor-generator set to avoid losses through resistors. A considerable number of these joints has already been installed on the lines of the Brooklyn Rapid Transit System and the Third Avenue Railway, New York.

W. S. Barstow & Company, Inc., New York, N. Y., have issued a pamphlet entitled "Industrial Opportunities in Sandusky, Ohio." The pamphlet contains every item of information concerning the Ohio city which would be of value to an investor seeking a location for a new industry. The information is compiled under the following headings: Population, natural resources, agricultural resources, transportation facilities, public utilities, financial resources, existing industries, factory buildings and sites, educational institutions, health conditions, religious institutions, civic improvements, labor conditions, commercial and industrial organizations, secret and social organizations, amusements and general information. This pamphlet is issued in pursuance of the Barstow policy of assisting in all possible ways the industrial development of communities in which the company operates public utilities. Similar pamphlets are in course of preparation for the other cities whose utilities are controlled by the General Gas & Electric Company, the Barstow holding corporation.

NEW PUBLICATIONS

The Industrial Arts Index for 1915. H. W. Wilson Company, White Plains, N. Y., and New York City. 509 pages. Price, $7 and also on the service basis.

This is a complete index of some eighty engineering and trade periodicals. A few of the English publications are included, but for the most part the papers indexed are American periodicals. The proceedings of the A.I.E.E., A.S.M.E. and other engineering societies, as well as the publications of various government bureaus at Washington are among those indexed. The need of such an index, in view of the large number of engineering publications, is great, and the publishers have done their work in very creditable form. The annual, like the single numbers of the Industrial Arts Index, is also sold on the "service" basis, that is, depending upon the number of periodicals taken by the purchaser which are indexed in the publication. Under this plan the price varies according to the use which the purchaser can make of the index and so puts the subscriber to a few publications on the same "service" basis as the subscriber to a large number.

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.
Consolidation of STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

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TIMBER SPECIFICATIONS NEEDED

Among the urgent needs of the electric railway industry brought out in the A.E.R.E.A. way committee's report on preparation of specifications for preservatives and the treatment of timber are specifications for ties, poles, cross-arms, lumber and bridge timber. On the basis of 1050 miles of track extensions annually and complete tie and pole renewals every ten years, the annual requirements of the electric railways are of the order of 10,000,000 ties and 300,000 poles. There does not seem to be any reasonable way of arriving at the total annual lumber and bridge timber requirements, but it is safe to assume that it is more than 50,000,000 ft. B. M. When taken collectively, this represents a large order for these materials and brings out very forcibly the need for specifications to govern their purchase. Even though ties, poles and bridge timber are being treated by some preservative method, their structural qualities should conform to specifications for first-class timber. In other words, it is more economical to treat timber of first quality than to treat inferior grades. Treatment will not remedy the defects, and the presence of decayed fungi, even though the timber is treated, makes it less resistant against their attack.

THE TRANSFER PRIVILEGE

That a transfer is a privilege is a point which should never be overlooked by a company in its negotiations with the public. To prove that this is the case, it is not necessary to go back to the time when the existing railway system in practically every city consisted of a number of unconnected properties so that to travel from one point to another in the city several fares had to be paid. Of course, this is most convincing evidence of the benefit to passengers of transfers, but the memories of most people will not go back to that time, and the point to be proved more often is that a transfer is as satisfactory as through service when the transfer is introduced to permit a change in car routeing. Admittedly, the transfer *per se* is an inconvenience, but if the passenger will look further to determine the cause of its introduction, he will find the basic reason is his own benefit. In nearly every case it is to permit him to use for part of his journey a trunk line on which cars are run at a higher speed or at a greater frequency than if through service to his destination was run. Hence, a transfer from a relatively slow and local service to a line of higher speed and increased frequency of car movement is a direct benefit, and the mere physical inconvenience of the change is generally a small price to pay for the saving in time gained by the passenger.

THE EYES OF THE COMMISSIONS

The latest annual report of the Missouri Public Service Commission, as shown in our last issue, states that the public and the utilities in Missouri are now on excellent terms, as evidenced by the small number of informal complaints, this condition being largely the result of broader and more liberal policies on the part of utilities in their dealings with the public. During the year few complaints were made as to unfair or discourteous treatment of the public by utility agents or employees, and the conditions between the utilities and their employees are being greatly improved. These words of commendation are worthy of note, particularly because they illustrate the importance that is attributed to the subject of better public relations by the Missouri commission. Nor does this body stand alone in that respect. H. L. Geiss, secretary Wisconsin Railroad Commission, stated last March before the Wisconsin Electrical Association that much could be said as to the advisability of giving the public relations of utilities considerable attention in connection with authorizations for security issues. Moreover, the Illinois Public Utilities Commission, in its recent Springfield Gas & Electric valuation decision, remarked that " a utility excellently managed, progressive in development, alive to public requirements, economical in operation, courteous to patrons and fundamentally honest in all transactions, should receive greater consideration, in the fixing of a fair rate of return, than should a utility of which the reverse is true." These instances clearly indicate the increasing recognition that commissions are giving to the good and the bad public relations of utilities. Virtue may be its own reward, but it is worth while to remember that there may be other and more material rewards, and that, on the other hand, the lack of proper conduct is being watched by the observant eyes of not impotent authorities.

THE CRUX OF THE JITNEY QUESTION

The decision of the New York Public Service Commission, Second District, in the Rochester jitney case, published in abstract in last week's issue, is the clearest exposition of the whole matter which we have seen from a public body. The commission admits that the jitneys possess certain advantages for city transportation and that some people, perhaps many people, would enjoy making occasional use of them. The broad question, however, is not whether the jitneys are often a convenience to the citizens of Rochester, but whether the interests of the city as a whole will be promoted by permitting their competition with the existing electric railway system. The facts are that the transportation field in Rochester, and the same is true of most other cities, is limited, so that the encouragement of the jitneys will necessarily mean arrested development of the railway and possibly its slow death. Hence, the real question at issue is not whether the jitneys have or have not some desirable features, but whether they can replace the electric cars as a whole or in very large part, to the benefit of the citizens. To this, in the opinion of the commission, there is but one answer: "No dependable form of transportation, good alike in winter or summer, has yet been devised to take the place of what Rochester would lose if further development of its electric railway was to be discouraged and interfered with by the State." The jitney situation in Rochester was clearly set forth in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 11, 1915, page 1175, where the data for 1915 were shown graphically. Between Jan. 1 and May 20, 1916, approximately 675 jitney licenses were issued on the same basis that the city issued tax licenses, the license fee being $1 and covering a period of one year. On June 1 there were fewer than 500 jitneys in operation, and the number steadily declined as the season advanced. During this period the jitney buses were operating illegally, as their operators were required by State law to secure certificates of public necessity and convenience from the Public Service Commission. This year in attempting to comply with the law they have been met by the sweeping decision referred to. The position taken is one which should appeal to other commissions which must face the same situation.

CONVENTION REPORTS IN THE "JOURNAL"

May is a popular month for technical conventions, and among those to hold annual meetings within the last few weeks have been the Southwestern Electrical & Gas Association, the State electric railway associations of Pennsylvania and Iowa, the National Electric Light Association and the American Institute of Electrical Engineers. The programs of such associations, acting like concave mirrors, are apt to reflect and focus the problems of the industry, so that we believe that the extended and prompt reports of these meetings which have been published in the columns of this paper in the last few issues will be appreciated by our readers. After all, only a relatively small number of men interested in electric railway problems can attend a convention, but if those who cannot attend are able to read an account of a meeting which was considered important enough to occupy the time of large numbers of their fellow workers, the value of such meetings is greatly enhanced.

A survey of the various railway conventions held during May discloses clearly the fact that the labor problem is one of the most pressing. By this we do not mean matters of hours and wages, because these are largely for local adjustment, but rather the scientific selection, examination and training of employees which involve the application of general principles and merit the attention which they have received in recent meetings. Judged by the number of papers presented, the topic second in importance at present is the development of passenger, freight and express traffic. More business is what the railways need, and they must take active steps to get it. Competition with the privately-owned automobile makes necessary the employment of the best methods to hold existing business while reaching out in new directions. This and the waning jitney competition have taught important lessons in the line of frequent and speedy service. As a result, the one-man car is a never-failing stimulant to discussion. While the managements are struggling with the development of the human side of the railway systems, are adapting equipments and methods in order to meet competition, are reaching out for new business and are endeavoring to maintain friendly relations with the public, the technical departments are meeting them half-way by keeping down operating costs. This is being done, if the convention discussions are trustworthy, through the use of materials best adapted to several uses, conscientious inspection and repair of equipment, and the use of devices for enforcing energy saving and efficient use of apparatus.

The editorial problem in reporting conventions is to condense without loss of data or distortion of point of view, and especially without eliminating the personality of the speakers. Convention papers are usually not illustrated, so that the reports are apt to appear formidable. They do, however, contain the facts which are needed in the railway business, and the progressive man in this field is the one who utilizes this as well as other means to keep informed. Managers are amply justified in expecting and requiring their subordinates to know what other companies are doing, when the facts are placed within their reach in these report issues.

BOSTON ELEVATED TAKES IMPORTANT STEP

A significant step was taken this week by the Boston Elevated Railway in a letter to Governor McCall of Massachusetts, asking for the appointment of a special commission to investigate the company's need of additional net revenue and to report its findings to the next Legislature. The promptness with which the Governor sent a special message to the Legislature recommending the designation of such a commission gives good grounds for hope that the inquiry will be conducted during the forthcoming recess, in which case a most interesting set of hearings may be anticipated. Whether or not such action is taken at this time, however, the company's course indicates that a turning point has arrived in its policy, and that this is the beginning of a movement to put the road upon a new plane of financial stability.

Readers of this journal have often been informed of the enormous burdens laid upon the Boston company by the rapid development of subway and tunnel lines in the last decade and a half, by the multiplication of transfer facilities, the demands of the public for increasing accommodations in the way of service, and the rising cost of labor and materials. In common with many other roads, the Boston Elevated has had to face the growing cost of operation and the more exacting requirements of the traveling public, but to an unusual extent the burdens of fixed charges have increased upon it through the insistence of the metropolitan community upon the construction of more and still more rapid transit lines. All through this period the company has also had to make its plans and perform its duties under the severe limitation of its charter, in which a fixed fare unit of 5 cents is specified for a journey between any two points on the system in the same general direction, while the onerous requirements of taxation have made it still more difficult to earn even savings bank interest upon its capital.

Without an express fare limitation in its charter, the company might have appealed directly to the Public Service Commission for authority to increase its fares, to make a charge for a transfer or to modify its service possibly along more economical lines, had any one of these plans seemed feasible. Under the circumstances, however, a direct appeal to the Governor marks a step of equal significance, and the recommendation of the latter that the Public Service Commission as well as the Boston Transit Commission, be a member of the recess board desired to make the inquiry, looks toward a concentration of expert knowledge in the proposed tribunal which will undoubtedly be most helpful in case the Governor's recommendation is enacted. The step taken is, of course, of wider significance than if its consequences were confined to Boston. Other companies have felt the effect of increased cost of operation, and the conclusions reached in Boston will undoubtedly have an influence on the solution of similar problems elsewhere.

The ways by which net revenue under the conditions prevailing at Boston can be increased need not be discussed at this time, but as a broad proposition, we believe that once it is demonstrated that a well-managed electric railway needs relief in order to hold up its head as one of the prospering concerns of a community, the citizens will prefer that such relief be afforded rather than to undergo the lowered standards of service and credit which are the final result of a close-fisted public policy, if indeed no worse fate befalls.

RAPID TRANSIT IN PHILADELPHIA

Philadelphia, by a popular vote of three to one, has approved a comprehensive plan for the construction of subway and elevated lines reaching every section of the city. The estimated cost of the new construction, excluding the cost of rolling stock, track and signals, exceeds $57,000,000. The loan ordinance specified in detail the routes to be followed.

The recent developments in Philadelphia are of significance to the entire electric traction industry, not only because of the size and importance of the new construction but more especially because of the principles which underlie the recent controversy as to what rapid transit lines should be constructed. The new lines were planned by the former director of city transit, A. Merritt Taylor. With a change in city administration on Jan. 1, William S. Twining, well known to traction officials, was appointed director of city transit. Mr. Twining had been in close touch with the formulation of what were colloquially known as the "Taylor plans," having been expert adviser to the former director of city transit.

Mr. Twining, upon assuming office, recommended a revised and curtailed plan of construction. He pointed out that the Taylor plans would involve a cost of such magnitude that the lines would not be self-supporting for twenty-five years. The aggregate deficit would exceed $30,000,000 and would average more than $1,000,000 a year. Mr. Twining also pointed out that no arrangement had yet been made for an operator, and an extensive construction program was inadvisable until this matter was settled. Again, the cost of all building material and labor was at present high, and owing to the European war the course of prices during the next three years could not be predicted, but any contractor for the work would naturally have to protect himself. If the Taylor plans were to be carried out, therefore, one of two alternatives would have to be accepted. The first was an increase in the tax rate of from 10 to 15 cents per $100 of assessed valuation.

Inasmuch as all sections of the city would not share equally the advantages of the new facilities, Mr. Twining recommended as the most equitable method an advance in the rate of fare on both the surface and rapid transit lines to a point sufficient to make them self-sustaining. By elaborate calculations, he demonstrated that to render the unified system self-sustaining, a rate of fare of about 7 cents, with universal transfers, would be required. He recommended the sale of "seven tickets for 40 cents" with successive adjustments in the rate of fare to lower levels as the traffic on the system increased. By 1950, the rate of fare would reach approximately 5 cents.

From the standpoint of common prudence, there is no doubt that Mr. Twining's suggestion had much to recommend it. The citizens would be paying directly for the improved transit facilities rather than indirectly through increased real estate taxes. The suggestion met with popular disfavor. An increase in the rate of fare was a definite, calculable amount which even the dullest could measure in terms of his personal budget. The possibility of an increase in real estate taxes was more remote, particularly as the interest on the new bonds could be charged to construction until the lines were completed.

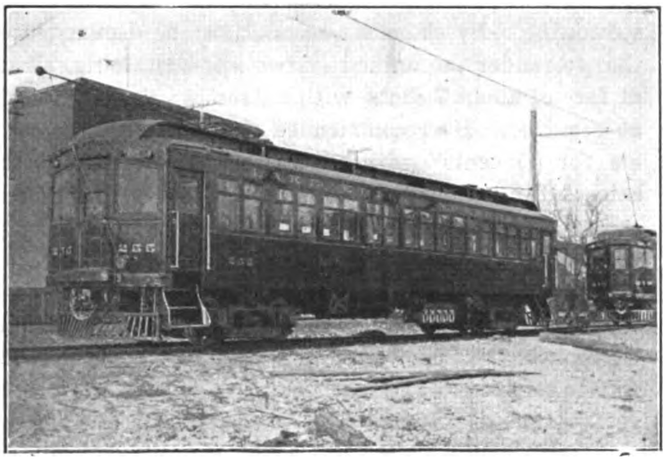
Mr. Twining also submitted an alternative proposal involving the construction of a smaller mileage of high-speed lines in the congested sections of the city. To the termini of these lines would be converged the surface lines serving the outlying sections. This plan he recommended as the best solution of the problem, pointing out that it is in accord with the well-settled scientific principles of the functions of rapid transit lines.

The matter was decided by the voters of Philadelphia, not on the basis of prudence, but on the basis of locality desires. Probably only a small percentage of the voters understood the deficits which would be incurred. They desired the new transit facilities, and they postponed the question as to how they should be supported until some future time.

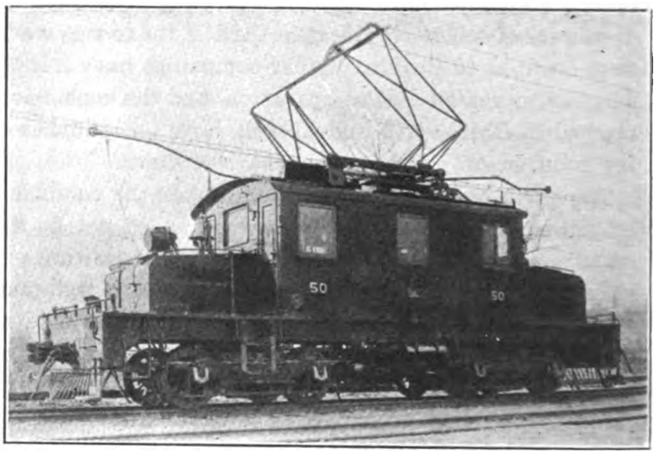
The Lake Erie & Northern Railway

This New 1500-Volt Electric Passenger and Freight Line Has Recently Been Opened Between Galt and Brantford, Ont.—Operation Will Shortly Extend Between Galt and Port Dover, 53 Miles

On Feb. 7, 1916, a frequent transportation service between Galt and Brantford, Ont., was inaugurated by the opening of the new 1500-volt line of the Lake Erie & Northern Railway, Brantford, Ont. This railway has been leased to the Canadian Pacific Railway for 999 years. It is now being extended to Port Dover, the roadbed and tracks of this section having already been completed. When this new extension is placed in operation, as expected shortly, there will be a direct two-hour connection between Galt and Port Dover on Lake Erie, a distance of 53 miles, which will afford people in the cities and towns along the line a comfortable and convenient means of reaching the lake shore. The route lies through a district of unusually attractive scenery. Between Galt and Brantford the line follows the beautiful valley of the Grand River. On nearing Simcoe and the Port it passes through a fertile and progressive agricultural section.



LAKE ERIE & NORTHERN RAILWAY—EXTERIOR VIEW OF PASSENGER CAR



LAKE ERIE & NORTHERN RAILWAY—VIEW OF 60-TON LOCOMOTIVE

The new railway promises to be an important factor, from an industrial standpoint, in the development of this district. It will provide a direct freight line connecting with the Canadian Pacific Railway's main line at Galt, which has long been needed in the territory served. Shippers from Brantford and Paris and other points south will thus have a more direct freight delivery to Toronto and points east. The roadbed of the new line, having been originally built for a steam road, is well adapted for freight service, the slight grades on the lines making it possible to haul large trains. Freight service was put into operation between Galt and Brantford on March 1.

CHARACTERISTICS AND EQUIPMENT OF LINE

The maximum grade on the line is 1 per cent, while the maximum curvature is 6 deg. The width of the roadbed is 16 ft. at fills which are less than 10 ft. high; in fills over 10 ft. high the width is increased 0.2 ft. for every foot in elevation. The rails are 85-lb., and the line is gravel ballasted.

An important feature of the new line is the few grade crossings. From Galt and Brantford there are not more than six of these crossings and in every case a good view can be gained of the railway on approaching the line. All crossings are marked with conspicuous danger signs. By selecting a route along the Grand River bank the new line keeps away from the main road.

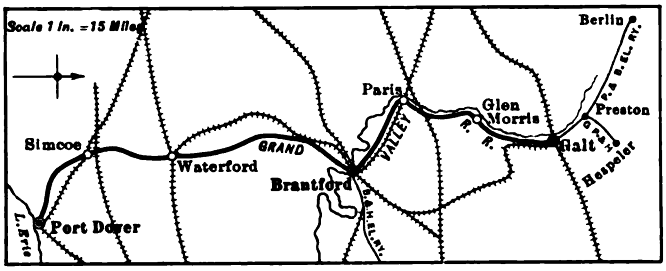
As the line pressure is 1500 volts, catenary construction is employed and includes an aluminum messenger steel-center feed wire and a steel trolley wire suspended under the feed wire by hangers.

The station at Paris, shown in the accompanying illustration, which overlooks the town from the east, is of red brick and stone, built low with a sloping roof. The station is divided into two well-lighted waiting rooms and lavatories. There is an attractive ticket office in the center of the large room. The building is steam heated. The interior woodwork is of the mission style in natural finish. The walls are covered with green burlap half-way up, and the remainder is tinted cream, which harmonizes with the green and woodwork finish. The ceiling is tastefully arched. The station at Glen Morris, illustrated herewith, is substantially built of stone.

Just before reaching the present Brantford terminus of the line at Lorne Bridge there is a large freight shed and brick carhouse, near which is also located a substation, illustrated on page 987. At present the stop at Brantford is made a short way from Lorne Bridge, but as soon as the weather permits, work on the new station will be begun. It will be erected on the east side of Lorne Bridge and will be built over the railway tracks. The main floor will be on a level with the street, and there will be a stairway down to the train below.

PASSENGER CARS

The Lake Erie & Northern Railway has started with a passenger equipment of eight vestibuled interurban passenger cars, including six motor and two trail cars. Six of the cars are straight passenger and two are combination passenger, express and baggage, and they were supplied by the Preston Car & Coach Company. With this equipment the trip from Galt to Brantford is made



LAKE ERIE & NORTHERN RAILWAY—MAP OF LINE

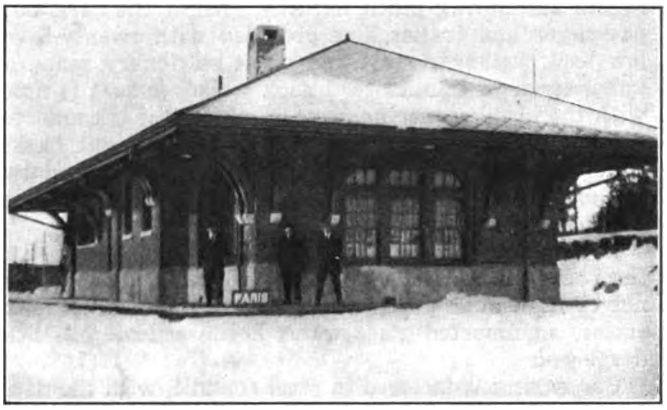
in fifty-five minutes, while the round trip takes two hours. For the present the cars will be operated on a two-hourly schedule, but as soon as connection can be made with the Brantford & Hamilton Electric Railway it is likely that an hourly service will be put into effect between Galt and Brantford.

The design of the cars involves the use of composite framing, as used in steam railroad service. Especial attention was accorded to the importance of having the general scheme of design conform to steam railroad practice and yet not include any unnecessary weight of material. The principal dimensions are as follows:

Length over buffers (free)	59 ft.	7 in.
Length over body corner posts	48 ft.	9 in.
Length of main compartment	32 ft.	½ in.
Length of smoking compartment	16 ft.	½ in.
Length between truck centers	36 ft.	9 in.
Length between crossties	8 ft.	0 in.
Length between body corner post and vestibule end post	4 ft.	2 in.
Width over side posts	9 ft.	4 in.
Width between reversible seats	3 ft.	3 in.
Width between window posts	2 ft.	3⅛ in.
Width of aisle	2 ft.	1 in.
Height, rail to top of roof	12 ft.	11½ in.
Height, rail to under-side of sill	3 ft.	6½ in.
Center to center of seats	2 ft.	8 in.
Wheel diameter		36 in.
Seating capacity		70

The cars, one of which is shown in an accompanying illustration, are of the monitor deck type of construction, with square deck sash and Gothics, having side sash of the lifting type. Single body sashes are provided in conjunction with a set of storm sashes for use during the winter only. The vestibule steps, on all four corners, are fitted with three risers, and trapdoors extend under the vestibule side doors for use with high station platforms, if necessary.

The center construction of the underframe is composed of two 8-in. steel channels 15½ in. apart, back to back and forming a box girder with top plate ¼ in. thick and bottom plate ⅜ in. thick, both 20 in. in width. This member absorbs all buffing and pulling strain, the draft rigging and spring buffing mechanism being riveted directly to it. The entire load of the body is carried on the side girders, which are of ⅛-in. x 36-in. plate stiffened at the lower edge by an angle and at the upper edge by a steel belt rail. Additional flange area is provided by the usual bent-angle, side post plates and steel corner posts.

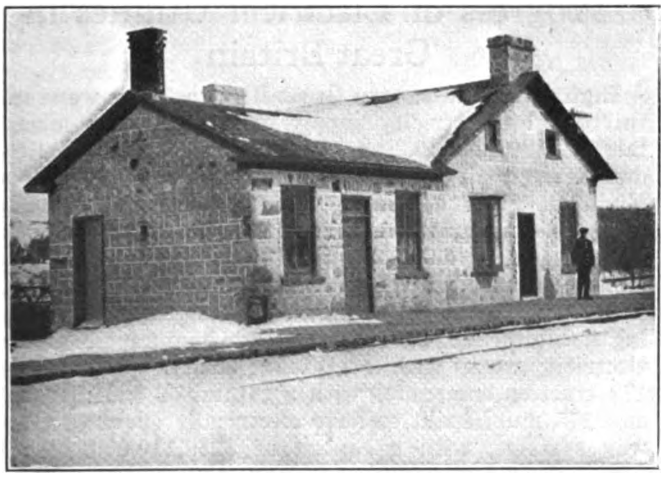


LAKE ERIE & NORTHERN RAILWAY—BRICK AND STONE STATION AT PARIS, ONT.

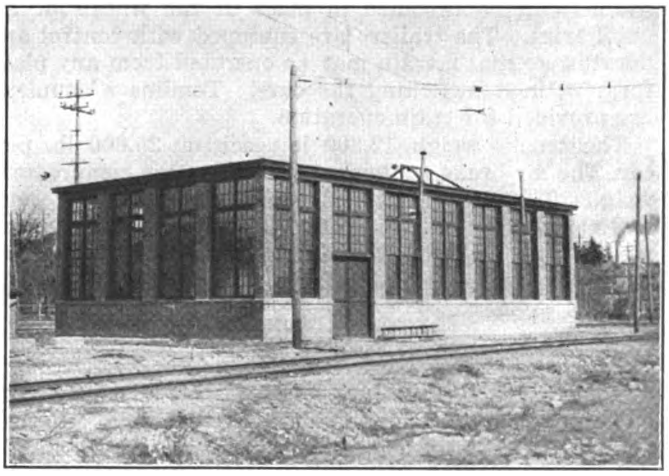
The wooden roof framing is supplemented with a steel carline over each wide pier, and so arranged that ample support is provided for pantograph bases at each end of the car. No. 10 cotton duck, laid in white lead and linseed oil, is stretched over the roofboard and tacked in place.

Vestibules are designed to conform with standard steam railroad car practice, the canvas diaphragms only being omitted, and a swing door is provided at the end opening, in order that the entire vestibule may be used for a motorman's cab on the motor cars, and making it possible to convert any additional trail cars to motor-car service by simply installing the necessary wiring and equipment. The vestibule steps have steel sides, wooden treads and composition tread plates. Motormen's mirrors are installed on the vestibule corner posts at diagonal corners. A metal pilot is supported from the platform framing at each end of the car.

The cars have a seating capacity of seventy. They are divided by a half glass partition into a main passenger and a smoking compartment. The passenger compartment is finished in mahogany with a square ceiling and beams, while the smoker is finished in quartered oak, mission style and also with a beam ceiling. Five Automatic ventilators are provided on each side of the car. Window curtains are of Pantasote with all-metal



LAKE ERIE & NORTHERN RAILWAY—STONE STATION AT GLEN MORRIS, ONT.

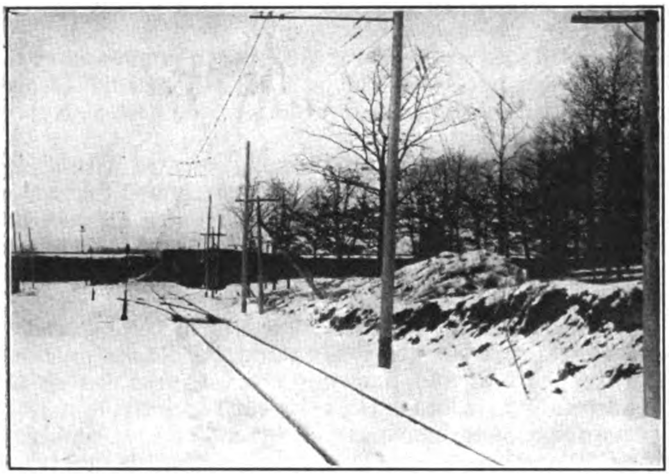


LAKE ERIE & NORTHERN RAILWAY—SUBSTATION AT BRANTFORD, ONT.

rollers and spring pinch fixtures. All of the cars, both passenger and trailer, are provided with twenty-seven low back walkover seats and eight stationary seats, all upholstered in Pantasote. Each walkover seat is fitted with the usual corner hand grab. Each set is connected to an annunciator push button system. Eight basket racks are installed in the main compartment, and two in the smoking compartment. The car is equipped with emergency tools.

A lavatory is located adjacent to the swing door in the body. A water cooler alcove is provided in the corner of the saloon partition. Instead of the usual metal cooler, an inverted glass water bottle scheme has been developed.

Car wiring is inclosed in steel conduit, with the usual outlet and junction boxes. The lighting of the cars is of an attractive and serviceable design. There is a lighting system of three circuits, twelve lights to each circuit. There are four large globes in the center of the ceiling, each containing three lamps, and twelve single-lamp droplights on each side of the flat lower deck. There is a separate circuit for the four marker lights, which are fed by two batteries.



LAKE ERIE & NORTHERN RAILWAY—TRACK AND OVERHEAD CONSTRUCTION AT PARIS, ONT.

The Canadian Westinghouse Company has supplied six 1500-volt quadruple motor equipments, electrical equipment for two trail cars and air brakes for both motor and trail cars. Each motor car equipment consists of four 85-hp. ventilated motors, with AB unit switch type of control. Ordinary wheel trolleys will be used at first, but the cars are so arranged that pantographs can be installed in place of the wheels or as auxiliaries. The trailers are equipped with control apparatus, so that a train may be operated from any platform without switching the cars. Tomlinson couplers are provided for train operation.

The trucks weigh 12,800 lb. each or 25,600 lb. per car. The air-brake equipment, including the compressor, weighs 2800 lb. Electrical equipment, including control and wiring, weighs 17,000 lb., and the bodies complete weigh 34,725 lb., which give a total car weight without passengers of 80,125 lb.

ELECTRIC LOCOMOTIVES

The Lake Erie & Northern Railway has received two 60-ton electric locomotives, one of which is shown in an accompanying illustration, of the eight-wheeled double truck type. The locomotives will handle standard freight cars, and Canadian Pacific passenger cars, the maximum train load being about 800 tons. The principal dimensions of the locomotive are as given in the following table:

Distance between truck centers	17 ft. 8 in.
Wheelbase, each truck	6 ft. 8 in.
Wheelbase, total	24 ft. 4 in.
Diameter of driving wheels	36 in.
Width over all	10 ft. 0 in.
Height over all	12 ft. 10 in.
Length, center to center of coupler knuckles	37 ft. 6¼ in.

The motors are of the Westinghouse 562-D-5 type, designed for high potential, direct current. The two commutating-pole motors are permanently connected in series so that the voltage across each is 750. Their nominal rating is 75 kw. They have forced ventilation, but also have fans on the armature shafts of a capacity sufficient for operation at three-quarter load in case of accident to the blower. The control equipment used on the locomotive is HB electropneumatic.

PERSONNEL

The officials of the Lake Erie & Northern Railway are as follows:

President, E. W. Beatty, Montreal, Que.; general manager, Martin N. Todd, Galt, Ont., who is also president of the Galt, Preston & Hespeler Street Railway; freight and passenger agent, C. J. Whitney, Preston, Ont.; superintendent, M. W. Kirkwood, Galt, Ont.; engineer, F. H. Midgley, Galt, Ont.; general foreman, J. J. Morrissey, Brantford, Ont. The main office is at Galt.

Automobile Inspection of Subway

Citizens in automobiles recently drove under the Harlem River and through a New York subway line. The remarkable feat was made possible by the new Lexington Avenue subway and its Jerome Avenue branch, which are so far completed that the trip by automobile was possible from 157th Street down to Sixtieth Street, passing in this trip through the new Harlem River tubes. It was made by the Public Service Commissioners for the First District, several members of their staff, and a few invited guests, including Theodore P. Shonts, president, and Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, which will operate the new line. The distance covered was about 5½ miles, and the trip was made to inspect the work. Frequent stops were made for flashlight photographs. This subway structure is completed from 157th Street to Fifty-third Street, and track laying is already under way upon the Bronx portion of the line.

Progress of Electrical Utilities in Great Britain

Eighteen years ago, in Great Britain, there were only thirty-eight electricity supply companies, with a capital of $29,220,000, and thirty-three municipalities owned electricity works with a capital of $9,740,000. Eighteen years ago there were seventeen privately-owned electric traction companies in Great Britain, with a capital of $34,090,000. This gives a total of eighty-eight concerns, with a capital of $73,050,000. To-day there are 276 companies owning electricity works, having a capital of $297,070,000; 328 municipalities own electricity works with a capital of $253,240,000; besides 172 traction companies with a capital of $891,210,000; and 175 municipalities have electrically operated tramway systems, with a capital of $258,110,000. These figures represent a total of 951 concerns and a capital of $1,699,630,000.

Meeting of Southwestern Association

At the Annual Meeting at Galveston, Last Week, the Subjects of Railway Interest Discussed Included One-Man Cars, Coasting Recorders, Paving, Selection of Employees, Car Maintenance and Traffic Development

THE twelfth annual convention of the Southwestern Electrical & Gas Association was held at the Hotel Galvez, Galveston, Tex., on May 17-19. Abstracts of three of the papers presented at the meeting were published in the issue of this paper last week. An account of the general meetings and of the railway sessions, with abstracts of the railway papers not published in the issue of May 20, follow.

The convention opened in the late forenoon of May 17 with an address of welcome by Hon. Mart H. Royston, city attorney of Galveston. Mr. Royston's remarks were not so much a welcome to the members as visitors, but as returning friends, for this was the fifth convention held in Galveston. The response to the address was delivered by W. B. Head, assistant to the president Texas Power & Light Company, and Mr. Head said that the members of the convention were glad to return to "Good old Galveston."

The attendance at the convention was very satisfactory as regards numbers, and included representatives from most of the electric railway and electric lighting companies throughout the Southwest, as well as representatives of supply houses from all parts of the country. The secretary's report on membership showed that the number of new members taken in about offset that of old members dropped.

The president's address was delivered by President David Daly, with W. B. Head in the chair. This address, given in abstract elsewhere, dealt with the vital question now uppermost in most cities of Texas—the jitney situation. The other business transacted at the opening meeting was the appointment of various committees.

THE RAILWAY SESSIONS

After the general meeting the convention divided into sectional sessions. At the railway session on Wednesday afternoon the first paper presented was that on "Practical Methods of Paving as Applied to Street Railways," by W. M. Archibald, superintendent maintenance of way Houston Electric Company. This paper is published in abstract elsewhere in this issue, and was discussed by S. E. Mason, assistant manager San Antonio Traction Company; D. A. Hegarty, president Texas Southern Electric Company; V. W. Berry, general superintendent Northern Texas Traction Company; G. H. Clifford, first vice-president and local manager Northern Texas Traction Company, and H. S. Cooper, secretary of the association.

Mr. Mason brought out the difficulty encountered in paving railroad crossings. One method, which was described by him and has given satisfaction, is to lay a 12-in. concrete base and then 12 in. of gravel under timbers 12 in. x 14 in. or 12 in. x 12 in. The ties are laid upon this foundation, and the spaces are filled in with gravel. After about six weeks of use the track is jacked up to its former position and the space below is again filled in with gravel. Broken stone is placed from the bottom to the top of tie, tamped hard and flooded with hot paving filler, and again tamped with a hot tamper. Two inches more of broken stone are added, and the whole is tamped and flooded with filler again. Crossings laid in this manner have now been in use for three and one-half years without repair.

Mr. Hegarty advocated the use of a pocket for the tie constructed in the concrete base, this pocket to be ballasted and drained. He also strongly advised that all new track be gone over carefully and all joints be ground smooth. This, he believed, would save a great deal of future grinding. Mr. Cooper spoke forcibly in favor of welded joints, maintaining that it was absolutely unnecessary to make allowance for expansion and contraction when the track is laid on a concrete base and the street is paved.

The next paper was on "Economical Maintenance of Cars, City and Interurban," by Fred. L. Bennett, master mechanic Houston Electric Company, and was read by the secretary, Mr. Cooper. It is published in abstract in another column. Those who discussed this paper were V. W. Berry, general superintendent Northern Texas Traction Company; W. E. Wood, superintendent of transportation Houston Electric Company; Albert H. Warren, manager Galveston Electric Company; Secretary Cooper; D. A. Hegarty, president Texas Southern Electric Company; C. H. Beck, Westinghouse Traction Brake Company, and Mr. Jacoby, salesman Westinghouse Electric & Manufacturing Company.

Mr. Berry emphasized the necessity for proper and adequate shop equipment as a means of reducing the cost of maintenance. Mr. Wood brought out the necessity of thorough and periodical inspection of cars. A discussion followed as to the length of this period, from which it was decided that the time limit depended upon the class of equipment and local operating conditions, and would vary for different locations. Mr. Wood has adopted 1000 car-miles as the time for thorough overhauling and examination.

The third paper of the session was on "Practicability of One-Man Cars and Their Operation," by D. R. Locher, second vice-president and general manager Corpus Christi Railway & Light Company. This paper was printed last week, and was discussed by W. W. Holden, superintendent of transportation San Antonio Traction Company; J. C. Thirlwall, General Electric Company; V. W. Berry, general superintendent Northern Texas Traction Company; P. W. Gerhardt, superintendent of transportation Dallas Consolidated Electric Street Railway; G. H. Clifford, first vice-president Northern Texas Traction Company; H. S. Mann, Goldschmidt Thermit Company, Chicago, and F. C. Webb, salesman The Rail Joint Company.

Mr. Holden suggested that the additional time necessary for a stop with a one-man car, due to issuance of transfers, making change, etc., was a strong point against their use. Mr. Thirwall quoted facts based on the use of one-man cars by the Federal Light & Traction Company, which would seem to prove that very little extra time is consumed in this way, and that the same schedules can be maintained. Mr. Hegarty described some of the features of the Birney car and the Haller car, and explained that in the latest types, if anything happens to the motorman so that his hand is removed from the controller, the brakes are set and the emergency doors are opened. Every operation, such as the opening and closing of doors, ringing of gongs, etc., can be conducted by the motorman without a change in position, so that the minimum amount of time is consumed in these operations and the maximum safety is attained.

It was brought out in the discussion that on certain lines where one-man cars have been placed in service they met with opposition from the men at first, but in all these cases the men would not now return to two-man operation. The one-man car also constitutes the best means of combatting the jitney, as it permits twice as many cars with the same number of men. The Northern Texas Traction Company of Fort Worth has ordered ten new one-man cars. It was also suggested that the name, "one-man" car, seems to produce a bad effect upon the general public by leading them to believe that men are being thrown out of work and that the safety to patrons is being decreased by one-half. Inasmuch as the safety of operation is actually increased, the suggestion was made that such cars in future be referred to as "front entrance" or "safety" cars.

The first paper of the second railway session held on Thursday afternoon, was "Scientific Selection of Employees," by P. W. Gerhardt, superintendent of transportation Dallas Consolidated Electric Street Railway. This paper was published in abstract last week. The discussion on it was opened by Dan G. Fisher, traffic manager Southern Traction Company, and others who spoke were G. H. Clifford, vice-president; V. W. Berry, general superintendent, and A. M. Watson, claim agent Northern Texas Traction Company; Rex Frasier, general passenger agent Galveston-Houston Electric Company; L. L. Stephenson, president and manager Yoakum Power, Light & Water Company; R. J. Irvine, vice-president and general manager San Angelo Water, Light & Power Company; W. W. Holden, superintendent of transportation San Antonio Traction Company; W. E. Wood, superintendent of transportation Houston Electric Company, and D. R. Locher, vice-president and general manager Corpus Christi Railway & Light Company.

Mr. Gerhardt maintained that education past the seventh grade in school was of no particular advantage in the making of a good motorman or conductor. He admitted that the main weakness of the system described by him at the present time was the lack of a thorough medical examination, and said that he was in favor of such an examination. Mr. Berry said that nearly 50 per cent of the men accepted on other tests in the Northern Texas Traction Company were turned down on their medical examination. Mr. Gerhardt went on to explain that the tests outlined in his paper were merely supplementary, and that little more than 20 per cent of the applicants reached these tests, as they were first rigidly examined as to morals, etc. Inquiries are also made into an applicant's past record, and his honesty often asserts itself in the manner in which he takes his examination. If a man accepts his examination with resentment he is dropped at once, and if he accepts with an amused tolerance he is quickly taught that it is no joke. To be a platform man is serious business. Mr. Wood said that the man who did the hiring should be a good judge of men.

A paper on coasting recorders was then read by R. E. Griffiths, assistant superintendent Northern Texas Traction Company. This paper was published in abstract last week. It was discussed by W. E. Wood, Houston; W. W. Holden, San Antonio; P. W. Gerhardt, Dallas; V. W. Berry, Fort Worth, and J. C. Thirlwall, Schenectady.

Mr. Wood said that the Houston Electric Company will equip all its cars with recorders, but felt that we should never forget that safety should come first and coasting second. Mr. Berry replied that the experience of the Northern Texas Traction Company had indicated that coasting was a means of obtaining safety first, rather than placing it second. Not a single accident on this line could be attributed to coasting, but the damage in such few accidents as had been had was greatly lessened by the fact that the motorman was coasting. Mr. Berry further said that the subject of coasting recorders had been very thoroughly covered in recent issues of the ELECTRIC RAILWAY JOURNAL. "Good coasters," he added, "will operate a car in exactly the manner in which the equipment was designed to be operated." His company had made a saving of $2,000 per month due to coasting recorders, and is well pleased with their use. Mr. Holden brought out the point that jitneys greatly interfere with the making of good coasting records.

The final paper of the railway sessions, "Methods of Attracting and Developing Interurban Traffic," was prepared and delivered by J. P. Griffin, general passenger agent Texas Traction Company, but because of the lateness of the hour the discussion was brief. This paper is printed elsewhere in this issue. Those who participated were G. H. Clifford, Rex Frasier and David Daly, president of the association.

OTHER BUSINESS

The electric light and power sessions were held on Thursday afternoon and Friday morning, and were devoted to papers of interest to operators of electric light and power companies.

The claim agents' session, which was to have been held concurrently with the Wednesday afternoon session, was postponed until Thursday afternoon because of delay in the arrival of the participants. This session was well attended, and papers of interest were brought up and discussed.

The gas men held no formal sessions, but talked over matters of interest to themselves.

As some members of the association, whose presence was essential at the business session scheduled for Saturday morning, found it necessary to leave on Friday night, the general session of Friday afternoon and the business session were combined and held on Friday afternoon.

Reports of the various committees were read and received. The resolutions committee reported among other things:

"That the thanks of the association be gratefully tendered to the technical journals of the United States for their uniform courtesy toward the association and liberality with which they have given space in matters pertaining to the association. We especially desire to thank the McGraw Publishing Company for copies of the current issues of its magazines, which it sent to this convention and which have been liberally used and appreciated by the delegates."

The officers elected for the coming year were: F. R. Slater, Dallas, president; H. C. Morris, Dallas, first vice-president; D. A. Hegarty, Houston, second vice-president; W. A. Sullivan, Shreveport, La., third vice-president; H. S. Cooper, Dallas, secretary; J. B. Walker, Dallas, treasurer.

The executive committee elected consisted of the president and vice-presidents mentioned above, David Daly, the retiring president, and for the two-year term, G. H. Clifford, Fort Worth; W. B. Tuttle, San Antonio; F. J. Storm, Amarillo, and W. B. Head, Dallas, and for the one-year term, R. Meriwether, Dallas; J. C. Kennedy, Brenham; E. S. Fletcher, Dallas; D. R. Locher, Corpus Christi, and W. S. Rathell, Houston, honorary member. An advisory committee of twenty-five members and a finance committee of four members were also elected.

On Friday evening a boat ride around Galveston harbor was tendered to all the delegates by the Galveston Commercial Association. It was enjoyed greatly by all. The final event of the convention program was a rejuvenation and joviation on Friday night, tendered to all visiting Jovians by the Galveston Jovian League. It comprised a one-act comedy good-naturedly "roasting" some of the more prominent members of the association, a banquet, and the initiation of seventeen new men.

President's Address at Southwestern Convention

BY DAVID DALY
Local Manager Houston (Tex.) Electric Company

The experience of the street railways with the jitney has brought out very plainly the misunderstanding by the general public of the business of public utilities and the conditions under which they operate. To the public there seems to be nothing illogical in the view that the street railways have hitherto had their opportunity, and that now they must live or go under in competition with the new automobile transportation.

This might be a reasonable view if street railways ever had had the possibility of great profit or the right to earn all they could, or if the business was one that could be closed out and the capital withdrawn. It has, however, been recognized from the first that the business cannot be relinquished—that it is subject to the regulation and control of the public, and at no time is entitled to more than a fair and reasonable return on the money that has been invested.

As an effect to these limitations, street railways have been supposed to have security, and in place of quick and large profits gained something of the permanency and stability of the city itself. There is a strange shortsightedness in the view of a large part of the public. Temporary advantage looms large to us all as individuals. The treatment of public service problems, however, has to do with a community life, and requires a broader and more far-sighted vision than that which may serve in the brief span of our personal activities.

Nothing costs a community less to give, nothing is so conductive to its solid and substantial upbuilding as security to the capital that is devoted to its needs and service. Nothing more readily attracts capital to these services than assurance that this capital is safe, and nothing else makes it content with small returns. Yet what do we see constantly? Every safeguard that can be taken from this capital is considered a victory for the public. Every burden that can be put upon it is a political asset for the man that places the burden. Yet every burden and every element of insecurity must eventually be paid for by the community by the withholding of investment for this public service and by the higher rate of return necessary to attract the capital.

We have long been accustomed to this tendency to load the public service corporation with menaces to its security, but we are beginning now to face a still more serious situation that all of us having such properties in charge must recognize. The end of a franchise period is a time when a continuance of the right to life is decided. We have been lulled into a rather careless feeling about this date because we have been constantly assured by the public that public service must go on in any event, and that the end of a franchise period means only a review of the situation, a determination of the amount of property devoted to the public service and a readjustment of the terms on which the corporation shall go forward in the next stage of its life. But we should not be blind to the danger in such a situation. We have property that is of value only in its present place and doing its present service. There is no more inviting target for the ambitious politician or the demagogic paper.

The value of public service property is in the income it produces. To the extent that this income is cut down the value disappears. We may as well have taken from us a part of our power house or a part of our rails as to be so deprived of a part of our proper and reasonable income. And what is our proper and reasonable income? It is the minimum percentage or rate that will induce investors to devote capital to this kind of service with such degree of security as it offers. No public would stand for a bald proposal that nearly half a corporation's property be confiscated, but a public can be wooed to believe that clippings from income, at one end and at the other, are justifiable.

These statements may appear exaggerated, but we have only to study what has been done in Cleveland and what has been attempted in Dallas to be convinced of the serious problems we have to face. Our position is not hopeless, but it requires our serious attention, because we must combat the fallacious arguments and make our public see the problem in its true light. Fortunately the Cleveland franchise itself and the proposed Dallas franchise, based on the Cleveland franchise, furnish a convincing reply to the fallacy that a depreciated value is a proper capital base on which to figure returns.

In Cleveland, for instance, upon the granting of the francsise, the property was depreciated to from 70 per cent to 75 per cent of its full value as measured by cost of reproduction to arrive at a capital base on which to figure returns. All new property to be added in the future is to be added to the capital base at its full cost. Provision is made in the franchise for repairs and depreciation, the theory of the franchise being that the capital base shall always represent the value of the property. The allowance for repairs and depreciation may be decreased if the condition of the property is such that the depreciated value of the property plus any reserve for depreciation is as much as 70 per cent of the cost of reproduction new. The latter provision is, of course, a plain recognition that property cannot always be absolutely new and that it is a burden on consumers to maintain a reserve that would always put the property in this useless and impossible condition.

The inconsistency should, however, be noted. The property in Cleveland that was in existence when the new franchise was imposed reached the standard of condition set for the future, yet this capital already invested was depreciated so that the income of the holders was only about three-quarters of what it would have been had it been invested later and the condition of the property been exactly the same. The property in existence when the franchise went into effect was allowed a capital base of but 70 per cent to 75 per cent of the reproductive cost because its condition measured by age was but 70 per cent to 75 per cent of new. The property that came into existence after the franchise went into effect was allowed a capital base of 100 per cent, even when its condition measured by age should be but 70 per cent of new. Why the discrimination? There was no reason whatever except that the early capital was already caught and the new capital was yet to be caught.

It is a bit discouraging that the public will tolerate this sort of thing, that the prejudice that has been created against corporations will blind the individual to treatment that he would not countenance in his personal dealings with anyone.

We must realize, however, that we have this prejudice to deal with, and we cannot rest our case with the public with a serene confidence that palpable truths need no presentation. It is necessary that we all be familiar with the schemes that will be proposed sooner or later, as surely as we have franchises and rights maturing, and we should none of use be caught by unpreparedness to meet the statements and arguments that will be advanced.

Economical Maintenance of City and Interurban Cars

BY F. J. BENNETT
Master Mechanic Houston Electric Company, Houston, Tex.

Economical maintenance of street and interurban railway cars can only be determined by observation and comparison. Yet comparisons of the practice of companies, operating under practically the same conditions, are often misleading and not analogous on account of local conditions.

Nearly all small roads and some larger ones have made shop equipment and facilities a secondary consideration, with the result that repairs have become expensive propositions. They have not added new shop equipment or replaced old machines from time to time, and this condition of inefficiency has been allowed to continue until everything in the shop is obsolete with relation to the work it is expected to do. In the addition of new machinery the fact is often overlooked that it is more economical in the long run to install a thoroughly modern machine of proper capacity with individual electric drive and with proper tools than to install a belt-driven machine to fit the old tools. This tends to keep the shop equipment out of date and fails to conform it to safety-first ideas.

The methods of doing work in some shops are as ridiculous as going bear hunting with only fists as weapons.

By way of illustration of crude methods, I might add that at one time I was connected with a street railway whose employees in the maintenance department consisted of two engineers, two firemen, two day shop men, one night shop man and one track man. The shop tools and appliances consisted of a half dozen solid open-end wrenches, a track jack, a blow torch, two ladles, a rope and windlass, two saw horses and a work bench with a carpenter's vise. A forge in a neighboring blacksmith shop was also utilized. Armatures were raised and lowered by a rope looped through the trapdoor in the floor of the car and attached to a windlass. Changing a pair of wheels generally took two days. Split gears were changed without removing the motors, trucks or car bodies. The chief engineer wound the armatures, the shop foreman washed out a boiler every Sunday night, and the track man oiled the curves. General overhauling or painting of cars was not thought of. On top of all this handicap the shaky cars, which were run around curves and down grades at from 40 to 50 m.p.h., were equipped with cast-iron wheels and hand brakes.

There are a number of kinks around the shop which tend to reduce the cost and time of certain operations. For instance, instead of soldering the leads into the commutator segments, our practice is to drive leads into the slots and put above the top lead a short piece of wire of the same size and equal in length to the commutator bar, and then to drive this piece in solidly over the lead. Again, noisy gears are poor advertising, and it is very essential to quiet operation to have the gears and pinions always turning in the same direction as when first installed. With sufficient grease they will wear to the breaking point before becoming noisy. Vibration caused by the gears is very detrimental to the armature windings and bearings, particularly where they have seen considerable service before this vibration takes place. The noise is generally noticed by the public, and word of it reaches the mechanical department by the way of the manager's office with the query, "Why?"

The scrap limit of interurban wheels is a serious problem, and if a road has both city and interurban cars it is practicable to turn down these scrap wheels for city use. Results show that small wheels are more satisfactory for city service than the standard 33-in. wheels, and on most equipment throughout the country 33-in. wheels could be replaced with 30-in. wheels without making many expensive changes in trucks or brake rigging. About the only prohibitive feature in this change is the clearance under the motor and gear case. Where permissible it lowers steps, increases acceleration and reduces current consumption. Whenever steel wheels are turned down, we make the pitch of the tread 1 in. in 20 instead of 1 in. in 25 as formerly, believing that this helps to keep the flanges away from the rail. The saving in flange wear is very perceptible.

Close watch of interurban wheels is very essential to insure safety in high-speed operation and requires the frequent gaging of flanges. The condition of one wheel hugging the rail at the expense of the flange can be remedied by new journal brasses, which will properly line up and center the wheels in the truck. Many wheels are started off wrong by using one old and one new journal brass on the same axle. The brakeshoe pressure and one-way operation tend to wear the brasses away from the center or toward the side of the journal box. Flanges can be reclaimed to some extent by moving the journal box forward from the center on the thin flange side, or back from the center on the thick flange side. This tends to keep the thin flange away from the rail and the thick flange close to the rail. It is only practicable on single-end equipment, and where the design of the truck is such as to allow a special pedestal to be used that will permit a filler plate varying in thickness from 1/8 in. to 3/8 in. to be inserted on the opposite side of the journal box.

Before leaving the subject of bearings it should be stated that when new or rebabbitted bearings are bored out accurately to fit the shaft, the job is only half completed, as the bearing shell should fit the housing snugly. Loose shells in bearing housings are as bad as bearings loose on the shaft, and when wear has become so great that shimming is necessary, it is better policy either to plane off the bearing cap so as to render shims unnecessary or else to rebore the entire box and use bearing shells of larger outside diameter. Cleanliness is essential to good maintenance, for unless work is put together clean and free from grit and dirt, good fits and long life of bearings will be sacrificed. The additional time required to clean shafts and bearings, oil wells and bearing housings before assembling is small. Systematic oiling is also of great importance. Armature bearings, motor axle bearings and journals on city cars are divided into classes for each type of bearing, and are arranged on a list for regular oiling, at intervals varying from four to twenty days, depending on the kind of bearing and service conditions. At intervals of six months, waste and oil are removed from all of the boxes, and hard or glazed and gummy pieces are removed. The waste is soaked in a vat for twenty-four hours, then drained on a board for forty-eight hours, after which it is again ready for use. The best wool waste obtainable will prove much cheaper when used as above mentioned. No attempt is made to oil the bearings of city cars on a mileage basis. On interurban cars, however, they should be oiled as follows: Armature bearings, 1500 miles; motor axle bearings, 1500 miles, and journal bearings, 2000 miles.

In maintaining equipment the co-operation of the transportation department in reporting defects is very essential, and the more accurate the reports the more they will be appreciated by the mechanical department. All reports of defects noted by the transportation department should have immediate attention.

Regular inspection is also necessary. The more frequent the inspections the better is the opportunity to know the true condition of the equipment. Economical maintenance means attention to small things. It is doubtful if one will ever have to report a missing car wheel, but the loss of a cotter key, if passed unnoticed, might cost the company many dollars. Too much stress cannot be laid upon frequent inspection of car roofs, as one small leak in the roof may cause the loss of the whole head lining, or it may start the ribs and roof boards to rotting. Careful inspection of high-speed interurban equipment should be made at close intervals. Heavy inspection should occur at intervals of not to exceed twelve months. This should include a written report showing the condition of the working parts of the equipment, stating the condition found and the action taken or renewals and repairs made. A weekly fire inspection is also of great value.

Efficiency among the shop men is another factor which means much to economical maintenance. Employees should receive every opportunity to become proficient in their particular tasks. Blueprints and bulletins should be posted whenever necessary, for they not only prevent many errors and accidents, but promote interest and increase the amount of work turned out. Organization tends to enable the men to work collectively, especially in fire drill maneuvers, at the same time giving efficient protection.

For a record and check on the actual variation of costs of standard parts used, it is well to keep a monthly shop operation report which will show work accomplished, together with cost per 1000 car-miles of items, such as brakeshoes, trolley wheels, gears and pinions, wheels, lubrication, etc. This report is not only of great value to the man in charge, but assists in the preparation of special and annual reports. The men in the shops can be trained to turn in repair cards showing parts removed or repaired, and work done in each instance. As the train crews sign their register cards they can check on the trouble card the items giving trouble during the day. This saves much time at night when the regular inspections are made.

The anticipation of the needs for supplies, especially on properties that are located far from the manufacturers, requires some diligent and persistent attention. Delay in securing some small article necessary for repairs will often cost many times the real value of the article. All brake levers, rods and beams should be equipped with standard hardened bushings before they are installed. If this is not done there is a chance for the holes to become changed in position from wear, which would change the ratio of brake leverage and make all parts non-interchangeable. It is much easier, more economical and safer to keep hardened bushings on hand and replace worn out ones than it is to plug up the old holes and drill new ones.

Too much care cannot be observed in the saving of scrap and worn-out parts. Employees in the shops should pick up all bits of brass and iron and put them in their respective bins. Worn-out trolley wheel parts, which often fall from the top of cars when repairs are being made, should be saved. Burnt-out incandescent lamps, whether broken or not, should be returned to the storeroom for systematic salvaging. All old bolts should be put in a barrel, and when time permits the man in charge of the thread-cutting machine should be instructed to assort, cut off and rethread them. Jobs should never be termed completed until the removed parts, scrap, tools and unused stock have been picked up and restored to their respective places. Inspection of the scrap pile will often reveal the fact that material such as brakeshoes, gears or pinions have been removed and thrown out that have considerable life left in them, and gear cases that can easily be repaired have been discarded or turned over to the junk dealer. This applies to brass bearings and castings as well, and especially to motor axle bearings, where the top half of the bearings do in some cases wear out completely and the bottom halves still retain their original tool marks. It often pays in such instances to match up two bottom halves, using one for the top bearing, after cutting oil hole and groove.

One of the most important items that the mechanical department has to contend for is the systematic overhauling and painting of cars. In some climates cars do better than in others, but here in the Southwest, where there is so much dampness, cars rust and mildew quickly. This leads to rusted iron and rotted parts, and the only safe method of saving the cars from such excessive depreciation is to pass them through the repair and paint shop on a systematic schedule. The schedule will range from nine to twelve months, depending on the rate of deterioration of varnish and paint. It is far more economical to varnish cars at periods of from nine to twelve months than to let them go for a much longer period, when they will most probably have to be burned off to the wood, necessitating extensive wood and iron repairs.

In conclusion, the question of economical maintenance of cars, whether city or interurban, depends on the frequency and accuracy of inspection, the prompt action taken regarding broken or wearing parts, and close co-operation between the transportation and mechanical departments. Equipment cannot be watched too closely, and economy must never take the place of, nor militate against, the factor of safety.

Developing Interurban Traffic

BY JAMES P. GRIFFIN

General Passenger Agent Southern Traction Company and Texas Traction Company

The passenger business of an interurban railway in this section of the country is its chief source of revenue. Hence, it is necessary to have a passenger department, which is the sales organization, to look after the details of solicitation, sale of tickets, etc., and this department should be live and up to date, ready to take advantage of every opportunity to develop and increase its business.

The organization of the passenger department consists of the general office and the traveling and agency units, the relations of which must be most cordial.

The local agent is the prime factor in the securing of passenger business. He is the man directly "on the firing line," and he, in conjunction with the trainman, can do more to mold favorable public sentiment toward an interurban line than anyone else. It is essential that the agent be a good, clean man, and one who commands respect in his town, for thereby he can be of material assistance in securing and developing business. Almost anyone can sell tickets to those who come to the window and call for such and such a ticket, but it takes art to sell round-trip tickets, through interline tickets, coupon tickets, etc. Courtesy is a valuable asset possessed by the good agent. The true value of the agent shows in his solicitation work. The live man knows in advance of probable movements and gets in touch with the people and increases the number to move. He should be possessed of the ability to go out and talk to his people and encourage them to make trips. Valuable work can be done by the agent through membership in the local commercial organizations. Friendships formed there with the men who are doing things in his town are lasting and bound to be beneficial.

Care should be taken by the general office to give proper credit to the agent for the work he does and encourage him in every way possible. A kind word spoken at the right time and a pat on the back in recognition of meritorious work yield rich dividends of loyal service. At the close of each week we have our agents forward to the general office reports of business solicited, secured and handled during the week, with comments upon business, crop and weather conditions, etc., and information as to prospective business. This tends to keep them interested in making a showing in their work, and anxious to do something each week, so that their reports will not be barren.

Along the line of keeping agents encouraged and interested, we have in effect on our system an "honor roll" plan, which is creating quite a lot of friendly rivalry among our agents. Under this plan, at the close of each month a statement is sent to the agents on each division showing their standing for the month as compared with the corresponding month of the previous year. This is figured in percentage gain or loss, so that the smaller stations are on the same basis as the larger ones. At the end of each six-month period three prizes in gold are distributed on each division, going to the agents making the first, second and third best showings for the period. We have found that agents take quite a little interest in this plan. They watch their business closer, know each day how they stand with the corresponding period of the previous year and are always striving to make a better showing. We have found from actual experience an increase in ticket sales, as the agent rarely ever lets a patron get away from his station without selling him a ticket. Often he sells round-trip tickets to those who have called for one-way and through interline tickets to those who had intended to buy only to the junction point and rebuy there, thereby insuring a return trip or a through trip via the interurban route. It has materially increased the sale of our cash coupon tickets, which contain $10 in transportation and sell for $8. This particular ticket has been strongly pushed by our agents. I recall the instance of an agent in one of our towns having a population of about 8000, who, during the last two days of the year 1915, went out into his town with a supply of these tickets in his pocket, and on the streets and in the stores and offices sold some sixty of them. He materially increased his standing on the "honor roll" by doing so.

At the close of the year we send to the agents a statement showing the total ticket sales at all stations for the year. This statement is arranged by divisions. The information appears to be very much appreciated by the agents and in many instances has given them a mark to shoot at. Naturally each agent has in mind some other station which he thinks he should beat in his receipts. If he falls down one year he strives harder during the following year. On the other hand, the other agent works to keep ahead.

Agents should be kept advised of coming events. It is our policy to send out several times each year a "Prospective Business Circular," giving advance information as to dates of conventions, meetings, fairs, baseball and football games, theatrical attractions, etc., to be held and to appear in our territory within the near future. At the close of each week there is mailed to the agents a "Passenger Department Weekly Schedule" giving a list of known events for the coming week. From time to time other information in various forms is sent to the agents. Complete files of the circular instructions and information of the passenger department should be furnished to agents to enable them to quote rates and arrangements for service intelligently.

The general passenger agent should call upon his agents as often as possible and discuss with them matters of solicitation, station work and business in general. By having at his finger tips information as to the results the particular agent is obtaining in his work, he is better fitted to talk to him about his condition. He should encourage the agent to give his ideas and talk freely about things as the agent sees them.

The traveling man of the passenger department should also call upon the agents often, once a week if possible. He is the "big brother" of the agent, and coming to him in the spirit of friendship and co-operation, mutual assistance can be rendered. Much of the groundwork of solicitation must be done by the agent, and then when the traveling man comes in, matters can often be brought to a final and successful conclusion.

The traveling passenger agent should be mobile and versatile. He should class "A-1" as a mixer. His field for solicitation and development is broad, its limits being almost boundless. It extends not only immediately along the line in his division but far into adjacent and surrounding territory, particularly around the terminal and junction points where connections are made with steam railroads. On these trips he should call upon the newspaper men, hotel men, principal business men, steam railroad agents, etc., everywhere preaching his doctrine of interurban service and rates. He should carry with him and distribute advertising matter, such as novelties, pencils, placards, time cards, etc. His outfit is not complete without hammer and tacks, and he should leave his tracks on the walls and fences of the towns he visits. When he comes into a town the first man he should see is the local agent. In consultation with the agent his moves are planned.

The traveling passenger agent should keep in close touch with the heads of the schools and colleges in his territory, and their athletic departments, also with the heads of fraternal orders, baseball and football organizations, etc.; in fact, every class of business that is likely to move frequently. He should accompany as many as possible of the special movements in his territory. This courtesy is appreciated by the parties, and by having a direct representative on hand, difficulties and misunderstandings may be avoided. He should report to the general office at the close of each week, showing the territory visited by him, business solicited and secured, etc.; also information picked up as to prospective business. He naturally is in close direct touch with the general office, from which he receives from time to time information as to possible movements in his territory.

The general office concerns itself with the supervision of the whole work, the keeping track of the details, etc. Here the work must be planned, mapped out, assigned and watched. The general office must be in close touch at all times with the agents and the traveling representatives. It puts out information to them and calls upon them for information and their reports. It lines up with the operating department the movement of special parties and extra business and assigns the proper one to accompany such movements. It lives in to-day and to-morrow, and not in yesterday.

Careful attention should be given by the general office to its correspondence. Inquiries should be promptly and carefully answered. An inquiry for service from some one in the immediate territory of the line should be answered in person by some one in the passenger department. The general office should from time to time put out tactful letters soliciting business. There are many places where such letters can be sent and secure good results.

Receipts can be increased from business developed to see the attractions at the theaters in the larger towns. It is our policy each week during the theatrical season to send to the agents circulars giving full information as to the theatrical attractions for the coming week. Posters advertising the attractions are often furnished by the theaters, and we display them in our stations and about our towns. Often dash signs are carried on the cars. The effort is made to make the interurban station headquarters for theatrical information. We have arrangements whereby we can reserve seats at the theaters for our patrons; the patron calls upon the agent in his town and indicates what seat he desires, the agent phones the general office, which in turn makes the reservation at the theater, information as to the location of the seats being passed back to the patron through the agent. The tickets are laid aside in the box office at the theater, and are called for and paid for by the patron when he reaches the theater. Hundreds of seat reservations are made through our organization each season. During the ten days of the return engagement of "The Birth of a Nation," at the Dallas Opera House, in February of this year, our office reserved over 800 seats, the agents reporting that more than 1500 people attended from points on our system. Several special parties were worked up. A great deal of this business was secured through the earnest efforts of the agents and the traveling representatives. This is only one instance of many. Other attractions have also been helped in the same way.

The securing of business through the means of what are called "prepaid orders" brings in quite a little revenue. Under this plan a patron is enabled to make deposit with one agent and have a ticket furnished at another station. This plan is used quite frequently by baseball and football teams, where their expenses are guaranteed and tickets furnished by the other team. The order is placed over the company phone and quite often the person to whom the ticket is to be furnished is waiting in the station when the order is received. The convenience of the plan means much to the patron, and avoids the sending of the money direct by mail, which in some cases might be diverted to other directions than the purchase of the interurban ticket.

Business developed for parks, while not particularly remunerative, still has a splendid advertising value. This business moves generally during the spring for school and church picnics, etc., and on Sundays and holidays during the spring and summer, when people want to get out into the open. Much revenue can be secured from small special movements, such as baseball and football clubs, conventions, etc. These movements should be looked for in advance, solicited and secured, and carefully watched to see that the service is adequate. Attention should be paid to athletics in colleges and high schools. The friendship of these boys can be easily secured, and then good service does the rest. No movement should be too small for the watchful eye of the good passenger man.

Where interurban lines connect and through tickets are for sale, joint solicitation should be done by the different passenger organizations. When advertising one's system, good words can be thrown in for the connection.

Special rates should not be encouraged where there is not a volume of business and unless they will materially increase this business. As a rule reduced rates on Sundays increase traffic from nearby points into the larger cities, and reduced rates for parties of ten or twelve or more tend to increase travel, particularly for special events where several people want to go and will induce others to make up the necessary number to secure the party rate. Special rates, at times, for conventions, meetings, etc., are necessary. They can be controlled quite well by making the rates good going only for one or two trains, thereby localizing the movement, and good returning on all trains within a specified limit. Special rates are also necessary during the periods of fairs, stock shows, etc. When carefully advertised they should increase the volume of business and the total receipts.

The daily and weekly newspapers undoubtedly offer the best general mediums for the advertising of interurban service. A number of subjects can be discussed in newspaper advertising—general thoughts as to service, convenience, comfort, rates, information as to attractions, etc. Much of our advertising space is secured in exchange for transportation.

Splendid advertising results can be obtained from the use of novelties specially suited for this work. Distribution is the chief drawback to novelty advertising, and unless one has a means of placing these novelties in the hands of those with whom they will do good, they should not be used. We have obtained good results from the use of notebooks, screw pencils and ordinary lead pencils. We have also used some change trays, desk brushes and paper weights with fairly good success. It has been our policy to distribute these novelties largely through our traveling representatives, placing them with newspaper men, hotel men, drummers, railroad agents, etc. Most of these novelties have been distributed in the territory off our line, the thought being to keep a more or less permanent advertisement with these people.

Flyers advertising reduced rates for special events are a standard form of advertising and one from which good results can be obtained. Distribution can be obtained through the assistance of agents. The best plan is to tie the flyers into bundles of about twenty before leaving the general office, nothing remaining for the agent to do but to place them about his town at the proper times.

A splendid solicitation medium is the timetable folder. This should be as simple as possible. Agents should have on hand for distribution a supply of these folders at all times, and they should be conveniently placed at the ticket windows so that patrons can easily obtain them. It is our practice every few months to mail our time cards to a selected list of hotels and steam railroad agents in our contributory territory in Texas and Oklahoma.

Blotters, placards and posters serve a good purpose in advertising. If you buy a blotter, buy a good one, one that when placed on a desk will be used and not thrown into the waste basket. Hotels in our towns call upon us from time to time for blotters for their writing desks and rooms. Blotters placed in public places, such as banks, postoffices, courthouses, etc., add to the well-balanced advertising plan of an interurban line. Placards and posters can be well displayed in the business houses and on the walls and fences about the towns.

Billboards, fences of baseball parks, etc., offer a means of getting the claims for interurban service before a large number of people.

Selling interurban transportation is like selling goods; it is easier to sell transportation with good service than with poor. The operating man naturally has troubles of his own, but he should remember that the passenger man is not immune. The brunt of the complaints falls upon the passenger department. When the passenger man is backed up with good service he can go to his work with a smile on his face and with words that carry conviction, for he knows that what he is offering is good.

The passenger department should periodically check up the train sheets and traffic charts to ascertain real traffic conditions, finding out if trains are running on schedule or late, and whether or not overloaded. While primarily it is the duty of the passenger department to call for additional equipment for special occasions, special trips, etc., and it does not pay direct attention to equipment needs of regular service, still I know from personal experience that operating men appreciate suggestions looking to improved service. Much good can be done by the passenger man securing the good will and friendship of the trainmen, from whom he can often receive valuable ideas as to service.

The passenger man should cultivate the friendship of steam railroad officials and agents. Many passengers come to the interurban upon recommendation from some steam road agent who has been the recipient of a courteous call or favor from an interurban man.

Street Railway Paving

BY W. M. ARCHIBALD

Engineer of Way Houston (Tex.) Electric Company

There are three essentials in a satisfactory paving for street railway work: wearing qualities, smoothness, and ability to withstand rail vibrations. The third quality is better explained by the somewhat slangy phrase, "tendency to stay put."

Ten years ago the wearing quality was considered of the utmost importance both by the public and street railway officials, but now, due to the change in street vehicular traffic, smoothness is the quality demanded by the public, and to this demand street railway officials are obliged to accede. Ten years ago street paving was worn more by wheel traffic or street vehicles than anything else, but under present roadway traffic conditions the failure of paving is due to other causes.

There is no type of paving yet developed which fulfills the three requirements mentioned. Granite-block paving fulfills the first and the third, and, from a strictly street railway standpoint, is undoubtedly the most economical type of paving, but it does not meet the public demand in regard to smoothness. Wood block, when laid properly as to drainage and traffic, fulfills the first two requirements, but except under certain conditions which are now well recognized, it is almost impossible to keep the paving where it belongs. Brick pavement is, I believe, the best all-around paving material for general street railway work, except under conditions of exceedingly heavy traffic. It has good wearing qualities; when properly laid and maintained it is reasonably smooth, and, under usual conditions, it will withstand the vibrations of the rail against which it abuts.

The several forms of bituminous sheet pavement fulfill only the second qualification. They do not wear well under heavy traffic and, when butted against a rail, the vibration of the latter is almost certain to cause particles of earth and other foreign matter to work down under the pavement sheet and cause it to curl. These pavements are smooth, however, and popular with automobilists, the general public and city officials.

A paving material to withstand rail vibration must do so of its own dead weight. To accomplish this the wearing surface and the paving base must be as nearly monolithic as possible. A cushion under the paving wearing surface is under present conditions unnecessary. The more nearly the entire paving approaches the condition of a solid block, the better will it wear and the less maintenance work will be necessary on it.

Brick pavement, laid flat with the wear at right angles to the direction in which the clay is forced through the molds, and on a moist mixture of cement and sand sufficient to form a uniform and even bed for each brick, makes a solid block when the brick are grouted with cement. The thinner this bed of cement is laid the better, as its setting depends, to a very large extent, on the moisture which permeates the joints while the brickwork is being grouted. Unless considerable water gets down to this bed there is not enough water present for the chemical action accompanying the setting of hydraulic cement. In very dry weather it is advisable thoroughly to sprinkle the brick after ramming and before grouting, as this is beneficial to both the bed and the grout.

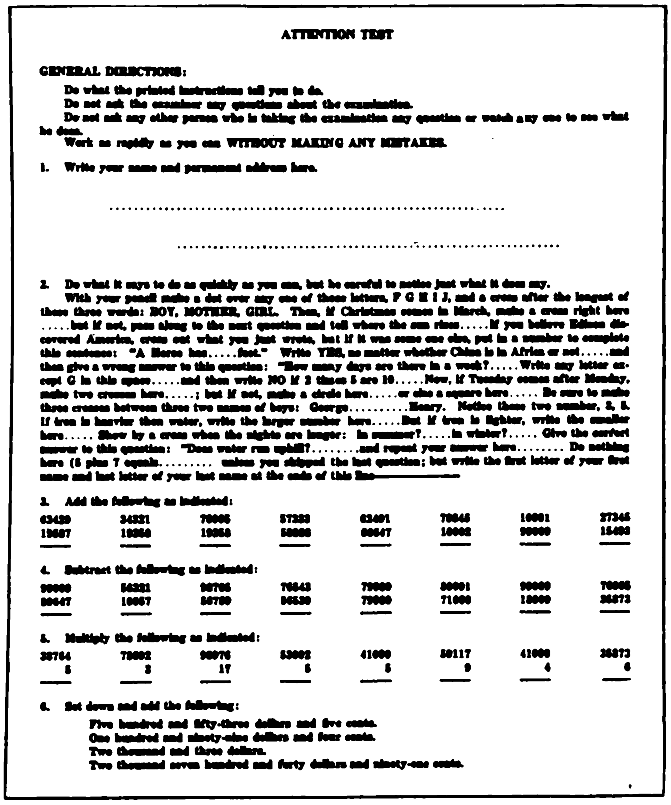
A pavement laid in this manner is durable if the bricks have been properly burnt and inspected for hardness. It is also a comparatively smooth pavement, as all joints and inequalities of brick are filled with cement grout when the same is brushed into it. Further, it is a pavement which will withstand considerable rail vibration as the wearing surface is cemented to the bed and the paving base.

Whenever the requirements are such that a sheet pavement of any of the various types must be laid between the rails, courses of brick or wood block should be laid alongside of the rails prior to the application of the sheet pavement. These blocks are subjected to unusual loads during the construction of the sheet paving, as the steam roller used in rolling the sheet pavement must necessarily go over the blocks. In most cases the blocks have been laid but a short time before the application of the roller, and usually the roller breaks the initial bond between the blocks and their bed. The blocks or brick should be laid on a stiff mortar and "shoved" into place and to grade in the same manner in which "shoved" joints are made on brick work. If conditions permit, they should be put in place at least two weeks before the application of the sheet pavement. Even then there will be many failures due to the action of the roller.

Scientific Selection of Employees

In the last issue of this paper an abstract was published of the paper on "Scientific Selection of Employees," by P. W. Gerhardt, superintendent of transportation Dallas Consolidated Electric Street Railway, read at the Galveston meeting of the Southwestern Electrical & Gas Association last week. In that paper Mr. Gerhardt referred to three tests given to prospective employees. These tests were termed, respectively, attention test, observation test and judgment test. The accompanying illustration shows the printed question blank used in the attention test.

In his account of this test, Mr. Gerhardt said that Questions 1 and 2 are in the way of catch questions and require the closest attention of the applicant. Questions 3, 4, 5 and 6 are arithmetical questions. The applicant is timed with a stop watch to determine how long he takes to answer these questions, and the number of



ATTENTION TEST

GENERAL DIRECTIONS:

Do what the printed instructions tell you to do.

Do not ask the examiner any questions about the examination.

Do not ask any other person who is taking the examination any question or watch any one to see what he does.

Work as rapidly as you can WITHOUT MAKING ANY MISTAKES.

1. Write your name and permanent address here.

....

....

2. Do what it says to do as quickly as you can, but be careful to notice just what it does say.

With your pencil make a dot over any one of these letters, F G H I J, and a cross after the longest of these three words: BOY, MOTHER, GIRL. Then, if Christmas comes in March, make a cross right here ......but if not, pass along to the next question and tell where the sun rises......If you believe Edison discovered America, cross out what you just wrote, but if it was some one else, put in a number to complete this sentence: "A Horse has.....feet." Write YES, no matter whether China is in Africa or not.....and then give a wrong answer to this question: "How many days are there in a week?.....Write any letter except G in this space.....and then write NO if 2 times 5 are 10.....Now, if Tuesday comes after Monday, make two crosses here.....; but if not, make a circle here.....or else a square here..... Be sure to make three crosses between these two names of boys: George..........Henry. Notice these two number, 3, 5. If iron is heavier than water, write the larger number here.....But if iron is lighter, write the smaller here..... Show by a cross when the nights are longer: In summer?.....In winter?..... Give the correct answer to this question: "Does water run uphill?.........and repeat your answer here......... Do nothing here (5 plus 7 equals......... unless you skipped the last question; but write the first letter of your first name and last letter of your last name at the ends of this line——————

3. Add the following as indicated:

63420	34221	70005	57233	62401	70645	10001	27345
19567	19358	19358	50000	66547	10002	90000	15403

4. Subtract the following as indicated:

90000	54221	98765	76543	79000	80001	90000	70005
89647	10057	56789	56530	79000	71000	18000	35873

5. Multiply the following as indicated:

38764	78002	98976	53002	41000	80117	41000	35873
5	3	17	5	5	9	4	6

6. Set down and add the following:

Five hundred and fifty-three dollars and five cents.
One hundred and ninety-nine dollars and four cents.
Two thousand and three dollars.
Two thousand seven hundred and forty dollars and ninety-one cents.

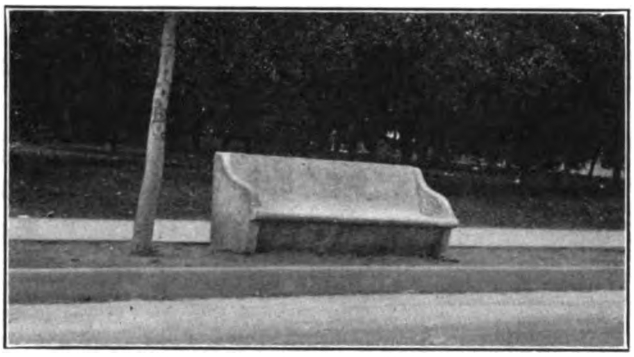
ATTENTION TEST BLANK USED IN SELECTION OF EMPLOYEES

omissions and errors are counted. He added: "This test is given but once, as its effectiveness depends wholly upon its novelty. The object of this test is to determine the applicant's ability to receive instructions and to do as he is told to do. How often do accidents occur due to the trainman's neglect or misunderstanding of a rule or bulletin? If by so simple a test we can decrease the chances of such accidents, is not the effort well worth while?"

Attractive Waiting Stations

Serviceable but Inexpensive Shelters and Resting Places for Patrons Have Been Erected by California Electric Railways

ALONG the electric roads of southern California, especially in the districts between cities, many small but artistic and serviceable waiting stations have recently made their appearance. Typical stations are shown in the accompanying illustrations. Although attractive, these stations are of a sufficiently inexpensive nature to permit the companies to erect them in sparsely settled sections, as well as in those communities which are thickly built up. Generally all the stations situated between two large cities are constructed from the same general design and of the same materials, thus reducing the cost of erection and at the same time allowing the station to give to the stretch of road a certain individuality.

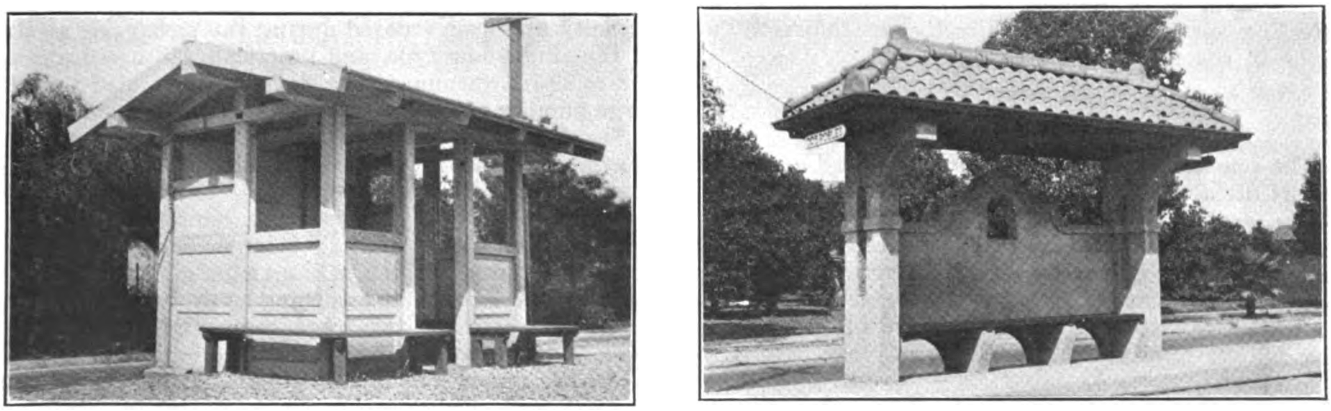


CONCRETE BENCH FOR NEAR-SIDE CROSSINGS

One of the illustrations shows an attractive open-air shelter finished in Spanish style. This structure is about 15 ft. long, and its open side is turned toward the tracks, from which it is removed a safe distance. The roof is covered with regular red Spanish tiling, which contrasts tastefully with the light exterior of the main section. The back, the ends and the chief braces are made solid of concrete, with an exterior finish of stucco. The seats consist of a 2-in. x 12-in. plank. About thirty of these stations are located between Los Angeles and Pasadena.

A serviceable bungalow type of waiting station also is shown. This has a semi-closed room, 8 ft. x 10 ft. The uprights for this station are 6-in. x 6-in. posts, between which concrete has been poured to form slabs. These slabs, which are 4 in. thick, have been given a panel effect. There are benches both inside and outside this station, which is sufficiently open for the comfort of those waiting for trains during summer, while at the same time it furnishes ample protection from the winter rain. The roof of this little structure is shingled.

A series of about thirty all-concrete benches, of the type shown in another illustration, have been erected along the line of the interurban railway entering Alhambra, which occupies the central strip of that city's leading thoroughfare. This series extends from city to city limit. The benches are located at both near sides of every crossing. They are about 10 ft. long, and are comfortably shaped. They are not polished. The end, back, seat and front are about 4 in. in thickness.



ATTRACTIVE SHELTER AND BUNGALOW TYPES OF WAITING STATIONS

N. E. L. A. Holds Annual Meeting

Association Considers Change in Name to Indicate Expanding Scope—Has Eye on Railway Power Business—At Three Profitable Technical Sessions Reports of Value to Railway Men Were Discussed

THE National Electric Light Association held its thirty-ninth convention this week in Chicago, the eighth in that city. The convention began with a reception on Monday evening, May 22, and the sessions were held from May 23 to May 26 inclusive. The headquarters were in the Auditorium Theater and the meetings were held in the Congress and Auditorium Hotels. The stage and orchestra of the theater were floored over to furnish space for exhibit booths, which also occupied the foyers.

In his presidential address delivered on Tuesday, E. W. Lloyd, Commonwealth Edison Company, Chicago, Ill., traced the progress of the industry in its several fields and in the stability of electrical securities. He outlined changes in the constitution and by-laws to provide for the welfare of geographical sections, and urged the change of name of the association to one more nearly indicative of the scope of its work, as was suggested by Frank J. Sprague.

Reporting for the public policy committee, he referred to the numerous meetings held during the year, and especially to the February and April conferences, called to discuss valuation, depreciation, federal legislation affecting water powers, and other important topics. As a result the appointment of a committee was recommended for the following purposes, to be made up of operators, engineers, accountants and lawyers, having experience in valuation work, to formulate a program for:

"(*a*) Establishing such relations with the valuation committee of the Interstate Commerce Commission as may be desirable properly to co-ordinate the valuation of other public utilities with that of steam railroads;

"(*b*) Agreeing as far as it may be possible to do so upon a terminology to be used in making appraisals of public utility properties;

"(*c*) Prescribing as far as may be possible to do so standard methods of appraisal;

"(*d*) Studying the records and decisions of adjudicated cases for the guidance of utilities in the preparation and presentation of future cases; and

"(*e*) Considering the desirability of joint consideration of the subjects embraced within this resolution with other public utility associations."

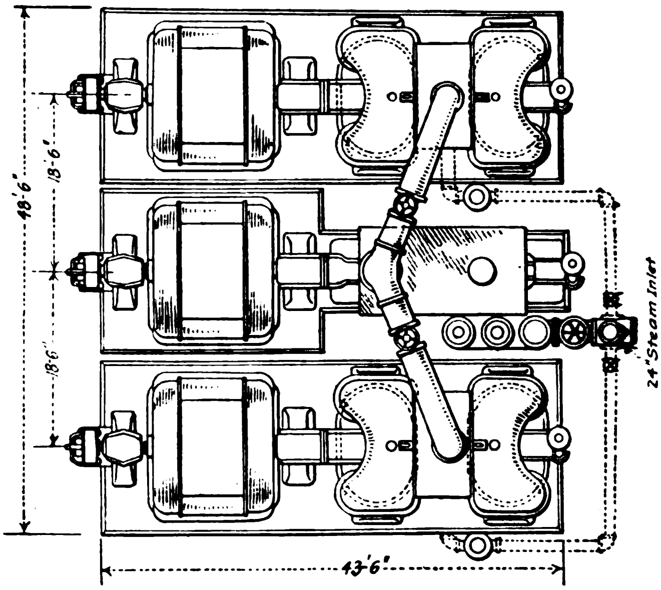
Abstracts of a number of the important reports affecting electric railways directly or indirectly are given in the following paragraphs.

Prime Movers

The committee on prime movers presented a 179-page report divided into three sections respectively on steam power, water power and gas power, and several appendices. It contained general studies by the committee, articles by specialists in a number of fields, statements from manufacturers as to the developments in their respective fields, and a complete bibliography on the subject of prime movers for the year covered by the report.

In introducing the report the committee stated that in steam power the feature of the past year was the phenomenal increase in the size of steam turbines and the large number of orders placed with manufacturers. Condenser development has kept pace with the turbines, and the size of the boiler unit is increasing. There is also agitation for a much higher steam pressure. In the field of internal combustion engines there is at present little or no activity in gas engine and gas producer work for power purposes, but the development of the heavy oil engine is very active. The power obtained from one cylinder in a heavy oil engine remains, however, comparatively small.

On the subject of Curtis steam turbines, the General Electric Company stated that in the larger sizes, the turbines under construction are designed to operate on steam pressures of from 200 to 300 lb. gage, and plans are now being considered for turbines for approximately 500-lb. gage. There is on order a 60-cycle machine of a capacity of 50,000 kva.-amp. comprising a single turbine of single-flow design direct-connected to a single generator. Of forty-five turbines of 10,000-kw. capacity and over ordered during the past year, all are of the single-flow type, and practically all are designed for a 29-in. vacuum. The company has also built a large number of geared turbines for driving generators.



THREE-UNIT, 60,000-KW. STEAM TURBINE FOR INTERBOROUGH RAPID TRANSIT COMPANY

The Westinghouse Electric & Manufacturing Company stated that the turbine manufacturers, by dividing the units into two or more elements, can meet practically any requirement as the size of a complete unit. The arrangement may be a single cylinder and a single generator, a tandem turbine with a single generator, a two-cylinder cross-compound turbine with two generators, or a three-cylinder two-stage compound turbine with three generators. The last-named arrangement is shown in the accompanying illustration of the 60,000-kw. unit under construction for the Interborough Rapid Transit Company, New York City.

The first arrangement has been used in sizes up to

35,000 kw. It represents the lowest initial cost but not the highest efficiency. Turbines of the second type have been sold up to or slightly above 35,000 kw. Its highest efficiency point is at a larger load and somewhat higher than in the first type, and its range of efficiency is quite a little better. The limiting condition of this type is the generator. The cross-compound principle conduces to reliability and simplicity of operation, as well as to economy. Among other advantages of the three-element type are these: The low-pressure elements and their exhaust chambers are smaller; the inlet pressure to the low-pressure element is higher, permitting the use of smaller connecting pipes, and if one of the low-pressure cylinders is operated alone on high-pressure steam, the steam consumption will not be intolerable for an emergency condition of operation. With the three-cylinder scheme, the highest economies commensurate with the largest size of turbine are obtainable, and at the same time there is a degree of flexibility due to possible operation of the individual elements separately. The Westinghouse Company has also been successful with geared units, and reported satisfactory performance of a 1000-kw. unit placed in operation at the plant of the San Diego Electric Railway in 1911.

UP-TO-DATE INFORMATION ON CONDENSERS

The committee's report gave much attention to condensers, although test results of the recently installed large condensers were not available. However, the performance of these condensers was stated to be satisfactory. The Westinghouse Company stated that the preponderance of sales is in favor of surface condensers, but, as there are many places where the up-keep of these is prohibitive, many important sales of jet condensers are being made. A jet condenser for a 45,000-kw. turbine is on order. A year ago a jet condenser of this size would hardly have been considered feasible. This company mentions the "heat balance" condenser, a jet condenser driven by both a turbine and an electric motor. This was designed primarily for plants having a fluctuating load where a single turbine would, at light loads, supply an overabundance of heat for feed water. During such periods the electric motor comes into use, the steam turbine being used only when its exhaust steam is required for heating feed water. The Wheeler Condenser & Engineering Company described a similar arrangement.

The Wheeler Company stated that all plants are not selecting turbo air pumps for surface condensers, the dry vacuum pump being preferred in many cases. According to this company, there are two schools of auxiliary design; one embodying the high-speed, turbine-driven air and circulating pump, the other the reciprocating-type pump and low-speed circulating pump. The latter makes a complete, self-contained unit of low steam consumption and low speed. The Henry R. Worthington Company reported that the arrangement of condenser tubes providing special lanes has resulted in a fairly equal distribution of work in the different classes of its surface condensers, and an evenness of pressure that would have been considered impossible even two or three years ago. In fact, the total loss through the condenser from the vapor opening at the suction of the vacuum pump to the exhaust nozzle has been reduced to hundredths of an inch. The two-stage rotative dry vacuum pump has proved highly satisfactory due to the entire neutralization of clearance, the prevention of air leakage into the first stage, the confining of any re-expansion of vapors to the second stage, and the addition of a set of valves interposed between the condenser and the atmosphere. The company also reported the results of tests on the effect of air leakage upon condenser efficiency, but did not discuss these. In addition, it brought out the fact that it is possible greatly to modify the condensate temperature by manipulation of the circulating water during the cold winter months. Actual tests have shown the possibility of varying this temperature through wide ranges with practically no variation in the vacuum carried. Pumping an excessive quantity of water, resulting in the additional cooling of the condensate, is accomplished at an excessive increase in power and auxiliary steam consumption. While it may be possible to utilize a part of the excess exhaust in heating the feed, it should be possible easily to maintain a condensate at a satisfactory temperature without the use of a heater, where the non-condensible vapors and the condensate are withdrawn separately from the condenser.

Regarding condenser tubes, the committee reported that, after correspondence with some twenty companies on this subject, it appeared that, of those purchasing tubes under specifications, the majority use a form based on the specification of the United States Navy. Of the remaining companies, the majority use "admiralty" mixture, a marked improvement being shown in some cases where a change has been made to this mixture. The Detroit Edison Company has found that for use with fresh water the following mixture has proved to have the longest life: Copper, 70 per cent; zinc, 30 per cent; tin, none; lead, under 0.01 per cent, iron under 0.075 per cent. The committee described the process for sand-blasting condenser tubes, and gave a drawing of the apparatus, which is very simple. A quart of sand can be driven through a tube in twenty seconds, and one operator can clean from 100 to 120 tubes per hour.

HIGHER BOILER PRESSURE COMING

The committee presented a resolution requesting that the A. S. M. E. take action on the rational rating of steam boilers. In introducing the subject of higher steam pressure for boilers, the committee presented a paper by Robert Cramer showing the possibilities of higher pressure. In commenting on the paper the committee drew attention to the fact that there are many practical features to be considered in the utilization of pressures in excess of present high-pressure practice, namely: Radical departure from standard boiler design, boiler losses resulting from higher flue temperatures; design of economizers to meet extreme pressure conditions; design and construction of pipe-line fittings and valves; finding suitable materials, not now known, for turbine blading to prevent erosion due to moisture contents in steam, and materially higher installation costs and the ever-present fixed charge on the investment.

In response to a query from the committee, the Babcock & Wilcox Company stated that gage pressures from 200 to 225 lb. at the boiler, with a superheat of 150 deg. Fahr. may be said to be average present practice in power station boiler plants. Recent developments in turbine and engine design make higher thermal and consequent over-all station efficiencies available by the use of higher pressures and degrees of superheat. The company has in course of construction a number of large boiler units for 350 lb. working pressure with 250 deg. superheat. Recent inquiries from customers regarding boilers for 500 to 600 lb. pressure with superheat up to 700 deg. Fahr. have prompted the making of a series of experiments which, while not yet completed, already demonstrate that if the demand for such a boiler is large enough, it can be manufactured and turned out as standard commercial apparatus. For 350 lb. working pressure the cost of the largest-sized units would probably be about 20 per cent more than for boilers of present standards. The question seems to be whether 500 or 600 lb. pressure with a practical limit of 700 deg. Fahr. temperature will, as compared with 350 lb. working pressure and 700 deg. Fahr. temperature sufficiently increase over-all station efficiencies to compensate for the difficulties incident to the higher pressure. In assuming 700 deg. Fahr. as the practical limit of steam temperature, the problems to be solved are entirely outside of the boiler and furnace. The company states that Sargent & Lundy of Chicago, Ill., are building a station in Wheeling, W. Va., for 350 lb. pressure, using B. & W. boilers and General Electric turbines.

CLINKERING OF COAL FURNISHES LIVE PROBLEMS

Coming to the subject of fuels and furnaces, the committee first took up the subject of fuel oil, which was considered from the standpoint of continuity of supply, cost, and facility for storing. In the East, the only fuel oil available is Mexican oil, of which four barrels are equivalent to one ton of coal. At the present price of $1 per barrel, oil cannot compete with coal. Moreover, the price of oil fluctuates widely and oil companies are not inclined to make a price which will hold long. The only safe way to store quantities of oil is in tanks underground, or largely so, and even then the fire hazard is considerable.

The next subject taken up was the clinkering of coal in its relation to stoking. J. P. Sparrow showed that coals having an ash fusion temperature above 2500 deg. Fahr. are practically free from clinker trouble. The critical clinkering point for the Taylor stoker lies between 2400 and 2500 deg. He stated that chain-grate stokers can burn, without serious clinker trouble, coal the ash of which fuses as low as 2000 deg. Fahr., and probably considerably lower. With underfeed and overfeed stokers and hand-fired grates the critical fusion temperature is about the same as that given above. Overfeed types of stokers, in which the incandescent fuel is in close contact with the grate bars, cannot successfully burn coals as high in pyrites as the underfeed stokers on account of the corrosive action of pyrites on the iron grate-bars. The committee then gave details of methods for sampling coal and for determining ash fusion temperatures, the latter subject being gone into in great detail.

STOKER MANUFACTURERS PROGRESSING WITH SELF-DUMPING FEATURE

In the matter of stokers, the committee presented reports from several stoker manufacturers. The Westinghouse Company stated that it had been found necessary to have three types of stokers; underfeed, Roney and chain grate, in order to fit all conditions. The Sanford-Riley Stoker Company, Ltd., reported that its self-dumping underfeed stoker has demonstrated the soundness of the principle of using moving retort sides. This feature was developed to slice the fuel bed and eliminate the possibility of fixed clinkers over the tuyeres. One of the chief aims in educating operators is to have them keep a comparatively dirty fire at the lower end of the stoker, the only troubles with ash plates having been due to carrying a green fire too far down in the stoker. This company finds a tendency in the direction of large stoker units, it having now in operation four stokers of sixteen retorts each. It is building ten stokers of fifteen retorts each to be installed under five boilers, making thirty retorts per furnace. The company's observations show that, so far as combustion efficiency is concerned, it is good practice to provide the greatest possible retort capacity. The combustion efficiency is inversely proportional to the speed of the fuel through the stoker.

The American Engineering Company reported improvements in the Taylor stoker dump plate. The company is now equipping the Taylor stoker with a power-operated dump grate, employing a steam cylinder for the purpose. A complete dump can be made with the power operated dump plate in from five to six seconds. The scheme for continuous ash disposal installed in the plant of the Detroit Edison Company is satisfactory, but it requires more space than is ordinarily found in power stations. It does not have the degree of flexibility desirable in power stations with widely fluctuating loads and high peaks, and it requires more time to start up a boiler from the unlighted condition, because the ash pocket must be filled with ashes before any considerable load can be put on the boiler.

FURNACE BRICK WORK FOR HIGH TEMPERATURES

The effects of the present higher temperatures on boiler brick work were discussed by the committee, and the means available for reducing damage were mentioned. The cooling of certain parts of the brick faces exposed to the fire is contrary to the basic principle of furnace efficiency and capacity, and has been generally discarded. A number of classes of firebrick have been developed, but experience has shown that fire-clay brick best fulfills the requirements of infusibility, absence of shrinking or deformation, strength, and resistance to vapor and slag penetration. The silica-alumina mixture is preferable to the silica-kaolin mixture. Firebrick must be of uniform size and true in shape so that perfect joints can be made, and a good quality of fire clay must be used in laying the brick. For side walls and other parts of the furnace where slag is most apt to collect, the brick must be sufficiently hard and strong to resist not only abrasion, but the chipping or slicing action due to the removal of the slag by manual labor. In general, the firebrick manufacturers have not kept pace with the development of boiler and furnace construction and operation.

WATER POWER

The committee reported that the past year had been notable for inactivity in the promotion of low-head hydroelectric generating stations, which was partly accounted for by the decreasing cost of electrical energy generated in large modern steam stations. There has been some activity in the replacement of low and moderate head units of old design and lower efficiency by modern wheels. Due to the improvements made in thrust bearings, the vertical type of wheel is giving excellent results. There is also a strong tendency toward increased simplicity and better design of water wheel auxiliaries.

The usefulness of water from an economic standpoint depends on the cost of development, including transmission lines, and the cost of fuel at some point contiguous to the market which is to be served. The cost of delivered power from the largest and most favorably located hydroelectric development is little if any less than the cost of steam power from the larger modern steam plants if the cost of fuel is not excessive. Within the past few years there has been a marked improvement in the reliability of the modern hydroelectric station.

The committee presented a resolution to the effect that the association should bring to the attention of the appropriate national engineering societies the present lack of a standard method of determining the head on water wheels under test when set in spiral casings, closed or open flume, and requested that these societies recommend a method of determining this measurement, which can be adopted as standard.

Central Station Power for Railways

A committee appointed about three months ago on energy supply for electrification of steam roads presented a report in which, among other things, a change in the name of the association to give recognition to the widespread use of electricity was recommended. The report stated that enough examples of power supply to railways by power companies have been made to demonstrate that such procedure is of great benefit to both parties and to the public. The railway company is a distributer of people and goods, whereas the electric power company is a distributer of electrical energy. The two types of utility represent distinct and specialized functions. In some cases railways which formerly generated power spent much effort in reducing the cost of production, whereas now, as purchasers, they concentrate their efforts in preventing waste of power. In Chicago, the entire power requirements of the electric railways are being furnished by the central power company, which during 1915 supplied 680,112,000 kw.-hr. at an annual load factor of 41 per cent. Economies result from the diversity of load and from the use of substations for supplying power to more than one railway and for lighting purposes. The census report for 1912 stated that one-third of all power used by electric railways was purchased, and the committee estimated that at present the ratio is one-half and increasing rapidly.

PREPARING TO HANDLE RAILWAY POWER BUSINESS

If the central power company desires to supply the electrified steam railroad with power ten or more years hence, it should begin at once to plan for that possible supply. The best way to prepare is to supply the street and interurban railway power. In general, the central power company can most economically attend to the production, transmission and conversion of such power up to the point of delivery in the substation to the outgoing railway feeders. In cities where the street railways are supplying their own power at present, it will not be many years before their facilities become inadequate and then the central power company should, as a matter of broad economics, supply the power. In the present state of the industry, it is not a very difficult matter to supply power for the electrification of terminals in large cities from extensions to existing central power systems.

In the case of main line divisions hundreds of miles in length, another problem arises in the sale of purchase of power except in those rare cases where one single power company already owns and operates all electric power plants along an entire railroad division, and also owns and operates an interconnecting high-voltage transmission line along or near such railroad's right-of-way. In the case of the Chicago, Milwaukee & St. Paul Railway, the Montana Power Company had lined up a sufficient number of interconnected power plants to be able to deliver electrical energy to the railroad at various points along the entire 437 miles of electrification. In the electrification of divisions of railroads, either power plants will have to be similarly interconnected for long distances paralleling railroads, by the central power companies getting together themselves, or else the steam railroads will have to build such high-voltage transmission systems.

A feature that will have considerable influence in deciding between electric power supply for electrified divisions for power stations operated by the railroad company and power service from the central power company is the reduction in the capital requirements for electrification. It is generally recognized that the supply of power to any community for light, street railway and industrial uses should centralize to avoid duplication of investment and to serve the best interests of the public generally. The supply of power for the electrification of steam railroads should form no exception to this rule.

In a paper on the same subject, Fred. Darlington, consulting engineer, New York, stated that power systems should be operated as monopolies to avoid splitting up generating plants and duplicating transmission lines. This means that they will be operated under government regulation. Liberal laws should provide for the utmost extension of unified systems, not only with intrastate, but with interstate connections. Increased size of generating units, which is the result of unification and of taking on new loads, secures better economy for central generating plants and reduces the cost of power. The best means for railroads to secure electric energy for motive power is to buy it from large public service electric plants, rather than to make it in smaller plants of their own. This is also in accord with a generally recognized principle that it is undesirable for railroads to engage in business foreign to their work as common carriers. As indicating the extent of this field, Mr. Darlington stated that there are about 65,000 steam locomotives in service in the United States of an aggregate capacity between 50,000,000 and 60,000,000 hp. These in 1914 consumed 150,000,000 tons of coal, costing $243,500,000.

He expressed the opinion, further, that the rapid extension of unified electric power systems weighs heavily in determining railroad electrification methods. Every increase in the size and scope of transmission systems and their connected generating plants has reduced the cost of electric power. In most instances the main transmission lines of the power system follow the general direction of the steam railroads, and in several instances the availabilty of central station power has been a determining factor in heavy railroad electrification. Undoubtedly the prospects of further steam railroad electrification are quite as much advanced by the extension of electric power transmission systems as by the improvements in railroad electrification apparatus.

East River Subway Tunnel Inspection

Engineers of the Public Service Commission for the First District of New York have just reported the result of an inspection of the south tube of the Battery-Joralemon Street subway tunnel under the East River to Brooklyn. The inspection was made to ascertain the extent of change, if any, in the position of the tube since the time of its completion in 1908. Careful observations were made, and it was found that during the period of eight years in which this tube has been in daily operation there has been absolutely no settlement. Other observations showed that there had been no movement whatever in a lateral direction. Examination of the lining of the tube showed that the leakage, which has always been slight, has materially decreased during the period of operation. The engineers will make a similar inspection of the north tube of the same tunnel within a short time.

A tabular statement which has been prepared in connection with the electric train service between Manchester and Bury, recently placed in operation, shows that the electric systems cut down the time of the journey substantially. By steam train the journey from Manchester to Bury, with stops, is shown as taking thirty-two minutes as compared with twenty-four minutes on the electric service. From Bury to Manchester the time by steam train is twenty-nine minutes as against twenty-two minutes by electric train.

Illinois Decision on Valuation

In Springfield Gas & Electric Case the Commission Looks Upon Original Cost as a Very Important Factor—Discusses Paving Allowances, Overhead Charges, Going Value, Depreciation and Rate of Return

THE Illinois Public Utilities Commission recently handed down a decision in Case 2138, City of Springfield *vs.* Springfield Gas & Electric Company, which is probably the most important decision in rate-making and valuation procedure yet delivered by this comparatively young commission. The Springfield Gas & Electric Company is owned by the Springfield Railway & Light Company, Springfield, Ill., one of the Hodenpyl, Hardy & Company properties. In its order the commission, among other things, discusses at considerable length the subjects of methods of valuation, paving allowances, overhead charges, depreciation, going value, the rate of return and procedure expenses. It fixes 7 per cent per annum as a reasonable rate of return upon an $800,000 valuation, and on this basis orders a reduction from $1 to 80 cents per 1000 cu. ft. of gas. The company has taken an appeal to the Circuit Court of Sangamon County.

VARIOUS APPRAISALS SUBMITTED

In the case before the Illinois Public Service Commission five different appraisals were submitted and recorded at the sixty-two hearings held in the matter. Two of the appraisals were by the city, two by the company and one by the commission. The valuations of most of the experts were appraisals of essentially the same inventory, prepared by the company's employees and field-checked by the commission's engineers. The appraisers, however, used various methods of determining their valuations, and no two followed identical theories. One of the city appraisers used as the basis of valuation the cost at which property of an equivalent effectiveness or capacity could be installed, the reproduction cost new of $715,852 of such an equivalent plant at present-day prices being depreciated in accordance with its age to give a present value of $547,448. This engineer advocated the use of prices current at the date of valuation, without any deviation tending toward an average of fluctuating prices on certain classes of material and labor. The other city appraiser prepared a valuation based upon data obtained from the company's books. He applied unit prices to the entire distribution system (about 50 per cent of the property) and lumped the other items into large classifications to which book prices and data were applied. He then depreciated his book value of $765,172 in accordance with life tables, supplemented with some actual inspection of equipment, and thus established a present value of $588,262.

One of the company's appraisers used as the basis of valuation the cost of reproducing the property under present-day conditions at present-day prices, average prices for the last six years being used on fluctuating material and labor. The result was a reproduction cost of $1,074,856. Depreciation was determined from actual inspection wherever possible, and otherwise from age and assumed life, and in this case the present value figure was $898,785. The other company engineer made his valuation upon the cost of reconstructing anew the existing system under the identical conditions which obtained at the time of original installation, the prices being the current market quotations of the date of valuation, modified by five-year average prices on fluctuating material and labor. Under this method the cost new totaled $1,075,304. The depreciation was determined in a manner quite similar to that of the other company engineer, and the present value result was $940,988.

The commission engineer based his valuation upon the original cost of the system at the time of the installation of the various items composing the aggregate property to-day, and where exact costs of some items were not obtainable from the company's records, he estimated the cost of similar items installed under similar circumstances as of the time of the actual installation. The total original cost thus determined was $953,988. After figuring the depreciation from an actual inspection of the visible property and from life tables and experience where the property could not be inspected, the commission appraiser found a present value of $806,404.

CRITICISMS BY THE COMMISSION

Thus the company's figures were the highest, the city's the lowest, and the commission's intermediate. In general, the company's experts employed the reproduction method of valuing the duplicated property, whereas the city's experts used either the reproductive equivalent-plant method or the book-cost method, and the commission engineer employed the original-cost method. In fixing the present value of the property at $800,000, the commission does not adopt any particular one of these valuation plans, for in its opinion no theory has been developed to a stage where it may be regarded as the panacea for all rate-making ills, and the courts have been extremely cautious in committing the judiciary to one method or another.

In commenting upon the various theories, however, the commission remarks that, as between duplication of identical equipment in a wholesale manner and reproduction of service through the creation of a modern equivalent plant, the latter avoids the principal fallacy of the reproduction-new theory. Furthermore, in its opinion it is worthy of note that the trend of rate regulation indicates more and more weight to be given by both courts and commissions to a careful and reasonable application of the equivalent-plant theory. Moreover, the commission criticises the reproduction of identical plant under past conditions at present prices as being a hybrid method, the application following the original-cost method as regards piecemeal construction and sequence of operations but the reproduction method in the use of present-day prices. If the reproduction method is to be utilized as a guide to value, the commission says, a reasonable application of the theory is to be expected. Viewed thus, a reasonable reproduction theory contemplates the duplication of the existing plant in a wholesale manner at present-day prices.

In general, the commission holds that the reproduction method, whether of identical plant or of service, is open to criticism upon the ground of unstableness, for valuations on such bases reflect the dictates of a particular date. With changes in prices, particularly the general increasing trend of prices, the valuations must change accordingly. On the other hand, the commission notes that the book-cost valuation of one city engineer and the original-cost valuation of the commission engineer are attempts to reach facts in existence, rather than to derive values based upon some theoretical premise. These two valuations, therefore, are more stable than the others in so far as prices are founded upon facts in the records of the company and are not subject to theoretical fluctuations. The commission engineer, in particular, appraised a carefully prepared and painstakingly compiled inventory and based his appraisal (except overheads) upon actual cost figures secured as far as possible from the company's books and records, and in the absence of actual records of original cost he estimated the cost of construction as of the time of installation. Hence the unit costs used by him are said to reflect quite exactly the extra cost of piecemeal construction for which counsel for the company vigorously contended. Finally, the commission states as noteworthy the fact that Halford Erickson, as chairman of the Wisconsin Railroad Commission, after years of experience volunteers the opinion that "original cost of existing property can be had with even greater accuracy than the cost of reproduction." In short, therefore, while the Illinois commission will not consider any one valuation method to the exclusion of all others, the present decision seems clearly to indicate the weighty importance that it attributes to original cost as a factor in public utility valuations.

No Allowance for Undisturbed Paving

One of the first debated questions that arose in the present case was in connection with an allowance for undisturbed paving. On this point the commission holds that paving actually cut and properly replaced in the installation of service is an element to be reasonably valued in a rate inquiry, but it dismisses paving not actually cut and replaced with the following words:

"Undisturbed paving, despite the claims of certain advocates of reproduction-cost-new theories, has no place in the case at bar. No legitimate reason can possibly exist for demanding that the public, after having improved its city streets at great expense, should pay a higher unit price for service owing to the fact that the pavement, which is the property of the public itself and not owned by the utility, possesses value. This and similar claims often lead the reproduction theories to irreconcilable absurdities and render the same of lesser weight as evidence in valuation proceedings than would prevail either in more consistent theories or in more reasonable applications of a reproduction theory."

Only General Finding on Overhead Charges

In the matter of the usual overhead charges the gas company made extensive claims, but the commission made no direct finding other than to state that it believed the company claims to be excessive. In its opinion items of overhead usually exist in an original-cost theory, but, more often than otherwise, a large portion of such costs is reflected by the charges existing on the utility's books either in the capital or the operating accounts. Moreover, it is said to be a generally recognized fact that, in a given valuation, the overhead percentages applicable to an original-cost method are considerably lower than those applicable to a reproduction method of appraising the identical property. The commission holds its own engineer to have erred in not adhering more closely to his theory of original cost, for he evidently neglected when fixing overhead percentages to take account of portions of overheads which ordinarily could not escape being included in the original cost of many items. It refuses to sanction, however, the entire claim of the city that in the commission engineer's theory of valuation all overheads should be excluded. It is quite true that in a plant constructed in a piecemeal fashion, items for engineering, supervision, legal expense, administration, insurance, taxes, etc., are met very largely by expenditures in the operating account. In its opinion, however, there are certain items, such as interest during construction, preliminaries, legal expenses, etc., which would nowhere appear in the costs set up in the commission engineer's valuation. Such original costs as might be available from the books could not reasonably be expected to include all proper overhead charges, and for this reason it would be unjust and unfair to the company to disallow completely in this particular case the item of overheads in a valuation based on the original-cost theory. The commission, therefore, arrives at only the general conclusion that the company's and its own engineer's overhead percentages are excessive.

Depreciation Should Be Deducted

In the opinion of the commission the weight of authority compels a reasonable deduction from cost new for accrued depreciation—both physical and functional—and further requires, in equity to both consumer and utility, an identical treatment of the subject in all its phases. Owing to the mass of conflicting testimony and arguments, the commission says that it is by no means certain that the company's counsel raised the issue of total non-deduction for accrued depreciation, or merely took the position that only actual physical depreciation should be deducted. The valuations submitted by both of the company's experts embraced allowances to cover accrued depreciation under these experts' theories.

In the case at bar, the commission has decided that the company's past operations have been so successful that there can exist no doubt but that accrued depreciation has been met and paid back to the investors by the consumers. Very liberal dividends have been paid on all outstanding stock, in addition to interest and other charges which have been paid out of earnings. As to surplus funds, the record shows that the company always has been liberally provided. Ample rates, in short, have been charged and collected to cover all maintenance and operating expenses, to provide ample dividends on capital stock, and, in addition, to establish a more than adequate fund to protect any amount of accrued depreciation which may be reasonably determined by competent experts to exist in the Springfield property at the present date. In the present case the depreciation fund is represented and reflected either by past reinvestments in additions and betterments to the property or in the surplus fund—or in both. The Supreme Court (212 U. S. 424) clearly stated that no part of money raised for accrued depreciation should be added to the capital account, especially where the same has been invested in additions and betterment to the property, and from the language used in this case it obviously would be wrong to allow a rate of return upon portions of utility property constructed out of an accumulated depreciation fund. The burden is upon the utility to show that it has not collected sufficient rates to cover all accrued depreciation.

Analysis of Going Value

To measure the element of going value, the company proposed some one of the following "rules of thumb" as measures: 25 per cent of the value of the physical property; $30 for each gas consumer in Springfield, and $5 for each inhabitant of Springfield. The commission holds, however, that going value, in its commonly-accepted meaning, either may or may not exist in a given utility, and its determination in any event rests upon the facts governing a particular case and not upon such "rules of thumb" as the foregoing.

Of the array of definitions for going value, four constructions placed upon this term have been recognized more or less authoritatively, which are noted by the commission as follows:

(*a*) Going value may be interpreted to mean the mere attribute of a utility in normal action—operating, engaged in business and organized.

(*b*) Going value may be the difference between the exchange value of a utility (were it possible to sell or to purchase the same in the open market) and the present appraised value of its physical property.

(*c*) Going value has been used synonymously with "good-will," *i.e.*, the probable continual resorting of customers to the old stand.

(*d*) Going value has been defined to mean the net unrecompensed deficits sustained by a utility when operating at a loss during the very early years of its existence.

As to going value designated as "*a*" (the organization of a utility business), it is often asserted that this is to be measured by the amount expended in accounts known as "new business," "free demonstrations," "commercial expense," etc. The advocates of this theory, the commission states, usually fail to distinguish between whether or not such items as this have been met in the operating accounts, which during past years have been borne by the consumer. If the former consumers have reimbursed the utility fully for this type of expenditures, then it is obviously improper to capitalize a duplicate charge against the future generation. On the other hand, if the past revenues of the utility have been insufficient to meet fully all expenditures along these lines, the deficit unavoidably must appear in any proper compilation to determine going value by the deficit and surplus method "*d*." Moreover, going value "*a*," if loosely considered, is subject to confusion with going value "*c*" (good-will), and the dividing line between the two is by no means definite.

As for going value "*b*" (exchange differential), it may be stated that this has no place in a rate determination on account of the resulting work in a circle. In regard to going value "*c*" (good-will), the courts have established that this element has no place in the fixing of valuation for the purpose of rate-making for public service corporations. This exclusion of good-will has eliminated the use of that term in rate-making for monopolistic public utilities, but its equivalent is ever-present. Owing, no doubt, to a confusion of terms, utilities display a tendency to make claims for a capitalization of connected consumers, for a capitalization of the population served, for an intangible valuation of a business organization occupied in serving the public and for other elements of exchange value—all in lieu of a now obsolete application of a good-will element to monopolistic public utility property. Utilities are likely, moreover, to confuse this good-will point of view of going value to mean the attributes of model operation and management, and to claim value in the capital accounts for features which, so far as charges to consumers are concerned, should be considered with more logical propriety in the rate of return. In this connection claim is often made for exceptionally competent supervision, but this, like incompetent supervision, cannot be regarded as an element of capital value. Proper reward for competent management is to be secured through adjustment of the rate of return.

In discussing going value "*d*" (accrued deficits in early operations), the commission recites the development of this method of establishing going value by the Wisconsin Railroad Commission, and mentions the common criticism that this method unavoidably rewards past inefficiencies of management and design. The commission notes that some modifications of the Wisconsin method have been suggested to it in rate-making and security-issuance cases, but that, in applying the methods, many of the experts are prone to err in an improper disposition of estimated depreciation. In other words, few appraisers, in computing going value, will give the same consideration to depreciation in the capital account that the identical subject receives in the annual operating expenses. When depreciation is consistently treated at every point, the commission avers, many a fanciful going-value table is changed from a net deficit to a net surplus. Under the Wisconsin method, according to the commission, two courses to pursue in the treatment of depreciation in its relation to going value are open. (1) For each annual charge to cover depreciation, the capital account should be reduced by the identical amount charged against depreciation, taking into consideration, of course, that plant extensions and betterments should be added progressively to the capital account. (2) If the computer is insistent that the original capital charge must be preserved, the going-value table should be made sufficiently comprehensive to include the depreciation fund which is being accumulated through the medium of annual charges, and this depreciation fund must be credited with its earnings.

Closely allied with the deficit-and-surplus method of computing going value is one commonly designated as the reproduction-of-a-predetermined-income method or by some equivalent name. The method, in the commission's opinion, is purely hypothetical and conjectural, is predicated upon the assumption that going value absolutely exists in a given utility property, is subject to many varying assumptions and is susceptible to any solution which the computer may desire to attain. This reproduction method of computing going value at best is little better than guesswork, and as such is devoid of any substantial merit. Regulatory commissions, as a general rule, have repudiated this method.

Taking up the specific claims of the Springfield company for going value to the extent of $250,000, the commission observes that one of the methods used in reaching this figure falls in the classification designated as going value "*a*." The figures tabulated by the company's expert as representing expenditures made by it in the past to acquire its existing business, however, have all been paid out as past operating costs, and the commission feels that no reason can possibly exist for capitalizing such expenditures. Were they not reimbursed to the company, they would automatically appear in a correct computation of the deficit-and-surplus tables. The other two methods of the company's expert come under going value "*d*" with its reproduction variation. No comment is deemed necessary for the variation, but the commission proceeds to criticize the deficit-and-surplus tables upon several scores. The main criticism is that in spite of a high operating allowance for depreciation no effort was made to handle the depreciation consistently in connection with the capital accounts. The commission's engineer submitted a computation of going value based upon the past deficit-and-surplus method and arrived at the conclusion that the company's past operations reflected surpluses instead of deficits. The commission's general finding, therefore, is that there is no proof that the "investment necessary to organizing and establishing the business" has not "been already compensated in rates charged and collected under former ordinances," and that the past earnings would more than indicate the early losses have long been reimbursed.

In discussing the idea that some value ought to be added to a going concern over the "bare bones" of the physical structures, the commission states that when utility property is appraised by an expert for rate-making purposes, there is little doubt but that the same is valued as a living and going concern. Certain of the company's appraisers distinctly stated that they had not included any computation of going value in their valuation. In a technical sense, however, these witnesses meant no more than to say that they had not made distinct and separate calculations of going value by any of the before-mentioned methods. Consciously or unconsciously they must have appraised the property in Springfield as a living entity. Were this not so, then the only value that could be attached to the property would be the scrap or junk value of its component parts.

REWARDING GOOD MANAGEMENT THROUGH RATE OF RETURN

The question of an equitable rate of return to be allowed upon a fair value of the company's property in Springfield resolved itself into the definition: "A fair rate of return for rate-making purposes is to be measured by the average annual interest which is necessary to attract capital to invest in legitimate utility securities in the State." The weight of the evidence, the commission finds, would seem to indicate that funds usually can be secured at a figure quite close to 6 per cent per annum, from which it follows that any rate of return in excess of 6 per cent will be compensatory to the shareholders for the inherent risk in the gas-making industry.

The trend of development, however, cannot be predicted with absolute certainty, and emergencies may arise which would make it necessary to allow a utility to earn more than a nominal interest in order that additional capital might be attracted whenever necessary. Moreover, whether or not a utility in its past operations has fulfilled its duty toward the public in rendering service in an adequate and efficient manner by keeping abreast of scientific and economic development, and whether or not it has rendered service of suitable quality to its consumers and conducted its business with a view of giving to its patrons full opportunity to utilize its service to advantage, are matters to be considered with other evidence in reaching a decision as to the proper rate of return.

In other words, a utility which is excellently managed, progressive in development, alive to the public requirements, aggressive in securing new business, economical in operation, courteous to consumers and fundamentally honest in all transactions, should receive greater consideration in the fixing of a fair rate of return than should a utility of which the reverse is true. Taking into consideration all these points, the commission finds that 7 per cent per annum is a fair rate of return upon the allowed valuation, this being equivalent to approximately 15 per cent on the total money actually paid into the Springfield utility's treasury by the investors.

ALLOWANCE FOR ANNUAL DEPRECIATION

The commission has endeavored to handle the subject of depreciation for the future in a manner consistent with its treatment of depreciation in the past. In fixing upon a reasonable and an equitable annual allowance to cover future operating conditions, the commission in general leans toward a straight-line method that provides for the setting aside of equal yearly installments into a depreciation fund. To cover future accruing depreciation, both physical and functional, the commission finds that the company is entitled to an annual allowance of $15,000. The fund so accumulated should be drawn upon only for renewals and replacements of existing unamortized property and should remain intact in an individual and separate account. The fund should be subject to an annual audit by the commission's accountants and should receive full credit for all interest which it may earn. Furthermore, with the consent and approval of the regulatory body, coupled with proper and judicious utility management, a large portion of the accumulated depreciation fund either could be invested safely in readily marketable bonds or could be reinvested to advantage in extensions and betterments.

ALLOWANCE FOR PROCEDURE EXPENSES

An interesting question arose in this case as to what disposition should be made of the company's expense extraordinary of about $30,000 incurred in the rate-making procedure before the commission. The commission has decided, however, that since the date when the rate question was opened, the current rates for service in Springfield have been far more than sufficient to compensate the local utility for every reasonable item of expense (including an adequate allowance for return and depreciation), and the excess collected during this period is greater by far than the total of both the city's and the company's procedure expenses. The commission finds for the city, therefore, that no allowance is to be made to the company for its expenses in this particular case. At the present time, however, the commission is not expressing how it would rule in a case in which the facts disclosed no excess revenue to have been collected during the pendency of rate-making proceedings.

Railways Exhibit Safety Appliances

Progress in the invention of safety appliances and practices of all kinds was vividly illustrated in the exhibit of the Third National Exposition of Safety and Sanitation, held during the past week in the Grand Central Palace, New York, under the auspices of the American Museum of Safety. Advance in modern railroad safety methods formed an important feature of the exhibit, as shown both by the displays of the railroad companies and those of the manufacturers of special safety appliances. An array of photographs exhibited by the Union Traction Company of Indiana, Anderson, Ind., the winner of the Anthony N. Brady medal, illustrated the careful attention to details of safety which have contributed to this company's enviable accident record. Among the features shown by the photographs were the following: bridge crossings where the crossings at grade have been eliminated; clearings made alongside a right-of-way which was formerly obstructed by trees; stop signs on poles for speed reduction, indicating proximity of curves or railroad crossings; scaling ladder and handles on the side of cars; motormen's mirror; broad luggage racks in cars; and sanitary drinking fountains for stations and shops.

Safe practice in rapid transit subways was represented by the exhibit of the Hudson & Manhattan Railroad, which was awarded the Travelers' Insurance Company medal this year. In this exhibit the operation of the mechanical track-lever automatic stop, used on this system, was demonstrated by a miniature working model of a train of cars electrically connected to a full-size section of track on which the automatic stop was installed. Labels were posted on the track section, calling attention to such features designed to reduce accident risks, as non-inflammable jarrah wood protective board covering for the third-rail; 100-lb. guard rails with malleable-iron guard brace; screw spikes, and vitrified ducts for carrying cables. A large assortment of safety apparatus and photographs of safe and unsafe practices were also displayed at the booths of three steam railroads having electrified sections, these being the New York Central Lines, Baltimore & Ohio Railroad and Norfolk & Western Railway. All of the railroads mentioned in the above article received grand prizes for their exhibits.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Steel-Tire Removal

BY R. R. POTTER
Superintendent of Equipment New York, Westchester & Boston Railway

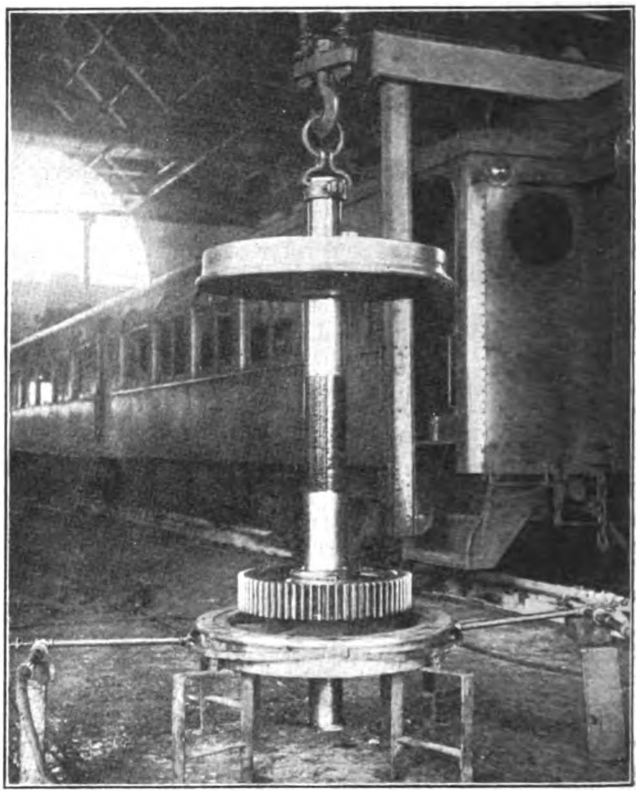
A modification of the customary method of removing and applying steel tires by the use of the gasoline or oil torch has been adopted with excellent results on the New York, Westchester & Boston Railway. The scheme involves the use of an overhead jib crane or one of the overhead, traveling type, the latter being provided in the Westchester shop, and with this the wheels are lifted and held with the axles vertical, while this work is being done. A split collar, or clamp with a bail, which is slipped over the journal end and tightened up enough to catch on the journal collar, is used to provide a ready means for attaching the crane hook. This device is used in preference to a yoke attached to the wheel spokes, because the wheel centers on the Westchester cars have an odd number of spokes and therefore do not provide a symmetrical support when the wheel set is up-ended. A symmetrical support is necessitated by the fact that a minimum amount of expansion for the tire involves such small clearances that the wheel set must hang absolutely true to enter or leave the tire without binding.

A pipe torch is used for applying heat to the tire, but this is supplied with city gas and air under compression instead of the gasoline or fuel oil customarily used, this source of supply having been found less expensive and more convenient than the others. The torch, instead of being made in a full circle of perforated gas pipe, is made in two halves each with its own supply hose, and these, together with three stands made from ½-in. x 3-in. strap iron, complete the equipment. The use of a torch made in two halves permits its ready adaptation to various sizes of tires without having to bend the gaspipe. At the same time the arrangement makes it easy to remove the torch from around the tire when a sufficient amount of heat has been applied.

When a tire is to be removed, the wheel set is upended by the crane, and is placed upon the strap-iron stands which hold the wheel-set high enough so that the end of the lower journal clears the floor. The crane is then released in case there is no other work for it to do, and the semicircular gaspipe torches are placed on blocks, so that the flame from the inner periphery of the pipe impinges on the tire, this flame being applied until the tire is loose. When a tire is being removed, the amount of heat required to loosen it is so small that it is customary to leave the crane in position, raising the wheel set slightly as the tire becomes hot, and knocking it off the center with sledges as soon as it begins to move.

When the tire is loose the crane is used to lift the wheel set, leaving the old tire on the stand, and this is removed and replaced by a new tire. To this the gas flame is applied until it has expanded enough to permit the entry of the wheel center, and the wheel set is then lifted into place and left on the stand until the new tire has shrunk into position.

The obvious advantage of this method lies in the ease of handling the various pieces involved, and in the certainty of having the tire set true on the center when the shrinkage takes place. On the Westchester cars the wheel centers are made with a collar that fits into a recess at the inside of the tire, and since the weight of the wheel set is supported on this while the tire is cooling, there is no possibility for the tire becoming skewed as it contracts, and thus having to be reheated and adjusted once more.



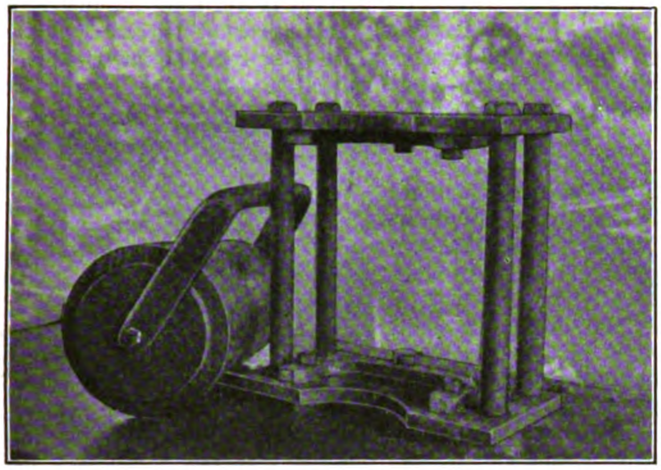
RIG FOR REMOVING STEEL TIRES IN WESTCHESTER SHOPS

Babbitting Jig Eliminates Hot Journals

BY M. F. FLATLEY
Master Mechanic Terre Haute, Indianapolis & Eastern Traction Company, Lebanon, Ind.

Accurate journal-brass babbitt linings are a very important factor in the elimination of hot journals, and when both accuracy and a reduction in labor cost can be secured by the use of inexpensive jigs, no electric railway should permit journal brasses to be neglected in this particular. The babbitting jigs and mandrels shown in the accompanying illustrations were designed for lining standard M.C.B. journal brasses and were manufactured in the shops of the Terre Haute, Indianapolis & Eastern Traction Company at Lebanon, Ind. These jigs have reduced the cost of babbitting to a minimum, and the character of workmanship has also been greatly improved by having the babbitting done by one man who has been schooled in the work and has some knowledge of metals.

The larger jig shown is used for babbitting 5-in. x

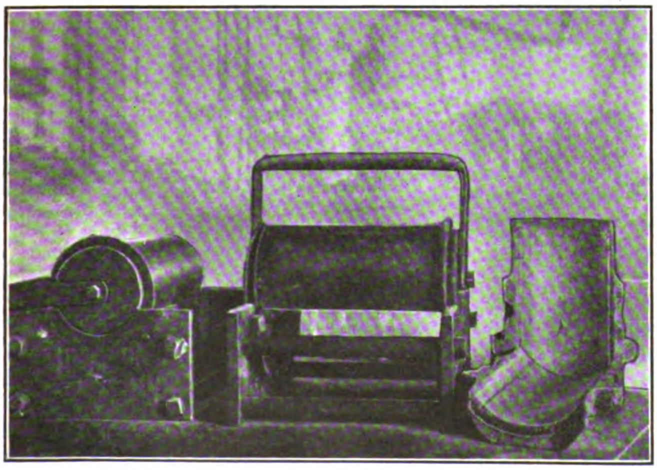


MANDREL AND FRAME FOR 5-IN. X 9-IN. BRASS

9-in. journal brasses. The frame in which the brass is placed for babbitting is substantially made and consists of steel end plates ½ in. thick, 5 in. wide and 9 in. long, separated by four ½-in. tie bolts fitted with pipe separators. These bolts clamp the frame together, and the space between the plates is made the exact length of a standard 5-in. x 9-in. brass. The steel-rests on the inside of each end plate, formed of ⅝-in. x 1-in. steel, fit the outer ends of a brass so that it is held securely in position during the babbitting process. These rests are fastened to the end plates with four ⅜-in. cap screws which pass through slotted holes, thus permitting the rest to be sprung to accommodate any slight variation in the outside dimensions of the brass.

The mandrel is 5 in. in diameter, being turned from a 6½-in. shaft. A ¾-in. fillet to correspond with the axle fillet at one end of the brass is provided, and during the babbitting process this fillet rests on one end plate and fixes the thickness of the babbitt lining. The mandrel is fitted with a steel pipe handle so fastened at its axis with ⅝-in. cap screws that the mandrel revolves. This permits the operator to pick it up when heated and place it in the jig without paying any attention to the part that comes in contact with the babbitt.

Essentially the procedure pursued in babbitting journal brasses begins with melting the babbitt from the old brasses. About 15 per cent of new babbitt is added to this old. If, after the old babbitt has been removed, the brass is found to be dirty or there is any indication that the tin might not adhere, it is carefully ground with a small carborundum wheel mounted on a flexible shaft. An acid solution is then applied after which the brass is dipped in the tinning pot, quickly removed and placed in the babbitting jig. In this position the heated mandrel is applied and the interval between the mandrel and the brass is quickly filled with babbitt. As soon as the babbitt has set, the operator may remove the finished brass and make ready for the next one.



COMPLETE JIGS FOR TWO SIZES OF BRASSES

The speed with which the babbitting process is done insures a secure bond between the babbitt and the brass, because all the work is done while the metals are hot. To obtain a good bond, however, the tinning of the brass is essential. The space between the mandrel and the brass to be babbitted is fixed so that not more than ⅛ in. of babbitt is applied in any one babbitting. To test the bond between all three metals thus applied in the babbitting process, the brass should ring clear when struck with a hammer.

Prevention of Drawbridge Accidents

BY G. B. TANIS

Trolley cars are subject to accidents at drawbridges used over rivers, due to the opening of the bridge just as the car reaches it, unless some means of killing the trolley wire before the bridge is opened is provided.

The accompanying diagram shows a foolproof method used on a number of bridges in Brooklyn to prevent such accidents, at places where the electric railway power is also used to open the bridge, for the passage of ships. Section insulators are placed in each trolley wire about 150 ft. before the bridge is reached. The trolley wires of this section are fed by a double-throw switch, the feeder being connected to the switch blade. As the trolley circuit is on one clip and the motor circuit which operates the draw is on the other, it is impossible to open the bridge without killing the trolley wires, thus preventing the operation of cars in the immediate vicinity of an open bridge.

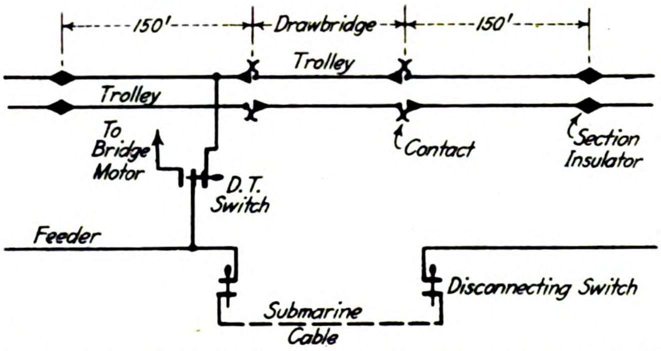


DIAGRAM OF TROLLEY AND FEEDER CIRCUITS AT DRAWBRIDGES

Car for Roadways and Tracks

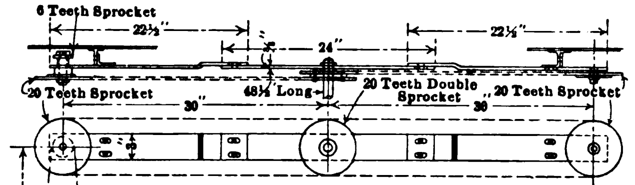
A car suitable for running on rails and also on highways has been designed by W. F. Holt, president and general manager Holton Inter Urban Railway of Redlands, Cal. It is intended primarily to compete with the jitney, and one will shortly be put in operation over the Holtonville Inter Urban Railway between El Centro and Holtville, Cal. The feature of the car is the type of wheel employed. This wheel has three tires, two of rubber for running on the highway and one of steel for running on the rails. In a patent which has recently been issued to Mr. Holt for this wheel, the steel tire is shown as between the two rubber tires and of smaller diameter, so that the rubber tires act as flanges when the car is running on an exposed rail and as tires when the car is running on the highway.

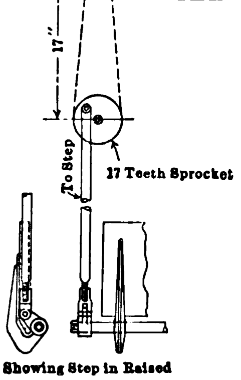
Mechanical Door and Step Operating Device for Center-Entrance Cars

BY A. TAURMAN
Superintendent of Rolling Stock Virginia Railway & Power Company, Richmond, Va.

Early in 1914 this company placed in operation a number of center-entrance cars. These were described in the issue of the ELECTRIC RAILWAY JOURNAL of May 16, 1914. After the cars had been in service for a short time a manual device for opening and closing the doors and raising and lowering the steps was devised by the writer, and this has since been applied to the cars. As the results were very satisfactory from the standpoint of maintenance cost, an application for a patent was filed and the patent was granted some months ago.

The device is manually operable from the conductor's well or platform. In addition to controlling the doors and steps simultaneously, the device also serves to lock the doors in a closed position on both sides of the car, which is desirable under certain conditions. Ordinarily, however, the mechanism is used to operate the doors and steps on one side of the car while the doors on the other side are maintained in their closed and locked position. The accompanying photographs and drawings will be useful in connection with the following description of the mechanism.



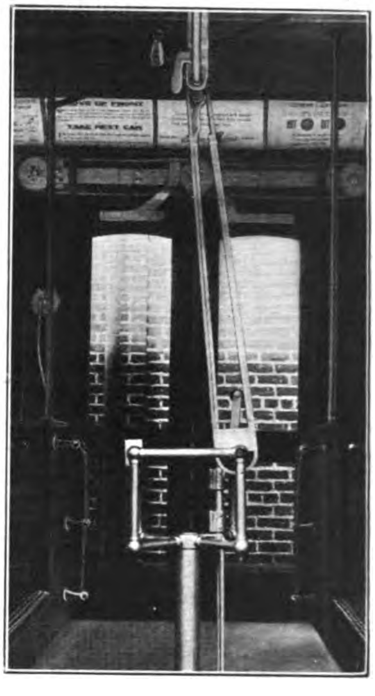


Showing Step in Raised Position

DETAILS OF DOOR AND STEP OPERATING MECHANISM

At each side of the car are arranged a pair of sliding doors of the usual construction, the upper edges of these doors carrying the ordinary roller hangers traveling on trackways, so that the doors are hung to slide towards and from each other in the usual manner. Journaled in a stand at the middle of the well is a small power shaft operated by a crank handle, this shaft having fast thereon a sprocket wheel. This sprocket wheel drives an endless chain which trains over another sprocket wheel, fast with a shiftable clutch sleeve, which, in turn, is loose on a divided operating shaft extending across the car adjacent to the roof and above the doorways.

The drive chain travels in a vertical direction, protected by a casing, the lower end of which is provided with side plates to form a housing for the sprocket. Each part of the divided shaft has on its end next the clutch sleeve a toothed clutch member, so that either part of the shaft may be placed in driven engagement with the power shaft through the chain and sprocket connections. The outer ends of the divided shaft are journaled in bearings carried by plates located at each side of the car above the doors. Mounted on the divided shaft adjacent to the outer ends thereof are double-sprocket wheels, each of which drives a pair of oppositely extending, horizontally disposed endless chains, which travel over single sprocket wheels mounted on stud shafts carried by the plates. Each stud shaft is provided with a small sprocket adapted to impart motion to a vertically disposed endless chain located at one side of the doorway, this chain in turn driving a crank sprocket mounted on a stud shaft. To this crank sprocket is eccentrically pivoted one end of a vertical lever rod, the lower end of which is threaded and screwed into a coupling member connected to a crank-arm fast on a rock shaft. This shaft carries the step, which is mounted on the shaft in the usual way, by means of angular bracket arms.



CHAIN DRIVE FOR CENTER ENTRANCE DOORS

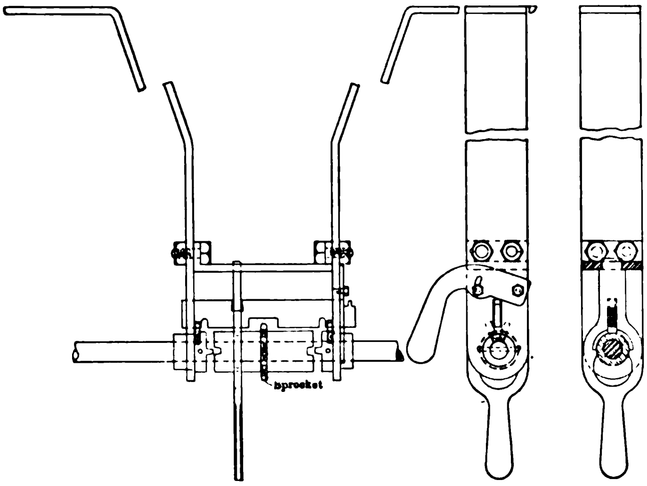
The doors at each side of the car are connected with the adjacent chains by means of bracket arms which are bolted to the top of the door, and attached to the upper and under runs of the endless chains by means of pins or studs, so that the chains, when driven by the double-sprocket, move the doors in opposite directions in opening and closing them.

Suspended from the top of the car is a frame, the parallel arms of which are bored at their lower end for the reception of the clutch members, these arms constituting hangers or supports for the inner end of the shaft members. As will be seen by reference to the detail views of the clutch and locking device, the frame is provided with a cross bar located above the shaft, and directly over the double clutch. This bar is bored for the reception of a stud at the end of the yoke lever to form a pivot point for the lever. This lever is employed to shift or slide the clutch sleeve and the locking bar, the latter sliding through slots in the side-arms of the frame. This locking bar also passes through a slot in the lever, the bar being notched so that it may interlock with the walls of the slot. This locking bar is also provided with an elongated central recess to accommodate the sprocket wheel on the sleeve, and is further provided with notches to permit the pins on the clutch sections to pass the locking bar. That end portion of the locking bar which slides through the arm of the

CLUTCH MECHANISM FOR DOOR AND STEP OPERATING DEVICE frame has its upper longitudinal edge formed with a pair of spaced notches, while pivoted to the arm is a latch terminating in an angular handle. This latch, shown in the end elevation drawing of the clutch locking device, is provided with a segmental slot through which projects a pin carried by the arm of the frame, this arrangement limiting the travel of the latch.

When the clutch sleeve is in the neutral or disconnected position it is out of engagement with both clutch members, and consequently neither of the sections of the divided shaft can be rotated through its connections with the power shaft, even though the conductor's handle be operated. Furthermore, these shaft sections cannot be accidentally rotated, for the pins on the clutch members make contact with the bar. However, the lever may be operated by the conductor to shift the clutch and the locking bar longitudinally relative to the shaft, and in either direction, so that one section of the shaft may be placed in driven engagement with the power shaft, and be further rotated, while the other section of the shaft will be out of engagement with the power shaft, and held against rotation.

To open the doors at the right-hand side, the conductor proceeds as follows: Grasping the yoke handle he shifts it to slide the sleeve clutch toward and into engagement with the clutch member, as shown in the photograph taken longitudinally to the car interior, thereby placing the shaft member in driven connection with the power shaft. When the yoke handle is so moved the locking bar will also be shifted, so that the notch in the bar will be brought into alignment with the pin on the clutch member to permit the pin to pass through the notch when the shaft section is rotated, and thus not impede the rotation of the shaft member. At this time the other clutch member and its shaft member cannot turn because the pin would strike the locking plate. Furthermore, this movement of the lever to the right, in sliding the locking plate, has brought the notch into position to receive the latch when the latter is depressed. The conductor now depresses this latch so that it interlocks with the notch and holds the locking plate against movement and the clutch sleeve in engagement with the clutch member.



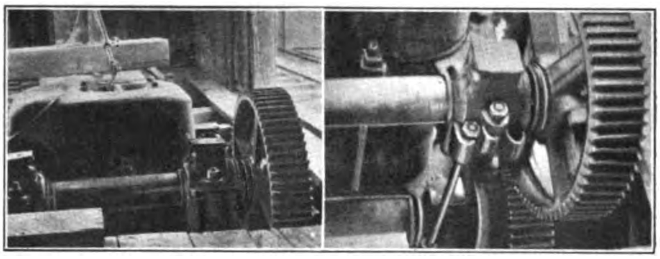
DETAILS OF CLUTCH FOR DOOR AND STEP OPERATING DEVICE

Should the conductor now desire to open the doors, it is only necessary for him to swing his handle, thus turning the power shaft to rotate the sprocket wheel and impart movement to the chain. The rotation of this chain will turn the shaft member, which is now connected with the clutch sleeve, and turning the double-sprocket will move the chains and door brackets connected to them, thus sliding open the doors. At the same time, the travel of the vertical chain will, through the step mechanism previously described, throw the steps downward and outward into position for use by the passenger. When it is desired to close the doors, the crank handle is swung back into its original position and the reverse movement of the chain and sprocket mechanism takes place, thereby closing the doors and elevating the step. Should it be desired to use the doors on the opposite side of the car the conductor simply releases the latch from the locking bar and operates the yoke lever to shift the clutch sleeve from the right to the left clutch member.

If both doors are to be maintained in closed position, the locking bar is unlatched by throwing the latch upward and the sleeve clutch is shifted to the neutral position, so that neither shaft member is in driven engagement with the power shaft. In this condition, as no power can be imparted to either part of the operating shaft, the doors will remain closed and locked.

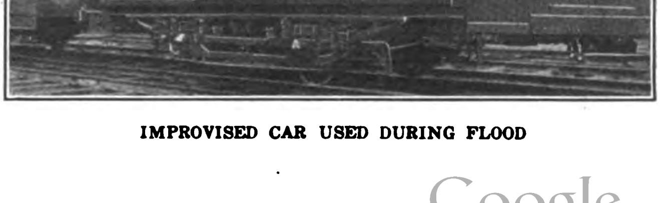
Northern Texas Traction Company Operates Through Floods

During the recent high-water period at Fort Worth, Tex., the Northern Texas Traction Company successfully operated its cars through water which covered the tracks to a depth of 40 in. for more than a half mile. The water rose to such a height that the north end of the massive reinforced concrete viaduct over the Trinity River was entirely submerged. The viaduct is built on a heavy grade, sloping toward the north, and the road at this end crosses a considerable stretch of low land. The road which passes over the viaduct is the only connection between the city and the north side of the river, and consequently the high water put the jitneys out of commission.



ARRANGEMENT OF MOTORS, GEARS AND AXLES ON IMPROVISED CAR

The traction company wished to renew service with as little loss of time as possible, especially since the jitneys were not able to operate. The single-truck car shown in an accompanying illustration, which made this possible, was equipped with a GE-800 motor on each



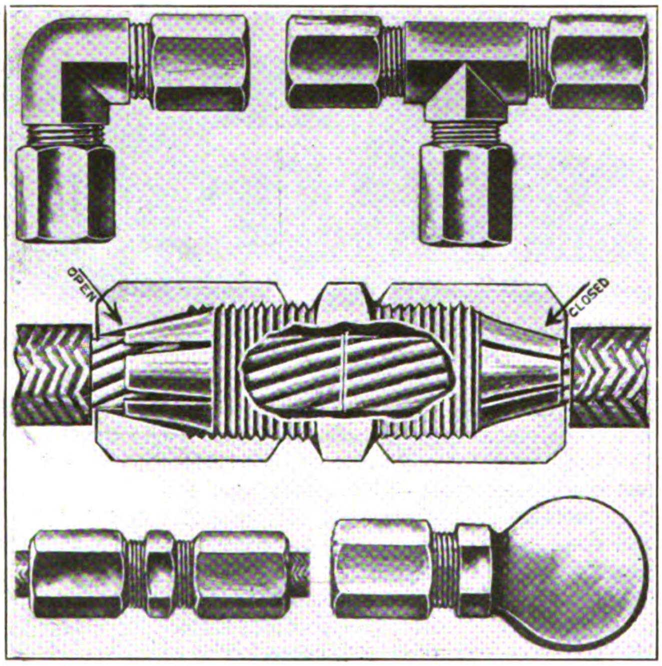
IMPROVISED CAR USED DURING FLOOD

axle. These motors were removed, leaving the cases and gears in place. Another set of GE-800 motors was placed on top of these cases and bolted to them by means of vertical rods. Looped bands were quickly prepared and "fake" axles were arranged as shown. Additional bracing at the top prevented lateral motion and kept the bolts tight. A controller was installed just inside the car. Although the water rose half-way up on the top motor case, this arrangement prevented injury to the equipment.

This high-water car was built over night and placed in service the morning following the 20-ft. rise in the river. An ordinary trail car with a seating capacity of fifty persons was attached at each end of the improvised motor car and the train was run across this stretch of flooded land at about 8 m.p.h. Passengers were transported in this manner for three days and it was sometimes necessary that they raise their feet from the floor in order to keep them dry.

Improved Type of Solderless Connector

The accompanying illustration shows several types of the solderless connector manufactured by the Frankel Connector Company, Inc., New York. The cross-section view in the center shows the principle of the connector and how the design has permitted the use of the fewest possible parts to make a rigid connection. This simple construction, it is claimed, reduces the liability of the connector getting out of order and in addition provides a connection which is strong mechanically and electrically.



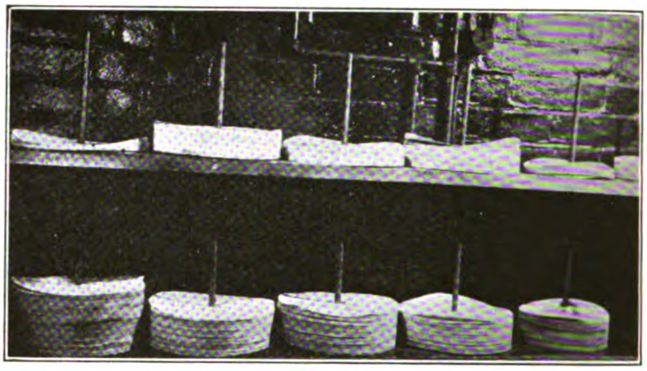
CROSS-SECTION VIEW AND ADAPTATIONS OF SOLDERLESS CONNECTOR

By using these solderless connectors in place of the soldered type connection, the makers claim a substantial saving in time as well as the added advantage of providing a joint that can be broken down without harm to the cable.

As a result of a test to which connectors were subjected the Underwriters' Laboratories, Inc., report that at 1000 amp. the soldered joint melted and dropped apart, while the joint where the wires were connected by the solderless connectors were unaffected by the test.

Compact Storage of Graphic Instrument Records

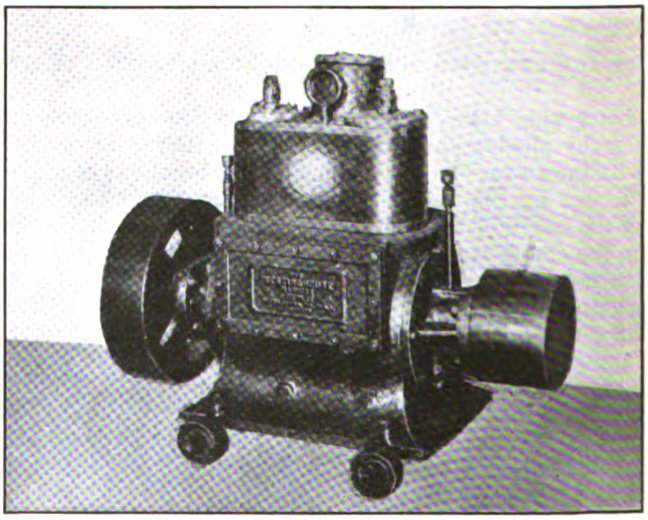
Three years' capacity in recording meter charts is obtained on two shelves in the office of D. P. Miner, chief engineer of the Manchester Street station of the Rhode Island Company at Providence. The shelves are 4 ft. 8 in. long, 10 in. wide and 7/8 in. thick, each being equipped with five 1/2-in. wooden spindles 8 in. high. Ample room for both unused and used charts is available, as shown in the accompanying illustration. The charts are circular sheets showing variations in steam temperature, temperature of exhaust steam at the condenser, vacuum, feed water temperature and draft pressure. In general used records are kept on the bottom pins, blanks being stored and classified just above.



METHOD OF STORING GRAPHIC INSTRUMENT METERS

Portable Engine for Station Service

At the Millbury (Mass.) plant of the Worcester Consolidated Street Railway a two-cylinder 4 1/2-in. x 4-in. Westinghouse vertical engine has been equipped with rollers, as illustrated, to enable it to be used at different points in turning down commutators or other light power work where a steam hose is available. The rollers are each 4 in. in diameter and 1 3/4 in. in tread and were taken from an old crane. They run on 1-in. shafts formed at the ends of square braced rods, the shafts being spaced 17 in. apart on centers. The engine is provided with a flywheel and pulley, and if needed elsewhere on the system is available for operation on either steam or compressed air.



PORTABLE ENGINE FOR STATION SERVICE

NEWS OF ELECTRIC RAILWAYS

KEY ROUTE INAUGURATES PIER SERVICE

Company Entertains 150 Business Men at Luncheon on Newly-Finished Million Dollar Improvement

On May 21 the San Francisco-Oakland Terminal Railways routed all traffic to the ferry slips over the new 2-mile earth fill which has just been completed. Prior to the use of the new route by regular traffic, the company provided a special train on May 18 to take a party of representative business men of the city of Oakland over the pier. By leaving town in the late forenoon and serving luncheon on a ferry at the slip, the party returned to town with slight interference to business. About 150 accepted the invitation and many of these made personal expressions of appreciation at the end of the trip.

To give all those who participated in the trip facts about the work just completed, cards of convenient size were distributed bearing statistics relative to the new pier. These cards explained that work was started in June, 1913, to extend the solid fill into the bay the maximum distance permitted by the War Department. Two parallel walls of rock were dumped to provide a retaining wall for material dredged from the bottom of the bay. The rock walls were required to be built up to about 30 ft. above the bottom of the bay, and to accomplish this 626,000 tons of rock were used. As the rock walls were extended out from shore, the hydraulic fill was begun, and this has been continued steadily until a total of 2,500,000 cu. yd. has been filled in between the rock supports. The completed fill is 200 ft. wide, which is adequate for thirteen parallel tracks.

From the end of the solid fill to the ferry slip a new trestle 3800 ft. in length has been completed, so that with the inauguration of service over the new route, about 6000 ft. of the old double-track trestle will be abandoned. This does not include about 1000 ft. of the old trestle adjoining the ferry slip which will be preserved for stub tracks and general car storage. The approximate cost of the pier and new trestle, completely equipped ready for service, has been about $1,250,000.

Under normal conditions there are now about 800 trains a day to the ferry slip. The new route is protected by automatic stops used in connection with automatic signals, of which there are eighty-one on the pier and trestle, these being spaced from 300 ft. to 450 ft. apart. The 3½ miles of main track involved is claimed to be the most densely signaled trackage in the United States.

ELECTRIFICATION OF ANOTHER IOWA ROAD PROPOSED

Plans are being considered for electrifying the Chicago, Anamosa & Northern Railroad and making it part of the Waterloo, Cedar Falls & Northern Railway. The road runs from Anamosa, Iowa, in a northwesterly direction through the towns of Jackson, Prairieburg, Coggon, Robinson, Monti, Kiene and ends at Quasqueton. It is 35 miles long. If it is made part of the system of the Waterloo, Cedar Falls & Northern Railway that company will build a connecting line from Quasqueton through Rowley to Brandon, Iowa, a distance of 15 miles, and will electrify the so-called C. A. N. This will add 50 miles to the system of the Waterloo, Cedar Falls & Northern Railway. The plan is being worked upon by the people along the line and the prospect of its being put through successfully is said to be good. The Chicago, Anamosa & Northern Railroad was a steam railroad. Its affairs have been in the hands of the United States courts for about two years, and since November, 1915, no trains have been operated over it. The property is to be disposed of at receiver's sale on July 11. The Waterloo, Cedar Falls & Northern Railway operates 135 miles of combined steam and electric railway. It is a standard gage line with 235 cars, eight electric locomotives and four steam locomotives.

EXPERIENCE ORDINANCE UNCONSTITUTIONAL

In the Marion Circuit Court, Indianapolis, Judge Ewbank has held to be unconstitutional a city ordinance requiring conductors and motormen, whether experienced or not, to receive thirty days' instruction from a man who has been in service on the lines of the Indianapolis Traction & Terminal Company for one year before he can be permitted to operate a street car in Indianapolis. This ordinance was passed by the City Council in 1914 at a time when the Indianapolis Traction & Terminal Company was seeking to restrain its employees from going on strike in violation of their working agreement with the company. No effort was made to enforce the ordinance until recently. The company's attorney attacked the ordinance as invalid, and cited decisions of the United States Supreme Court to support their arguments, saying that it gave no guarantee of competency. In his ruling, Judge Ewbank said:

"The reasoning by which the highest court in the country reached the conculsion that a statute which undertook to forbid any one from serving as a freight conductor without two years' previous experience as a freight brakeman, whatever his knowledge or proficiency in railroading or his previous experience as a trainman in the operation of trains, while not excluding anybody from serving as a freight conductor who had served two years as a freight brakeman, however lacking in education, knowledge or proficiency, was unconstitutional and void, leads irresistibly to the conclusion that this ordinance is also in conflict with the Constitution and void."

CITY LINE DEFIES UNITED RAILROADS

Eighteenth Street Crossing Installed by City of San Francisco Over Night

The completion of the Church Street extension of the Municipal Railway, San Francisco, Cal., has been delayed somewhat by the refusal of the United Railroads to permit the installation of the necessary crossing at Eighteenth Street, as was reported in the ELECTRIC RAILWAY JOURNAL of May 13, page 920. On advice of the legal department, however, the city engineer ordered the contractors to proceed with the work, and this was done on May 13 without apprising the company of the city's decision.

A crew of about fifty workmen started installing the crossing at 1 p. m. on Saturday, and the work continued through most of Saturday night. No preventative injunctions were presented by the private company and no attempt was made to obstruct the crossing. The work was completed before Sunday morning traffic was scheduled to start. Charles N. Black, vice-president and general manager of the United Railroads, is quoted in San Francisco newspapers as saying that no legal action would be taken in the matter at the present time. A question still to be settled, it is pointed out, is the cost of maintenance of the crossing. It is admitted that the burden of this can be thrust entirely upon the line which found the other tracks already installed, but thus far the United Railroads has not demanded its rights in similar cases. Since the completion of the Eighteenth Street crossing, the city has ordered the United Railroads to raise its track to official grade, the rails having been found to be 4 in. too low.

The Church Street line is to run from Sixteenth and Church Streets to Market, over Market to Van Ness, and thence down Market to the ferry, making it necessary to cross the United Railroads' tracks at three places. This work has already been ordered by the city, and was to have started on May 20. In commenting on the situation, M. M. O'Shaughnessy, city engineer, said that there will be no secrecy about crossing the Market Street tracks. When this work is started it is likely that the right of the Municipal Railway to cross and to parallel the United Railroads' tracks on Market Street will be tested in court.

WAR-TIME PRECAUTIONS TAKEN AT NIAGARA

The Dominion military authorities have ordered the construction of barbed wire entanglements in the Victoria National Park at Niagara Falls, Ont., in the vicinity of the power houses. Between Niagara Falls, Ont., and the Dufferin Islands and Chippewa, Ont., cars on the Park & River division of the International Railway will be escorted under armed guard. A machine gun has been mounted near the approach to the lower steel arch bridge under the command of the Ninety-eighth Royal Battalion, and barricades of sand bags have been thrown up around the tracks of the International Railway between Bridge Street station and the Whirlpool stopover. Fear of attempts by German sympathizers to cripple Canadian power plants and transportation facilities at Niagara Falls, Ont., is given as the reason for the precautions. Officials of the International Railway and the Great Gorge Route have been asked to cooperate with the Dominion military authorities to safeguard Canadian property, and armed soldiers, members of the next overseas contingent from Toronto and Hamilton, Ont., in the Niagara Falls concentration camps have authority to ride on all cars from Chippewa on the upper river to Queenstown, which is the lower terminus of the International Railway's Park & River division. The military restrictions and censorship have prevented the taking of any pictures of the barbed wire entanglements, machine guns, soldiers, etc., in action along the Canadian frontier guarding the railway property and the power houses.

SHORT STRIKE IN TRENTON

The trainmen in the employ of the Trenton & Mercer County Traction Corporation, Trenton, N. J., went on strike at midnight on May 18. Early on the morning of May 20 service was resumed, it having been agreed in the interim to arbitrate the questions at issue. There was no disorder and no attempt was made to operate cars during the short time that the men were out.

The week before the strike was declared the company discharged fourteen conductors charged with stealing. The men had been negotiating for new working conditions and more pay. The men discharged were in many cases, it is claimed, active in the union. The company denied that the activities of the men influenced it in the least. The men said that the company, if justified in discharging the men for the reason given, should have justified itself by taking the matter to the grand jury and having the men indicted for stealing.

A movement looking toward arbitration was begun the morning following the strike. It was first proposed that the City Commission arbitrate the matter, but this was changed so that only the preliminary arrangements were handled by the City Commissioners. The strikers will appoint an arbitrator, and the company will name a representative. These men will select a third, and they will form the board which, before July 1, will adjust the differences between the men and the company. The arbitration will be confined to passing upon the justness of the action of the company in discharging a number of conductors, including an officer of the union. The question of the terms of the new working agreement, to date from July 1, will be settled by direct conference between the representatives of the men and the officers of the company. Peter E. Hurley, general manager, has been selected to represent the company.

BUFFALO WAGE MATTERS ADJUSTED

An agreement has been reached between the International Railway, Buffalo, N. Y., and its employees whereby platform men will receive a wage increase of 3 cents an hour during the first two years of the three-year agreement and an additional cent in the last year. Other employees including barnmen, trackmen, etc., will receive a general increase of 13 to 14 per cent. The new scale has been accepted by the union by a vote of more than five to one. The company's first offer of a general increase of 2 cents an hour was rejected by the men, who demanded an increase of 8 cents an hour. An agreement has been reached on almost every other point at issue and a three-year agreement will be signed. The increase will date from May 1 when the last three-year agreement expired. During the first two years of the agreement, new platform men will receive 26 cents an hour; second-year men, 27 cents; third-year men, 29 cents, and those who have worked four years and more, 34 cents. During the third year of the agreement each class of men will receive an additional cent. The Buffalo, Lockport and Niagara Falls city employees and the Buffalo & Niagara Falls, Buffalo & Lockport, Lockport & Olcott and Park & River divisions men will all benefit by the increase.

STANDARDS FIXED FOR GRADE-CROSSING SIGNALS

Plans for protecting grade crossings throughout the United States were adopted by the American Railway Association, at a recent meeting at the Biltmore Hotel, New York. The special committee on prevention of accidents at grade crossings was authorized to meet with a committee of the National Association of Railway Commissioners, and to join with them in recommending standards to be followed in the protection of grade crossings and to obtain legislation requiring compliance with such standards. The association adopted five specific standards, which will be recommended for adoption by public service commissions and other properly constituted authorities. These standards cover:

Uniform approach warning signs.

Uniform color of light for night indication.

Uniform use of a circular disk, approximating 16 in. in diameter, with the word "Stop" painted thereon in large letters, instead of the vari-colored flags which are now in use by crossing watchmen or flagmen.

Uniform painting of crossing gates with alternate diagonal stripes of black and white, "somewhat like a barber's pole."

Uniform rules governing crossing watchmen or flagmen while controlling or regulating street or highway traffic.

The report of the special committee that made these recommendations to the association stated that accidents at crossings have increased 1000 per cent in the last five years in some parts of the country. This was due largely to the increased use of the automobile. It was with the view of standardizing the crossing signals throughout the country, in order that automobile drivers might have ample warning when approaching a crossing that the association took steps to make warnings uniform for all States.

The circular disk, with the word "Stop" in large letters, with a contrasting background to make it stand out in bold relief, will eliminate the complaint that flags, which are now generally used, do not give the drivers sufficiently clear indication whether the flagman is urging them across the tracks or trying to stop them. This desk will be held up in the middle of the highway.

The "caution approach" sign will serve to remind drivers that there is a railway crossing 400 or 500 ft. ahead. At night the same color light will be used at all crossings, so that there may be no misunderstanding as to the meaning of such signals.

MR. DOHERTY MAY VISIT TOLEDO

It is possible that Henry L. Doherty will spend a few days in Toledo, Ohio, after the convention of the National Electric Light Association in Chicago, if his health will permit. Should he be able to do this, Mayor Milroy's street railway commission will probably hold daily sessions while he is in Toledo in order that all possible progress may be made on the new franchise.

Judge Ralph Emerey, retained as the attorney of the commission, has found some faults in the rough draft of the proposition submitted by the commission. It is said that some of the provisions are in contravention of the State constitution and will have to be changed, but he has not yet been able to prepare a report on the matter.

Legislation was introduced in the City Council on May 22 which will clear Summit Street of all vehicular travel, except street cars, between 4.30 p. m. and 6.30 p. m.

References to other phases of the negotiations at Toledo are contained elsewhere in this issue.

NEW 100.000-KW. STATION FOR CONNECTICUT COMPANY

The Connecticut Company, New Haven, Conn., has awarded a contract to The J. G. White Engineering Corporation, New York, for the engineering and construction of a new steam power plant at New Haven. The plans for this power station are being prepared for an ultimate capacity of 100,000 kw. Construction work on the foundation for the plant will begin at once. This plant will take the place of the company's old direct current station at New Haven, and probably two substations will be built in New Haven for local distribution of current to the Connecticut Company's lines. The current generated by this new plant will be in addition to the electrical energy delivered to the Connecticut Company's lines by its other important stations, among which are those located at Waterbury, Bridgeport, Hartford and Berlin.

NEW PROCEDURE ADVOCATED IN TORT CASES

Figures collated by Judge William L. Ransom, of the City Court, show that the public service corporations in New York City charged to operating expenses during 1915 a sum approximating $3,250,000 on account of payments and expenses in connection with tort claims. According to the New York *Times* the purpose of gathering these statistics was to prove that some better method was needed in determining the justice of such claims, and to prevent the submission of "expert" testimony that is often of such a character as to create the strongest suspicions of its honesty. After telling what injustice has grown out of the present system, and how much the injustice has indirectly cost the people, Judge Ransom made these suggestions, which he thinks will greatly reduce the total amount of claims paid each year without doing any injustice to those who have a real grievance against the corporations sued:

"1. Where an injury is sustained for which a public service corporation is claimed to be liable in tort, the injured person should be required to give written notice of injury and claim within a short period to the Public Service Commission and to the company, similarly to the notice required under the Workmen's Compensation act or in the case of tort claims against a municipality. It should then be the duty of the commission to investigate the physical circumstances of each such accident. This would tend mightily to eliminate fictitious and fraudulent claims of mishap and prevent the common misrepresentation of the physical surroundings. After suit is brought, the written reports made by the commission's investigators should be made available to both parties, but should not be evidence upon the trial. No such action should be permitted to be settled except upon order of court, made upon notice to the commission.

"2. Coming more directly to the topic of medical expert testimony, I believe that upon the service of such a notice of injury and claim, the injured person, the prospective defendant, or, in a case where a public service corporation is involved, the Public Service Commission should have the right, upon petition to the court, to obtain an immediate physical examination of the injured, by a physician selected by the court from a list of physicians authorized to make such examination. The list itself should be selected by the Appellate Division in each department, from among the physicians certified by the State Board of Regents to be eligible. Not less than 200 physicians should be designated in each metropolitan department. The State Board should, in my present judgment, certify to the respective Appellate Divisions the names of all resident physicians who (1) are graduates of colleges of good standing and rigorous requirements as to degrees, or can prove possession of equivalent knowledge, training and mental discipline; (2) are graduates of a medical school of good standing and adequate facilities, clinical and otherwise; (3) have been engaged in the general practice of medicine and surgery for upwards of five years; (4) have been engaged in some form of special study and practice for at least a year, either in laboratory investigation or hospital practice, or have shown qualifications by the authorship of a medical work of acknowledged value, by the holding of a teaching position in a medical school of recognized standing, or by membership in exclusive societies, devoted to the investigation and study of special branches of medical science.

"3. Either party should have the right to have his own physician or physicians present at such examination, but there should be no examination of a plaintiff at the instance of an adverse party except in connection with such an examination by a physician selected by the court. The court should be empowered to order a further examination by the same or by additional physicians, selected from the same list, upon showing of substantial reasons therefor."

City Officials Sued by Amalgamated.—Judge Dillon of the Common Pleas Court at Columbus, Ohio, has taken under advisement two suits filed by national organizers of the Amalgamated Association, asking that city officials be enjoined from alleged wrongfully interfering with their work in organizing a union among employees of the Columbus Railway, Power & Light Company. Each plaintiff asks $10,000 damages from the city officials.

Bill of Particulars Demanded in Strike Suit.—An order has been granted by a Supreme Court justice requiring the International Railway, Buffalo, N. Y., to furnish a bill of particulars to the county of Erie in its suit to recover $100,000 damages alleged to be due for the failure of the county to protect railway property during the strike three years ago. The company has another action of similar nature pending against the city. The railroad company by the terms of the court order is required to specify items of alleged damage and also to give names of persons who made alleged threats, etc.

Right to Proceed with Extension Case Granted.—According to a decision of the State Supreme Court, the Public Service Commission of Missouri may now proceed with the hearings of the petition of residents of North St. Louis that the United Railways be compelled to construct a street railway from the municipal docks at the foot of North Market Street to Broadway and thence to St. Louis Avenue and to the city limits. The Supreme Court denied a writ of prohibition filed by the United Railways to restrain the Public Service Commission from making the order asked for in the petition.

Stay Granted in Mill Tax Case.—The United States Supreme Court has made an order staying until June 1 the sending down of its mandate to the Missouri Supreme Court affirming its judgment against the United Railways, St. Louis, in the mill tax case. The attorney for the company explained that he had been given until June 1 to file a motion for a rehearing in the case, and the final order of the upper court was to be held back until this date. The recent decision of the United States Supreme Court adverse to the company was noted in the ELECTRIC RAILWAY JOURNAL of April 15, page 745.

Middlesex & Boston May Tear Up Line.—George M. Cox, vice-president and general manager of the Middlesex & Boston Street Railway, Newtonville, Mass., has advised Superintendent of Public Works Macksey of Woburn that if the Woburn City Council insists on the installation of granite paving blocks between the rails of the Pleasant Street line, the directors of the company will probably order the tracks removed. The street is being rebuilt by the town. Mr. Cox states that the directors cannot see their way clear to expend the sum of money necessary to comply with the order of the board.

Massachusetts Labor Conferences.—Officials of the Worcester (Mass.) Consolidated Street Railway and the Springfield (Mass.) Street Railway were to confer on May 25 at the office of Henry C. Page, general manager of the Worcester company, with representatives of the unions on the two properties, upon wages and working conditions. Employees of the Worcester & Warren Street Railway have submitted a request for a wage increase to the directors. Conferences with union representatives are continuing on the Boston Elevated Railway, looking toward the conclusion of a new agreement in due course.

Connecticut Wages Adjusted.—The trainmen in the employ of the Connecticut Company have approved the following wage scale: 26 cents an hour the first year of service, 27 cents the second year, 28 cents the third year, 29 cents the fourth year, 30 cents the fifth year and 32 cents thereafter. The men had asked for a scale which ran from 28 to 35 cents an hour. The new scale will be in effect from June 1, 1916, to June 1, 1918. The conference board representing the men has also ratified the company's offer of a wage scale and new working terms for motormen and conductors on the lines of the New York & Stamford Railway.

Arguments in Toledo Contempt Case Concluded.—Lawrence Maxwell, counsel for the plaintiffs in error, and United States District Attorney E. S. Wertz, for the United States, have completed their arguments before the United States Circuit Court of Appeals at Cincinnati in the appeal of the Toledo Newspaper Company, publisher of the Toledo *News-Bee*, and its editor, Negley D. Cochran, from the decision of United States District Judge John M. Killits, who found against them in contempt proceedings in connection with the street railway litigation at Toledo. The suit grew out of cartoons and editorials which were published in the newspaper, criticising the United States District Court.

New Carhouse to Be Built at Springfield.—Work will be started at once upon the new Hooker Street carhouse of the Springfield (Mass.) Street Railway, to which reference has been made in these columns. The carhouse job, which will include new repair shop, storerooms, an assembly hall and locker room, barber shop and restaurant, will cost about $250,000. It is hoped to complete it by Jan. 1, 1917. The carhouse proper will have a frontage of 205 ft. on Main Street and will have a depth of 190 ft. It will be one story in height and of brick and concrete construction, having a yard with storage and loop trackage facilities. It is also expected, within the above estimate, to remodel the present carhouse at Carew Street to a considerable extent.

Proposal Made for Financing Toledo Commission.—At a meeting of the street railway commission of Toledo, Ohio, on May 16, it was announced that John N. Willys, of the Willys-Overland Company, proposed to finance the work of the commission. N. D. Cochran and N. C. Wright, members of the finance committee, reported that provision would be made in the franchise to be formulated to reimburse Mr. Willys. It was reported at the meeting that Henry L. Doherty was still too ill to confer with the commission and that no progress can be made until a number of preliminary matters are discussed with him. It seems unlikely that any work of importance can be done until the latter part of June and perhaps later. In the meantime Judge Ralph Emery will report on a number of legal points involved in the plan which the commission is working out.

Washington Suburban Line Employees Strike.—Although the Washington & Old Dominion Railway, Washington, D. C., expressed its willingness to carry out the arbitration agreement in every way, the employees announced on the morning of May 12 that they would strike at 4 p. m. if the company did not comply with their renewed demands for increased wages, changes in working conditions and in hours of labor identical with the original demands, which were refused by the company. Temporary restraining orders in Washington and Virginia were obtained by the company against about 150 former employees to prevent interference with the company in the conduct of its interstate commerce and the carrying of United States mail. A hearing on this injunction was set for May 25. On May 20 W. B. Emmert, general manager, announced that cars were being run and many passengers carried. He also said a number of strikers had returned to work and that many others had taken advantage of the company's offer to consider applications of former employees.

Storm Damages Western New York Lines.—Western New York interurban lines, especially those operating in the southern tier of counties, were seriously affected by the series of cloudbursts following a continuous rainfall on May 13-15. Property damage estimated in excess of $1,000,000 was done by the high water. The electric railways operating in Olean and those entering the city were forced to abandon regular schedules. Sections of track were washed away along the Western New York & Pennsylvania Traction Company's line and a concrete culvert was also destroyed. In some parts of the city the water was 16 ft. deep. No attempt was made to operate cars on the line between Olean and Hornell owing to high water. In Batavia car service in West Main Street was stopped and boats were pressed into service. Two miles of tracks between Batavia and Attica were destroyed. The line between Perry and Silver Lake was washed out near Fairview and service was temporarily interrupted. At one time the water threatened to destroy the floodgates in the power race in Mount Morris. Laborers strengthened the gates with mud and sandbag embankments. The electrical storm which followed the cloudbursts temporarily crippled many of the small electric power plants feeding the interurban lines. The damage was confined exclusively to Cattaraugus, Chautauqua, Wyoming, Genesee and Allegheny counties and the southern part of Erie County. None of the lines operating out of Buffalo experienced difficulty.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Association

The committee in charge of the midsummer meeting and boat trip of the Central Electric Railway Association announces that a very large number of applications for reservation of staterooms and tickets have been received. The rule of "first come, first served" is being followed in assigning accommodations. The steamer South American, on which the trip will be made, has state rooms for 500 people. The steamer will sail from Toledo at 11 a. m., central time, on June 27. The tour will cover the route up the Detroit River, through Lake St. Clair and the St. Clair River, up Lake Huron to "The Soo" and through the St. Mary's River, then to Mackinaw Island for a half-day stop and then down Lake Michigan to Benton Harbor or Chicago. This is a trip of nearly 800 miles. The committee announces that a stop of an hour will be made in Detroit and that mail to be delivered at Mackinaw Island, Mich., should reach there early the morning of June 29. The party will disembark at Benton Harbor and Chicago on the afternoon of June 30. Reservations should be sent to John Benham, 15 South Throop Street, Chicago.

Arkansas Association of Public Utility Operators

The program has been announced for the meeting of the Arkansas Association of Public Utility Operators to be held at Little Rock, Ark., on June 6, 7 and 8. The session on June 6 will be begun at 2 p. m. The delegates will be welcomed by Mayor Charles E. Taylor of Little Rock. H. C. Couch, president of the association, will respond. The reports of the executive committee and of the secretary and treasurer will then be presented. Mr. Couch will then make his address as president. The program of papers of interest to electric railway operators is as follows:

JUNE 6

"Co-operation of Association Members for Mutual Benefit," by C. J. Griffith, general manager of the Little Rock Railway & Electric Company.

JUNE 7

"How to Obtain Proper Relation Between Employees and Company," by F. Law, manager of the Russellville Water & Light Company.

JUNE 8

"The Troubles of Central Station Operators and Their Remedies," by B. C. McKinnon, manager of the Eldorado Light & Power Company.

"Relation of Power Factor to Central Station Costs," by Fred Johnson, district manager of the Wagner Electric Company, St. Louis, Mo.

"Commercial Publicity," by W. F. Moody of the new-business department of the Arkansas Light & Power Company, Arkadelphia, Ark.

There will be a theater party at 8.30 p. m. on June 6. On June 7, at 3 p. m., there will be a Jovian rejuvenation. On the same day and at the same time as the rejuvenation there will be an automobile ride for the ladies. At 8 p. m. on June 7, the banquet of the association will be held at the Hotel Marion. Following the presentation of the paper by Mr. Moody on the afternoon of June 8, new officers will be elected for the association.

Financial and Corporate

ANNUAL REPORTS

Hudson & Manhattan Railroad

The comparative income statement of the Hudson & Manhattan Railroad, New York, N. Y., for the calendar years 1914 and 1915 follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Gross revenue—passenger fares	$3,477,695	93.3	$3,490,880	93.1
Miscellaneous revenue from railroad operations:				
Advertising	$121,149	3.2	$150,689	4.0
Other car and station privileges	69,026	1.9	66,803	1.8
Sale of power	12,081	0.3	3,618	0.1
Miscellaneous transportation revenue	15,443	0.4	10,949	0.3
Other miscellaneous revenue	30,591	0.8	28,008	0.7
Total miscellaneous railroad revenue	$248,293	6.6	$260,069	6.9
Total railroad revenue	$3,725,989	100.0	$3,750,950	100.0
Operating expenses of railroad:				
Maintenance of way and structures	$269,424	7.2	$260,801	6.9
Maintenance of equipment	179,676	4.8	159,256	4.2
Power	243,508	6.5	245,478	6.5
Transportation expenses	615,302	16.5	622,485	16.6
Traffic expenses	1,110	0.6	1,625	0.1
General expenses	147,573	4.0	157,692	4.2
Total operating expenses of railroad	$1,456,595	39.1	$1,447,339	38.6
Net operating revenue from railroad	$2,269,393	60.9	$2,303,610	61.4
Taxes on railroad operating property	272,237	7.3	251,205	6.6
Net income from railroad operation	$1,997,156	53.6	$2,052,405	54.8
Net income from outside operations	982,627	26.4	997,270	26.5
Total income from all operating sources	$2,979,783	80.0	$3,049,676	81.3
Non-operating income	43,111	1.1	28,627	0.7
Gross income	$3,022,895	81.1	$3,078,304	82.0
Income deductions prior to bond interest	243,765	6.5	236,790	6.3
Net income applicable to bond interest	$2,779,130	74.6	$2,841,513	75.7
Bond interest on N. Y. & J. 5's, first mortgage 4½'s and first lien refunding 5's	2,137,998	57.4	2,121,007	56.5
Balance of net income available for interest on adjustment income bonds	$641,132	17.2	$720,506	19.2

During the last calendar year the company suffered a slight loss of $13,185, or 0.3 per cent, in gross revenue from railroad operation, this arising mostly from decreases in passenger revenue and advertising revenue. The railroad operating expenses (including depreciation) showed an increase of $9,256, or almost 0.7 per cent, and taxes increased $21,032, or 8.3 per cent, so that the railroad income decreased $55,249, or 2.6 per cent. The increase in operating expenses arose mostly from higher expenditures for maintenance of way and structures and equipment, with decreases in the other items. After taking in the decreased net income from the Hudson Terminal Buildings and other outside operations and the increased non-operating income, the gross income applicable to fixed charges showed a loss of $55,409, or 1.8 per cent for the year, and the small increase in income deductions other than bond interest raised the loss in net income applicable to bond interest to $62,383 or 2.2 per cent. The balance of net income for the period available for interest on the adjustment income bonds was less by $79,374, or 11.0 per cent, than in 1914.

From January to September the passenger traffic showed decreases as compared with the same months in 1914, but it is noted that the traffic of the company had shown a normal growth prior to August, 1914, when the European war broke out. Since the full effects of the war did not begin to operate against the company's business until Sept., 1914, it was not until Oct. 1, 1915, that significant comparisons in traffic could be made. Since this time, the business of the company has shown such satisfactory increases as almost to overcome the decreases of the prior months of 1915. Beginning with October, the traffic over the uptown lines showed increases for the first time since the installation of the 7-cent fare.

The following table gives some comparative traffic statistics for the last two calendar years:

Number of passengers carried	59,915,192	59,900,257
Number of passengers carried per mile of road	7,048,846	7,047,089
Number of passengers per revenue car-mile	7.68	7.54
Passenger revenue per mile of road	$409,140	$410,691
Gross railroad operating revenue per mile of road	438,351	441,288
Operating expenses (excluding taxes) per mile of road	171,364	170,275
Net railroad operating revenue per mile of road	266,987	271,013
Passenger revenue per revenue car-mile	$0.4456	$0.4393
Gross railroad operating revenue per revenue car-mile	0.4774	0.4720
Operating expenses (excluding taxes) per revenue car-mile	0.1866	0.1821
Net railroad operating revenue per revenue car-mile	0.2908	0.2899
Passenger revenue per passenger	$0.0580	$0.0583
Gross railroad operating revenue per passenger	0.0621	0.0626
Operating expenses (excluding taxes) per passenger	0.0243	0.0242
Net railroad operating revenue per passenger	0.0378	0.0384

Westinghouse Electric & Manufacturing Company

The income statement of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., for the fiscal year ended March 31, 1916, follows:

Gross earnings, sales billed	$50,269,239
Cost of sales—factory cost, including depreciation	40,839,344
Net manufacturing profit	$9,429,895
Other income	1,106,730
Gross income	$10,536,625
Deductions from income	869,837
Net income available for dividends	$9,666,788

The sales billed and the net income for the year were in excess of the results for any previous year in the company's history. In 1915 billed sales totaled $33,671,485 and net income $2,009,744. The increase was due partly to munition orders, the shipments of which totaled $8,578,266. The total orders for war munitions booked by the company, its proprietary companies and the Westinghouse Machine Company amounted to approximately $96,527,000. These orders included firm orders, orders subject to cancellation for undelivered goods upon the payment of an agreed profit, and orders subject to cancellation upon three months' notice to stop work. Nearly all of the work upon war munitions is being carried on at plants constructed or acquired especially for this class of business, and thus does not interfere with the regular output.

The value of orders received during the year, exclusive of orders for war munitions, was $58,218,171, and the value of unfilled orders as of March 31, 1916, for the regular products was $22,097,995, as compared with $5,464,965 at the same date of last year. (The value of unfilled orders as stated in the report of March 31, 1915, included $3,486,445 for war munitions.) During the early part of the year the East Pittsburgh works were operating considerably below their capacity, but the regular business has increased so that they are now operating at full capacity on regular products.

The surplus at the close of last year was $7,473,411, which was increased during the year by net income and other credits to $17,166,496. Dividends were paid upon the preferred stock at 7 per cent per annum and the common stock at 4 per cent per annum for the first quarter and at 6 per cent per annum for the remaining three quarters. "Deferred charge for expenses" in connection with the bond issues of 1906 and 1915, which had been carried in suspense, has now been entirely written off, the amount being $1,080,266. "Patents, charters and franchises" have been reduced by $1,894,057 and that amount charged against surplus. For the purpose of eliminating all items in the nature of good-will, the amount of $1,875,000, heretofore included in "Investments" and representing the excess of book value over the par value of the capital stock of the Perkins Electric Switch Manufacturing Company, has been written off against surplus. At the end of the present year the remaining surplus was $9,246,707.

OPTION TAKEN ON DALLAS PROPERTIES

United Electric Securities Company Is Considering Purchase Upon Basis of City Co-operation

At the request of the United Electric Securities Company Stone & Webster have given an option on their holdings in the Dallas traction, lighting and terminal properties. The United Electric Securities Company will exercise this option and take over the interests of Stone & Webster only in case Dallas people will participate with them both in the reorganization and in the financing and management of these public utility properties under acceptable franchises.

If this option is exercised, the Dallas Electric Corporation, the holding company, organized under the laws of the State of Maine, will be dissolved; the Consolidated, Metropolitan and Rapid Transit traction lines will be merged in a new local company to be organized under the laws of Texas, and it is expected that this company will acquire, by lease or in some other way, the local Oak Cliff lines and operate them as a unit with the Dallas traction lines; the lighting and power properties will be separated from the traction properties and will be reorganized, owned and operated by a local Texas company.

J. F. Strickland, Dallas, and his associates have expressed a willingness to co-operate in the financing and reorganization of the light and power company, and to undertake its management. No definite plans have been formed as to the traction lines, and none will be until after the arrival of J. A. Trawick, vice-president of United Electric Securities Company. In the event the above plans cannot be worked out with the city authorities and the local people the United Electric Securities Company will not exercise its option to purchase.

It was later announced that Charles W. Hobson, president of the Southwestern General Electric Company, would head the local corporation which is planned to take up the task of reorganizing the street railway system of Dallas and that Mr. Strickland would be in executive charge of the electric light and power properties which will be placed under a separate corporation from the street railways. It was also stated that steps would shortly be taken to secure modifications of the traction and light franchises adopted at the election on April 4. In the meantime, work along the lines of financial and operating reorganization of the properties will be carried on.

CITIES SERVICE TO INCREASE CAPITALIZATION

A special meeting of the stockholders of the Cities Service Company, New York, N. Y., has been called for June 29, at which time the stockholders will be asked to approve an increase in the authorized capitalization of the company from $65,000,000 to $100,000,000. The increase is to be from an authorized $40,000,000 of preferred stock to $60,000,000, and from an authorized issue of common stock of $25,000,000 to $40,000,000.

The former contract having expired, the Cities Service Company has entered into a new contract with Henry L. Doherty & Company by which it will pay in cash only the actual expenses incurred in the management and operation of these properties, but as further compensation the Cities Service Company has given to Henry L. Doherty & Company an option on $3,000,000 of common stock at $225 a share, and also the right to purchase at $250 a share one-third of all other common stock which may be issued in the next five years. This contract provides that in consideration of the granting of these options Doherty & Company agree to turn over to the Cities Service Company all their present public utility properties and to conduct all operations in the public utility properties and oil properties in behalf of the Cities Service Company, and that Doherty & Company shall have the right to take up and operate for their own account or for other parties only such properties as have first been offered to the Cities Service Company at cost and their purchase declined by that corporation.

In addition to the regular annual rate of 6 per cent in cash, beginning Aug. 1, 1916, the Cities Service Company will also pay 2 per cent on the common stock in common stock on Sept. 1 and an additional 4 per cent in common stock on Dec. 1. The board also expects to pay 6 per cent in common stock in 1917 and thereafter to increase the dividends paid in common stock 3 per cent each year so long as earnings of the company justify this policy.

The directors have voted to make an offer to the stockholders of the Toledo Traction, Light & Power Company to take over their holdings of preferred and common stocks at approximately their present market prices. The same offer will also be made to the stockholders of the Lincoln Gas & Electric Light Company and to those of the Montgomery Light & Water Power Company. An offer will also be made to the holders of the preferred stock of the Electric Bond Deposit Company by which they may exchange their stock share for share for preferred stock of the Cities Service Company.

BOSTON ELEVATED SEEKS FINANCIAL AID

Appeals to Governor for Commission to Examine Need for Increased Net Revenue

In a letter addressed to Governor McCall of Massachusetts on May 22 and signed by Henry S. Lyons, secretary for the board of directors, the Boston Elevated Railway appealed for the appointment of a recess commission to report to the next Legislature whether the State should take any action with a view to enabling the company to obtain a net revenue adequate for its corporate and public purposes. The letter set forth that at present the company is unable to obtain the additional capital necessary to equip the tunnels and rapid transit lines under construction and to make other additions and improvements for the reason that it has already issued the amount of bonds allowed by the law and is unable to sell its stock at par, which is the minimum price required by law. The letter also stated that the results of the present fiscal year have confirmed the opinion previously expressed and held by the company, that with the present rate of fare which it is permitted to charge, the transfer privileges which it is compelled by its charter to grant, the rentals for subways already constructed and in process of construction, and the other burdens and charges to which it is subject, it will be impossible for the company to continue to raise capital required to provide additions and improvements to the property, entirely apart from the ability to earn a reasonable return on the money invested. Unless some other remedy looking toward radically increased net revenue is provided it is absolutely necessary that some modification be made in the company's existing contract with the State. Reference was made in the communication to the investigation reported by the Public Service Commission to the Legislature on April 9, 1915. The Governor has sent a special message to the Legislature recommending the establishment of a commission composed of the Public Service and the Boston Transit Commissions, and additional members to conduct the desired inquiry.

CONSOLIDATION OF UTAH LINES PROPOSED

Negotiations are under way for the merger of the three corporations now operating electric lines in Utah and southern Idaho. The railroads involved are the Bamberger line (the Salt Lake & Ogden), the Orem line (the Salt Lake & Utah) and the Ogden, Logan & Idaho Railway. These three companies, some time ago, appointed the same operating officials for each of the lines. A consolidation of the corporations would give the new company control of a continuous line from Preston, Idaho, the northern terminus of the Ogden, Logan & Idaho line, to Payson, Utah, the southern terminus of the Orem line, a distance of 213 miles. The three companies together have $9,500,000 of stock outstanding and about $15,000,000 of bonds. Emil G. Schmidt, president of the Des Moines (Iowa) City Railway, and F. C. Chambers, electrical engineer of the company, are understood to have inspected the properties in the interest of capital which has under consideration the matter of participating in the merger.

American Cities Company, New York, N. Y.—The gross earnings from all sources of the combined constituent companies of the American Cities Company for the calendar year 1915 amounted to $14,203,898, a decrease of $618,207, or 4.2 per cent as compared to the 1914 results. The operating expenses and taxes totalled $9,171,021, an increase of $37,439, or 0.3 per cent, so that the net earnings at $5,032,877 represented a decrease of $655,646, or 11.5 per cent. The deductions from income totalled $3,651,442, an increase of $170,469, or 4.9 per cent, thereby making a decrease of $826,115, or 37.4 per cent, in the $1,381,435 of income applicable to dividends on stock. The decrease in gross earnings was caused entirely by the general business depression and jitney competition, both of which conditions were only temporary, as was shown by the increased earnings in the last three months of the year effected by the adjustment of business conditions and the regulation of jitney competition.

Central Park, North & East River Railroad, New York, N. Y.—In sustaining a decree of the lower court, Judge Buffington, in the United States Court of Appeals, at Philadelphia, Pa., has dismissed the suit of Richard B. Kelly, New York, against George W. Elkins and the estates of P. A. B. Widener and Thomas Dolan. Mr. Kelly was a minority stockholder in the Central Park, North & East River Railroad, a subsidiary of the Metropolitan Street Railway. He alleged that the defendants, directors of the company in which he was a stockholder, had wasted more than $2,000,000 of the assets of the company. The action in this case was referred to in the ELECTRIC RAILWAY JOURNAL of Jan. 16, 1915; March 13, 1915, and Dec. 18, 1915.

Choctaw Power & Light Company, McAlester, Ohio.—The Choctaw Power & Light Company has filed articles of incorporation under the laws of the State of Maine with a capital stock of $2,500,000, presumably as the successor to the Choctaw Railway & Lighting Company, the property of which was sold under foreclosure on April 8, as noted in the ELECTRIC RAILWAY JOURNAL of April 15, page 752.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—Application for the appointment of a receiver for the Cincinnati, Dayton & Toledo Traction Company was filed in the Common Pleas Court of Butler County, Ohio, on May 12 by Albert D. Alcorn, Cincinnati. Mr. Alcorn alleges that he holds five $1,000 bonds of the company on which the interest has been overdue for some time. He says that the board of directors of the company has taken no steps to protect the bondholders, since it has allowed the Ohio Electric Railway to continue to operate the road, although in default for the payment of its rent. He asks that the company be enjoined from turning over its affairs and property to the bondholders' committee. A three-day conference between Randall Morgan, head of the syndicate which controls the Ohio Electric Railway, and the bondholders' committee had just been concluded in Cincinnati at the time Mr. Alcorn presented his petition. J. M. Hutton, chairman of the committee, made the following statement: "There have been a number of conferences, but no conclusions have yet been reached. There are problms in the future requiring large sums of money, such as expenditures to connect with the loop, conservation plans and the maturing of underlying first mortgages, one of which falls due in July. These matters will all require a good deal of consideration and some time to solve." The company has filed an answer to the petition of Mr. Alcorn in which it makes a general denial of the allegations set forth. Some months ago a proposal was made to the company for the modification of the lease under which the road is operated by the Ohio Electric Railway. The likelihood was also reported at one time of the committee representing the bondholders reorganizing the company with the end in view of having the company operate its own line.

Columbus Railway, Light & Power Company, Columbus, Miss.—Interests headed by R. T. Fant, Memphis, Tenn., are reported to have acquired the property of the Columbus Railway, Light & Power Company. It is stated that Mr. Fant has been elected president, succeeding C. F. Sherrod. Charles Hayes is to continue as superintendent.

Denver (Col.) Tramway.—F. W. Hild and John W. Morey have been elected directors of the Denver Tramway, succeeding J. A. Beeler and Thomas F. Keely. Mr. Hild is general manager of the company.

Detroit (Mich.) United Railway.—The Detroit United Railway has notified the holders of the first consolidated mortgage 5 per cent gold bonds of the Detroit Electric Railway, numbered 1 to 1000, both inclusive, that they fall due and will be paid on presentation at the office of the Central Trust Company, New York, N. Y., on June 1, 1916.

Kansas City (Mo.) Railways.—The board of directors of the Kansas City Railways met on May 22 in Kansas City. Ford Harvey, formerly one of the receivers of the Metropolitan Street Railway, and Frank Hagerman, attorney for the receivers, resigned as company directors. Their places were filled by the election of J. E. Gibson, general manager of the company, and Clyde Taylor, general counsel. The other company directors are P. J. Kealy, C. W. Armour, R. J. Dunham and E. F. Swinney. The five city directors are W. T. Kemper, John H. Wiles, F. C. Niles, D. M. Pinkerton and John W. Wagner. The board will hold regular meetings the first Wednesday of each month.

Lancaster & York Furnace Street Railway, Millersville, Pa.—The reorganization of the Lancaster & York Furnace Street Railway has been completed. The bondholders, who took the property from the receivers' hands, have chosen the following directors: Paul Heine, Dr. A. B. Bausman, Eli G. Reist, Elam H. Myers, J. W. Gardener, J. B. Harnish, Amos M. Landis and Martha H. Davis. The board organized by electing Paul Heine president; J. B. Harnish, vice-president; Elam H. Myers, treasurer; John H. Myers, secretary; John H. Ware, general manager. The road has resumed operations, after having been closed since early last January.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The Mahoning Valley Railway has been authorized to issue $117,181 of its improvement and refunding mortgage bonds and deliver them to the Mahoning & Shenango Railway & Light Company in payment, at par, for advances made by it for the construction of additions, extensions and improvements from Nov. 1, 1915, to March 31, 1916.

Metropolitan Street Railway, Kansas City, Mo.—Ford F. Harvey has been discharged by Judge William C. Hook of the United States Circuit Court at Kansas City, as one of the receivers of the Metropolitan Street Railway. Herman Brumback has also been discharged as special master. Robert J. Dunham remains as receiver to close up such business as still remains under the receivership. A change in the board of directors of the successor company, the Kansas City Railways, is published above.

Mexico (Mex.) Tramways.—The New York office of the Pearson Engineering Corporation reports that the relations between the Mexico Tramways and the Mexican interventionists, who took over the operation of this property in October, 1915, are of a very pleasant and satisfactory nature.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Company, New York, N. Y., Reilly, Brock & Company, Philadelphia, Pa., and the Hibernia Bank & Trust Company, New Orleans, La., have bought from the New Orleans Railway & Light Company $3,250,000 of refunding and improvement 5 per cent bonds and $3,250,000 of two-year 6 per cent notes. The proceeds will be used to pay off maturing notes amounting to $4,000,000 and to buy $1,000,000 of the company's French series of refunding and improvement bonds, as well as supply funds for improvements. The new notes are being offered at par and interest.

Philadelphia Company, Pittsburgh, Pa.—Holders of the 5 per cent preferred stock of the Philadelphia Company are to receive further opportunity to exchange their holdings share for share for 6 per cent cumulative preferred stock up to and including July 15 upon payment of $3 per share, subject to the adjustment of the dividends as of the date of deposit of the 5 per cent preferred stock.

Pittsburgh (Pa.) Railways.—The United Traction Company has answered in the District Court of the United

States at Pittsburgh the application for a receiver for the company, asked for by Charles E. Estlack, Woodbury, N. J., on behalf of himself and all other preferred stockholders. The company denied that the Philadelphia Company and the Pittsburgh Railways have failed to keep the property in proper operating condition. On the contrary, the answer says "the property of the United and its subsidiary companies is in better condition now than it was at the time of the making of the operating agreement." It is denied that the net earnings of the United Traction Company were large enough to pay fixed charges, a dividend of 5 per cent upon the preferred stock, and to show a surplus to the credit of the company, if the charges, which were properly charges of maintenance, had been so made, and if reserves had been properly set up for injury and damage claims not settled, and for depreciation and obsolescence. It is averred that under the methods which prevailed at that time of keeping the books of a public service corporation, charges were made to capital account which the companies are now compelled to pay to maintenance or against reserves set aside out of the earnings, and, while the directors and officers of the company followed the usual custom in their methods of keeping the books, such method is not now followed.

Public Service Corporation of New Jersey, Newark, N. J.—The gross increase in total business of the Public Service Corporation of New Jersey for April, 1916, was $369,992, or 12.8 per cent, as compared to April, 1915. The balance available — after payment of operating expenses, fixed charges, sinking fund requirement, etc.—for amortization, dividends and surplus was $350,037, and the increase in surplus available for dividends was $84,322. For the four months ended April 30, 1916, the gross increase in total business amounted to $1,599,234, a percentage of increase of 13.6 per cent. The balance available for amortization, dividends and surplus was $1,562,965, and the increase in surplus available for dividends totaled $387,879.

Seattle, Renton & Southern Railway, Seattle, Wash.—Scott Calhoun and Joseph Parkin, receivers of the Seattle, Renton & Southern Railway, have recommended to Superior Judge A. W. Frater that the bid of F. J. Carver, an attorney representing undisclosed clients, be accepted for the property. Mr. Carver submitted a bid to the court on May 12. His proposal to the bondholders and creditors is to assign their claims to his clients, who will subscribe $375,000 in cash for the present needs of the road, exchanging second mortgage bonds with the present bondholders, and preferred stock with the common creditors, his clients to retain the first mortgage bonds and the common stock, so that they may operate the property. A certified check for $10,000 has been deposited with the receivers of the line by Mr. Carver. Judge Frater has fixed May 25 as the date for confirming the sale. The court will then decide whether the bid of $1,200,000, the minimum price set by it for the property, made by clients of Attorney Carver, or the same amount bid by clients of John C. Higgins, representing Peabody, Houghteling & Company, will be accepted.

Southern Public Utilities Company, Charlotte, N. C.—E. H. Rollins & Sons, New York, N. Y., are offering for subscription at 97 and interest, to yield more than 5.20 per cent, $900,000 of Southern Public Utilities Company first and refunding mortgage 5 per cent bonds due on July 1, 1943. A statement of earnings of the company for the year ended March 31, 1916, shows as follows: Gross income, $1,645,965; operating expenses and taxes, $986,580; net income, $659,385; interest on $5,488,500 of outstanding bonds, $278,420; surplus, $380,965.

West Penn Traction Company, Pittsburgh, Pa.—An extra dividend of 2½ per cent has been declared on the $6,500,000 of preferred stock of the West Penn Traction Company on account of accumulated dividends along with the regular quarterly 1½ per cent dividend. Both dividends are payable on July 15 to holders of record of July 1. The quarterly dividends on the preferred stock, beginning with the Oct., 1914, to and including the Jan. 1, 1916, payments, were deferred. Quarterly distributions were resumed on April 15, 1916, when one-half of 1 per cent extra was paid on arrears.

DIVIDENDS DECLARED

American Railways, Philadelphia, Pa., quarterly, 1 per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1¼ per cent, common.

Northern Texas Electric Company, Fort Worth, Tex., quarterly, 1 per cent, common.

West Penn Railways, Pittsburgh, Pa., quarterly, 1¼ per cent, preferred.

West Penn Traction Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred; 2½ per cent on account of accumulated preferred dividends.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROGUE (LA.) ELECTRIC COMPANY

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$16,199	*$8,999	$7,200	$3,461	$3,739
1 " "	'15	14,853	*9,028	5,825	2,088	3,737
12 " "	'16	197,636	*106,935	90,701	30,989	59,712
12 " "	'15	180,222	*112,592	67,630	25,034	42,596

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$7,097	*$8,466	†$1,369	$1,101	†$2,470
1 " "	'15	7,006	*6,854	152	1,135	†983
12 " "	'16	116,967	*98,618	18,349	13,384	4,965
12 " "	'15	122,452	*101,311	21,141	13,345	7,796

CAPE BRETON (N. S.) ELECTRIC COMPANY, LTD.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$27,866	*$19,940	$7,926	$6,451	$1,475
1 " "	'15	23,495	*15,666	7,829	6,543	1,286
12 " "	'16	371,850	*215,629	156,221	78,780	77,441
12 " "	'15	344,248	*209,008	135,240	78,123	57,117

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., April,	'16	$638,491	$20,670	$617,821	$41,631	$576,190
1 " "	'15	342,336	15,298	327,038	40.833	286,205
12 " "	'16	5,591,248	195,589	5,395,659	500.166	4.895,493
12 " "	'15	3,946,538	137,607	3,803,931	466,666	3,342,265

COLUMBUS (GA.) ELECTRIC COMPANY

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$66,735	*$28,272	$38,463	$28,705	$9,758
1 " "	'15	55,582	*26,186	29,396	28,791	605
12 " "	'16	752,394	*328,458	423,936	344,242	79,694
12 " "	'15	690,773	*307,168	383,605	336,079	47,526

DALLAS (TEX.) ELECTRIC COMPANY

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$159,828	*$100,143	$59,685	$36,779	‡$24,906
1 " "	'15	144,815	*89,420	55,395	33,428	21,967
12 " "	'16	1,851,642	*1,140,849	710,793	414,454	‡303,539
12 " "	'15	2,110,020	*1,204,413	905,607	390,933	514,674

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$62,339	*$34,888	$27,451	$8,867	$18,584
1 " "	'15	52,189	*31,984	20,205	8,772	11,433
12 " "	'16	761,575	*398,230	363,345	105,630	257,715
12 " "	'15	670,976	*391,985	278,990	103,352	175,637

EL PASO (TEX.) ELECTRIC COMPANY

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$86,491	*$47,940	$38,551	$4,810	$33,740
1 " "	'15	78,329	*45,189	33,140	4,229	28,911
12 " "	'16	1,014,837	*531,703	483,134	51,960	431,174
12 " "	'15	1,020,917	*559,699	461,218	50,671	410,547

FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$141,317	$85,871	$55,446	$54,620	‡$943
1 " "	'15	138,953	80,786	58,167	54,527	‡4,049
3 " "	'16	420,091	251,244	168,847	161,964	‡7,490
3 " "	'15	430,341	244,035	186,306	160,618	‡26,729

KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$65,682	$35,789	$29,893	$20,525	‡$13,147
1 " "	'15	58,707	33,184	25,523	19,824	‡9,564
9 " "	'16	640,014	327,853	312,161	183,560	‡149,351
9 " "	'15	608,578	325,154	283,424	177,994	‡129,497

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$27,190	*$14,692	$12,498	$5,357	$7,141
1 " "	'15	21,698	*13,056	8,641	5,456	3,185
12 " "	'16	292,373	*162,348	130,025	66,259	63,766
12 " "	'15	269,990	*177,430	92,560	66,885	25,675

JACKSONVILLE (FLA.) TRACTION COMPANY

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$54,731	*$36,762	$17,969	$15,440	$2,529
1 " "	'15	53,497	*37,426	16,071	15,645	426
12 " "	'16	612,704	*426,044	186,660	180,181	6,479
12 " "	'15	688,368	*463,722	224,646	156,621	68,025

VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar.,	'16	$474,338	$224,588	$249,750	$148,099	‡$108,404
1 " "	'15	399,491	202,889	196,602	138,037	‡65,021
9 " "	'16	4,206,648	1,967,998	2,238,650	1,301,756	‡1,008,393
9 " "	'15	3,860,783	1,858,867	2,001,916	1,225,583	‡836,154

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

CASE AGAINST JITNEY STATED

Newspaper Shows Forcefully How Jitney Reacts to Railway Patrons' Disadvantage

The case against the jitney was stated forcefully in the Scranton (Pa.) edition of the Elmira (N. Y.) "Telegram" of May 21. The article follows, substantially in full:

"Do you know that every time you ride in a jitney you are striking at the street railway transfer and giving a blow to the people who live in one side of the city and work in the other side? The street railway transfer is the one big drawback in the management of modern street railways. It is a condition of the past that does not exactly fit into conditions brought about through modern street railroading. The street railway companies would give a great deal to abolish the transfer, for the reason it would add more than 33 per cent to their daily earnings. A quarter of a century ago, when street railway men worked for 10 and 12 cents an hour and railway equipment did not cost one-half of what it does to-day, in order to humor councilmen who granted street railway franchises, the companies were liberal with transfers and such were put in the contracts. The street railway could afford to issue transfers years ago, for few people lived very far away from their labors. But now a man living in Dunmore may be employed in Keyser Valley, and he is carried 5 or 6 miles for 5 cents. Similar conditions exist in several parts of the city. The street car companies find little profit in the long haul, and they would be very glad to abandon it. But to break the contract the street railway company must have a valid and a convincing proof.

"The Pittsburgh Railways has issued notice that it will go before the Council and ask the privileges of increasing fares under certain conditions. The company says it is forced to do this to keep out of bankruptcy, as the recent advance in wages to employees has added $500,000 a year to the pay roll. The Pittsburgh company wants to charge 10 cents for all fares after midnight. It also wants to cut off a number of transfer privileges. In other words the people of Pittsburgh will have to pay the increase in wages received by the street railway men, just as the consumer will pay for the advance in wages received by the miners.

"As I have said, the company would be very much pleased to get rid of the transfer. It is not only dead loss, but it requires a lot of clerical work that otherwise would be unnecessary. When the company goes before Council and shows that it cannot meet operating expenses, owing to the competition of the jitney, and that many people do not appreciate the transfer privileges, Council will have facts that cannot be overcome with ease, and sooner or later the Council will be forced to enter into some compromise with the company to permit it to meet its pay roll and the interest on its bonds. The result will be that this Council or some other Council will permit the street railway to abandon the transfer. This will add to the burden of the working people. It will mean a dime where a nickel pays the price to-day.

"Who is to blame? The jitney and the people who patronize it—the thoughtless people who do not understand what they are bringing about. It is said the Scranton Railway is losing $500 and $600 a day through the jitneys. The street railway pays the city $10,000 a year for the use of the streets. The jitney does not pay the city a cent. The street railway has spent millions of dollars to lay pavement. The only contribution the jitney has for the city is the wear and tear of the streets, the congestion of traffic and the added danger to pedestrianism. The jitney is a pirate. It refuses to obey a city ordinance passed a year ago, requiring each jitney owner to furnish a bond sufficient to cover any damages he may do to persons in or out of his car. The jitney refuses to obey the ordinance forbidding more than the seating capacity of the car. The local courts have declared the ordinance constitutional. The jitney people have taken an appeal to the Supreme Court, which will give them another year to help kill the street railway transfer. Many of the jitney owners belong to other towns, men who have never paid a cent towards the taxation of Scranton and yet come to Scranton and take possession of the streets that have cost us millions of dollars. The Public Service Commission, paid to look after the care of people, drags along as if its purpose was to give street railways the opportunity to go before Council and seek the privilege to withdraw street railway transfers. If you are going to give the jitney the right to collect 5 cents for the short haul, you are giving the street railway the food it wants to set aside a contract that is in favor of the people.

"The street railway employs 500 or 600 people in Scranton, paying union wages. The jitneys employ no one. The street railway employs union labor. The jitney people are not unionized. Sixty-five per cent of the nickel you give the street railway conductor goes to the labor of this city. A hundred per cent of the nickel you give the jitney man goes, in many instances, outside the city."

BAY STATE FARE HEARINGS GOING FORWARD

At the hearing on May 16 at Boston in the Bay State Street Railway fare case the cross-examination of R. M. Feustel, the company's valuation expert, was resumed by Arthur G. Wadleigh, counsel for the city of Lynn. It was brought out that the company's total revenue for the year ended June 30, 1915, was $8,819,633, the maximum revenue being $961,932 in July, 1914, and the minimum $588,256, in February, 1915. The average monthly revenue was $734,969. The witness said that the heavier summer business was largely of the all-day riding character. Some opportunity existed for borrowing equipment from other divisions than those handling the maximum loads. In regard to park and similar special rate tickets the point was made that these were omitted in the establishment of the proposed rate schedule.

Mr. Feustel said that the major part of the proposed tariff was drawn up by D. Dana Bartlett, New York, and himself. After the valuation had been made and the property allocated to the various operating routes, a long study was made of the zone system in an attempt to fit it to the property. This was found impracticable from the physical collection standpoint and from the identification of passenger standpoint, on certain congested territory. The rearrangement of the present system of fare collections was then taken up by sizing up the deficit on the various lines, going over the line carefully and getting information from local superintendents as to the flow of traffic. As far as possible the routes were terminated at neutral points between cities or towns from which traffic flows substantially in both directions. In general, the local rate in cities was set at 6 cents. New zones were fitted into certain lines showing a large deficit and where the total through lengths of ride seemed long for the fares paid.

The witness held that it would be difficult to find a single traffic territory of the system which was paying a 7 per cent return on the present fare basis unless such a territory were narrowed down to an individual city and the 5-cent fare collected in that city, with the existing transfer limit. Lynn, Brockton, Lawrence and Salem might be considered as paying on the above basis, excluding the larger community interests of each outside the cities. Mr. Feustel said that in his opinion a promise to restrict rates in securing a franchise can be shown to be absurd from the standpoint of the people giving it and of those receiving it, and that such promises should have no bearing in an honest attempt to fix fair rates. No attention was paid to the franchise requirements in reaching the rate schedule now before the board for approval. If there was a loss in operating a line the public must pay for it in the end, and whether the public misapprehended the situation for the moment should not enter into the fair fixing of the rate. The witness said that "the method of getting franchises and attempting to fix the fare in the franchise, regardless of knowing what it was going to cost, was one of our unfortunate American methods of having a public utility deal and trade with a public community, and it being as rough a method as it is, it must fall down on both sides in many cases." No moral issue could be seen in such cases in the witness' opinion.

ALBANY FARE ARGUMENTS CONCLUDED

The hearings on the application of the United Traction Company, Albany, N. Y., to the Public Service Commission for the Second District for permission to increase its fare between Albany and Troy from 10 cents to 15 cents were closed on May 17. William E. Woollard, representing the communities affected, declared that the company had failed to show that it must have increased rates on any basis of fair return on the property used in the public service, but had instead submitted a mass of figures showing only that it was not able to meet the fixed charges on its capitalization. H. T. Newcomb, for the company, refused to make an oral argument. He declared his intention of filing a brief later.

Mr. Woollard made his argument on the results of the day's cross-examination of C. F. Hewitt, general manager, and Wilson H. Elder, auditor of the company. During the morning H. C. Hopson, the expert retained by the protesters against the new fares, brought out that the company had never set up any reserve for depreciation as required by the Public Service Commission's uniform system of accounts.

Mr. Hewitt testified on the morning of May 17 that the company had been unable to make new extensions because it was not able to borrow the money necessary on account of its poor credit. The company also submitted an exhibit which purported to show that instead of the Hudson Valley Railway being a drag on the United Traction Company the traction company enjoyed a net return of $148,000 in 1915 from its interest in the Hudson Valley Railway. The United Traction Company itself in 1915, according to these figures, showed an operating loss of $219,929.

NEWARK JITNEY SUPPORTERS THREATEN APPEAL

The jitney situation in Newark, N. J., has become involved by the co-enactment of the so-called Kates State law designed to regulate jitneys, which has just become operative, and the regulatory ordinance passed by the local Board of Works of Newark and said to be approved by Mayor Raymond. On one side it is announced that the jitney supporters will seek a writ of certiorari to review the action of the Board of Works in passing the measure. On the other is the statement of Trolley Inspector Crawford that on May 27, with the aid of the police, he intends to proceed under the Kates act by having every jitney owner who has not filed a bond for insurance arrested.

There are at least 400 jitney owners in the city, Mr. Crawford estimates. So far only about fifty of this number have filed bonds with him. His view is that the owners of buses have had ample opportunity to file bonds, as by May 27 practically two weeks will have been given for this purpose. Of the 400 it is expected there are some who will quit business as soon as an attempt is made to enforce the law; in fact, about twelve already have announced such an intention.

DEFENSE OF LOS ANGELES 5-CENT FARE CASES

Inadequate revenue formed the basis of the facts and argument presented by the Pacific Electric Railway in opposition to the contentions of the city of Los Angeles, Cal., for extension of 5-cent fare limits on various lines, described in ELECTRIC RAILWAY JOURNAL of May 6, page 862. The company's case was presented on May 16, 17 and 18, at a hearing before the California State Railroad Commission, in Los Angeles, by President Paul Shoup, Traffic Manager D. W. Pontius, Assistant Traffic Manager O. A. Smith, and Chief Counsel Frank Kerr. Voluminous testimony was offered in proof of the company's claims that revenue from the districts to which extensions were demanded would not be sufficient to warrant the extension of the lower fare, and that revenue on the company's lines now existing does not warrant any movement in the direction of reduced rates. Statistics were presented showing the cost of operation on the different lines, and the revenues, also a statement showing that the company as a whole is not at the present time making an adequate return on the investment in its facilities.

A statement of particular interest in connection with the Palms case showed the loss in revenue which would result by breaking down the through fares through the operation of the long and short haul principle if the 5-cent fare were established to Palms, with through fares based on the sum of the resulting reduced locals.

This was the final hearing in these cases, but the company has until June 10 to put in further statistics of travel requested by the commission, after which briefs will be filed by the city and the company.

CHICAGO ELEVATED BIDS PUBLIC'S CO-OPERATION

Elevated News, published in the interest of the elevated railways of Chicago, took on a new form with the May issue, changing from a four-page folder to an eight-page booklet. In it appeared the announcement that the company hoped to become a medium through which co-operation of the public with the company and its employees may be more fully developed and expressed. An article entitled "Co-operation" reads as follows:

"In the operation of a public utility the co-operation of the public with the company and its employees is essential if the highest degree of efficiency and the best service are to be attained. In the nature of things, it is impossible for the officials entrusted with the management of the elevated railroads to come in personal contact with the hundreds of thousands who daily use the lines. The attitude of the company toward its patrons must in a large degree be reflected through the conduct of the employees and the character of the service given.

"The management of the elevated railroad is frankly desirous of establishing and maintaining the most harmonious relations with its patrons. It realizes that a pleased public is a most valuable asset. It recognizes that there are human limitations beyond which the company cannot go in the matter of service, but it desires to give the best service possible within such limitations. It is constantly trying to improve the service and believes that its patrons appreciate that fact. *Elevated News* is issued to help the company, its employees and patrons to become better acquainted. We are all human and life's little irritations become less annoying when viewed with a little human understanding. Instead of indulging in useless criticism, let us all work together in a spirit of co-operation and in this way make for better service and a greater Chicago in which we are all interested."

HEARING ON ADDITIONAL CARS FOR BROOKLYN

The Public Service Commission for the First District of New York is conducting a hearing into the need for additional surface cars on the Brooklyn Rapid Transit System. The company contends that the opening of the new rapid transit lines will release a sufficient number of cars to permit it to give adequate service on all surface lines without purchasing additional equipment.

William H. Smith, supervisor of inspectors for Brooklyn for the commission, was a witness on May 15, 18 and 22. He testified regarding the number of surface cars operated and kept in reserve by the company. He also testified regarding the number and types of cars operated in the congested sections during the rush hours and the average number of standing passengers carried during the evening rush hours. On May 22 D. L. Turner, engineer in charge of subway construction, testified regarding the dates when the various sections of the dual subway system would be completed and the rapid transit facilities the system would supply to various sections of Brooklyn where there are no such facilities at present. W. G. Gove, superintendent of equipment of the company, testified on the same day regarding the inspection and overhauling system of the company. He also spoke of the present abnormal condition of the steel and copper market and the increased cost of equipment if ordered at this time. He expressed the opinion that it would be impossible to secure new cars of the Brooklyn center-entrance type for at least nine months. On May 24 W. S. Menden, chief engineer of the New York Municipal Railway Corporation, testified regarding the relief which he expected would be afforded the Brooklyn surface lines when the dual system was put in operation. William Siebert, superintendent of surface transportation, testified regarding the number of surface cars which would be released when the new rapid transit lines were opened and also the number of additional cars needed for various extensions. The hearing was then adjourned until June 2.

Chain Tickets Offered in New York.—A soldier of fortune has appeared in New York who is offering subway and elevated tickets to the gullible under the old endless chain scheme. This man is out of the West and made his way to New York via Denver. He operates as the Economic Ticket Company and claims to be new at the business. He stated in an interview, however, that he had neither advertised nor used the mails in furthering his sales.

New York Smoking Rule to Stand.—The Public Service Commission for the First District of New York decided, on May 22, not to abrogate the present regulations as to smoking in cars. This decision was made known in an order denying the application of Charles Dushkind, secretary and counsel of the Tobacco Merchants' Association of the United States, asking that the commission rescind the order of Sept. 16, 1913, which governed the conditions on which smoking is permitted on certain cars of the surface lines. The Tobacco Merchants' Association sought also to have the commission issue an order requiring all railroad companies operating elevated or surface lines in the city to provide smoking cars or cars having smoking compartments. The order of the commission now confines smoking to the four rear seats of open cars and of convertible cars. Similar requests of the advisory board of the cigar makers' organization to the commission were also denied.

Twin City's Broad Publicity Policy Delineated. — An engaging description of the versatility shown by the Twin City Rapid Transit Lines, St. Paul and Minneapolis, Minn., in making its advertising produce results is contained in the May 18 issue of *Printers' Ink* in the form of an article by T. D. MacGregor entitled "Keeping Dividends Up by Putting Advertising on the Payroll." The article maintains that an intelligent and consistent policy of advertising for ten years and the training of employees in courtesy and efficiency have been important factors in the present success of the company and its popularity with the press and public of its territories. The development and influence of the company's publicity department under the experienced hand of A. W. Warnock, its general passenger agent, is outlined in the article. This publicity has assumed definite shape in the publication of bookets, folders and advertisements exploiting the Twin Cities, their attractive surroundings and agreeable method of transportation, and treating such subjects, for example, as hints to employees on how to treat the public. Full page advertisements have been frequently placed from time to time in the newspapers urging the public to co-operate in reducing accidents. An unusual practice described is that of publishing a display advertisement in the newspaper occasionally explaining why cars were delayed beyond a period of ten minutes.

New Bay State Folder Shows Through Routes.—A new folder advertising trolley trips has been issued by the Bay State Street Railway, Boston, Mass., under the direction of Ralph M. Sparks, general passenger agent. The folder contains sixteen pages and includes time-tables, halftones, and descriptive matter relative to points of interest on the company's system and its connections, with maps of the Boston rapid transit lines and special trolley trips along the north and south shores of Massachusetts and via interior routes reached by the company's service. A new and improved feature of the folder is a large map of the Bay State system, on which all through car service is indicated by carrying solid lines of various colors from terminus to terminus. Important terminals or transfer points are shown in circles, and where a through route begins or ends at one of these it is so indicated upon the map, the line being carried through the circle when the service is continued without change to another point. Local lines are shown with points of connection to through routes, and by reference to the map the number of cars required for a journey between any two points on the systems north and south of Boston instantly can be ascertained. Lines of other street railways in the territory are also shown. A new route described in the folder covers the shore trip from Boston to Portland, Me., ten hours and twenty minutes of actual running time being scheduled, with ten changes en route.

Personal Mention

Mr. Fred C. Hornstein has resigned as general superintendent of the Ephrata & Lebanon Traction Company, Lebanon, Pa., to accept a position as superintendent of station erection with the New York Steam Company, New York.

Mr. W. B. Anderson is now assistant treasurer of the Pensacola (Pa.) Electric Company, taking the place of Mr. E. J. Seaborn, who is now with the Tampa Electric Company. Mr. Anderson was formerly in the treasurer's office of the Tampa Electric Company.

Mr. E. Sears has been placed in charge of the maintenance of electric equipment on the Chicago, Milwaukee & St. Paul Railway, with headquarters at Deer Lodge, Mont. Through a typographical error in an item in the ELECTRIC RAILWAY JOURNAL for April 29 the name was printed Mr. E. Fears.

Mr. William von Phul, a member of the firm of Ford, Bacon & Davis, residing in New Orleans, has been appointed to succeed Mr. Charles N. Black as vice-president and general manager of the United Railroads, San Francisco, Cal., effective on June 1. Announcement of the appointment was made in San Francisco on May 20.

Mr. Horace Fligg, of the engineering department of the Denver (Col.) Tramway, has been granted leave of absence and has gone to Boston, Mass., where he is temporarily associated with Mr. John A. Beeler, consulting engineer to the Bay State Street Railway, in connection with the fare case now before the Public Service Commission of Massachusetts.

Mr. H. A. Albin, who has had the supervision of the construction and operation of the lighting and power plant of the Lebanon Valley Light & Power Company in Schaefferstown, Kleinfeltersville, Richland, Milback Springs and Newmanstown, Pa., has had added to his jurisdiction the position made vacant by the resignation of Mr. Fred C. Hornstein as general superintendent of the Ephrata & Lebanon Traction Company.

Mr. Philip D. Laird of Montgomery County has been appointed a member of the Public Service Commission of Maryland, succeeding Mr. W. L. Henry, whose term has expired. Mr. Laird was formerly chairman of the commission, but resigned about a year ago because of ill health. He has now recovered. The new commissioner was speaker of the House of Delegates in the last Maryland Legislature. The appointment becomes effective on June 1.

Mr. Hugo Wurdack, St. Louis, president-elect of the Missouri Association of Public Utilities, was born at St. Louis on March 9, 1871, and has resided in that city continuously since that time. During the greater part of his life he has been engaged in the public utility business. For two years he was in the employ of the St. Louis Illuminating Company and later acted as superintendent of the electrical department of the Laclede Gas Light Company. After fourteen years of service in that position he became assistant general manager of the Laclede Power Company. He has been president of the Light & Development Company, St. Louis, since 1907.

Mr. George Quackenbush, formerly traffic manager of the Illinois Traction System, has been appointed assistant general manager of the Rock Island Southern Railway System, Rock Island, Ill., in charge of operation, reporting to Mr. E. C. Walsh, Jr., vice-president. Previous to becoming traffic manager of the Illinois Traction System in March, 1910, Mr. Quackenbush was assistant general freight agent of the Chicago & Alton Railroad, and prior to that held important traffic positions with the Iowa Central Railroad. For a time he retired temporarily from the traffic department of the Chicago & Alton Railroad to accept a position as manager of the Western Union Telegraph Company at Denver, Col. Mr. Quackenbush remained in the service of the Illinois Traction System until October, 1914, when he resigned to take up private business.

Mr. F. R. Slater, who has been elected president of the Southwestern Electrical & Gas Association, is acting general manager of the Texas Power & Light Company, with headquarters at Dallas. Mr. Slater has been connected with the Texas Power & Light Company since 1912 and is well known among electric railway operators, particularly in the East. He was graduated from Cornell University in 1894. After completing his course in electrical and mechanical engineering he was engaged for a short time in the design of the power station of Columbia University, after which he entered the designing department of the Otis Elevator Company. On the outbreak of the war with Spain he decided to engage in military service and served as adjutant in the First United States Volunteer Engineers. After the close of the war he joined the forces of the Manhattan Railway, New York, N. Y., which was then converting its elevated lines from steam to electricity. He remained with that company until he joined the engineering forces in connection with the building of the original New York subway. On the subway work, Mr. Slater was assistant engineer in charge of the construction of the d.c. distribution system and later was principal assistant engineer. He and Mr. H. N. Latey subsequently formed a partnership under the firm name of Latey & Slater for the general practice of engineering with offices in New York, but he withdrew from the firm in 1912 to go to Dallas. At the time of the St. Louis Exposition in 1904, Mr. Slater served as a member of the advisory council of the Electric Railway Test Commission.

F. R. SLATER

Mr. E. C. Allen, the newly elected president of the Iowa Electric Railway Association, is general manager of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa. He was born in Ypsilanti, Mich., in 1875, was graduated from Michigan College in 1895, and completed a special course in law at the University of Michigan in 1897. In July, 1897, Mr. Allen took charge of the material and time keeping during the construction of the interurban railway between Ann Arbor and Detroit, Mich. Upon the completion of this construction he was made traveling auditor and later general freight agent. In this latter position he was a pioneer in the development of interurban freight traffic. In 1902 the road between Ann Arbor and Detroit was extended to Jackson, Mich. In 1903 it was taken over by the Detroit United Railway and Mr. Allen was made superintendent. In 1913 he resigned from the Detroit United Railway to become general manager of the Cedar Rapids & Marion City Railway. The company owns 27.5 miles of line and operates fifty-two motor cars and seven other cars. It is controlled by the United Light & Railways Company.

Mr. T. C. Cherry has been made second vice-president and general manager of the Auburn & Syracuse Electric Railroad, Syracuse, N. Y., under the financial readjustment outlined in the Electric Railway Journal of May 13, page 925. Mr. Cherry was born and educated in Syracuse and in 1894 entered Syracuse University, where he took an engineering course and a two-year course in law. He entered the employ of the Syracuse Rapid Transit Railway, working on construction and track work but later was made superintendent of track. In 1900 he went to Lorain, Ohio, as superintendent of construction of line and track under Mr. C. Loomis Allen, who was then general manager of the Lorain Street Railway. Mr. Cherry served as dispatcher and was later made general manager of the company. Since that time he has been connected with electric railway, light and gas companies in New York, Michigan, Ohio and Pennsylvania. For the last four years Mr. Cherry has been vice-president and general manager of the Maryland Electric Railways, Annapolis, Md. He is a director in the firm of Allen & Peck, Inc.

Mr. E. W. Holst, who was appointed mechanical engineer of the Bay State Street Railway, Boston, Mass., on May 4, was the subject of a brief biographical sketch, with a portrait, in the Electric Railway Journal of March 18, 1916, page 584. His service with the Bay State Street Railway and its predecessors dates from 1904, when he joined the staff as superintendent of car repairs. In 1907 he was appointed superintendent of equipment of the entire system, which includes nearly 1000 miles of track in three States. Two principal types of passenger cars have been designed by Mr. Holst. In 1909 he brought out the reduced weight semi-convertible car well known to readers of this paper, in which a saving of 6600 lb. was obtained without sacrifice of strength and efficiency as a transportation unit, and in 1915 a convertible car of reduced weight and embodying many novel features was designed by him. This was described in the Electric Railway Journal of Oct. 23, 1915, page 854. Mr. Holst also designed a reduced weight truck for his company, and has done similar work in the field of express car design. He always has been very active in the American Electric Railway Engineering Association, is a prominent member of the New England Street Railway Club, and is now president of the New England Railroad Club. In his new work he will have charge of all construction and reconstruction in the mechanical field of the company's operations.

Mr. Howard W. Irwin, whose appointment as superintendent of car repairs of the Bay State Street Railway, Boston, Mass., was noted in the Electric Railway Journal of May 13, is a native of Brattleboro, Vt., and has had varied experience in both central station and railway fields. He was educated at Amherst College and at Purdue University, receiving the degree of B. S. of M. E. from the latter institution in 1903. Mr. Irwin was first employed by the General Electric Company, and was assigned to the steam turbine test at the Schenectady, N. Y., works, later being placed in charge of this testing service. In 1905 he was appointed assistant superintendent of power, in immediate charge of the electric motor drives in the entire plant. He left Schenectady in 1906 to become manager of the public utility properties of the Northern Electric Company, with headquarters at Fargo, N. D. In 1910 Mr. Irwin joined the staff of the Bay State company as superintendent of instruction. In this connection he was responsible for many novel features of the instruction car described in the Electric Railway Journal of Aug. 13, 1910, page, 252. Mr. Irwin subsequently became assistant superintendent of equipment, and then investigating engineer of the department of motive power and machinery. He is a member of the New England Street Railway Club, Engineers Club of Boston, and an associate member of the American Institute of Electrical Engineers. In his new work he will have general charge of rolling stock maintenance and shop administration over the entire system.

H. W. IRWIN

OBITUARY

Walter P. Ellingwood, connected with the Puget Sound Electric Railway at Puyallup, Wash., died recently from injuries sustained in an automobile accident. Mr. Ellingwood had been in the company's service fifteen years.

Marion H. Keyes, formerly superintendent of the Pennsylvania Avenue division of the Capital Traction Company, Washington, D. C., is dead. Mr. Keyes was born in Prince William County, Virginia, in 1853 and went to Washington in early manhood. He was first employed in the surveying department of the district government, and in 1875 entered the service of the Capital Traction Company. He retired from the company in 1909.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Chester & Eddystone Street Railway, Harrisburg, Pa.**—Chartered in Pennsylvania to operate a 2 1/3-mile electric railway in Delaware County, Pa. Capital stock, $15,000. Van Horn Ely, president of the National Properties Company Philadelphia, Pa., president. Directors: Henry P. Carr and Harold B. Anderson, Philadelphia; John J. Henderson, Melrose Park, Pa., and T. W. Wilson, Wilmington, Del. [April 15, '16.]

FRANCHISES

Martinez, Cal.—The Martinez & Concord Interurban Railway has asked the Council for a franchise to construct a line on Escobar Street eastward from Pine Street. The project for building the line along Main Street has been abandoned. [April 29, '16.]

Lakeland, Fla.—The Tampa & Eastern Traction Company has received a thirty-year franchise from the City Commissioners to construct a line in Lakeland. Frank L. Cooper, secretary. [May 6, '16.]

Tampa, Fla.—The Export Phosphate Railway & Terminal Company has received a franchise from the City Council to construct a line in Tampa. A provision in the franchise provides for the electrical operation of the line not later than two years from the date of starting operations. The American Agricultural Chemical Company, New York, is financing the line. H. L. Pierce is interested. [July 25, '14.]

Springfield, Mass.—The Springfield Street Railway has asked the Council for a franchise to double track its line through Park, River and Bridge Streets, West Springfield.

Brooklyn, N. Y.—Three applications made by companies in the Brooklyn Rapid Transit system for extensions of surface car lines in Brooklyn and Queens have been granted by the Public Service Commission for the First District of New York during the week as follows: Brooklyn Heights Railroad Company, extension from Fresh Pond Road at intersection of present tracks with tracks of the Lutheran Cemetery line, thence along Fresh Pond Road to form a connection with the existing tracks of the company in Myrtle Avenue; Brooklyn, Queens County & Suburban Railroad Company, extension on Metropolitan Avenue from Dry Harbor Road to Jamaica Plank Road; Nassau Electric Railroad, extension on Eighth Avenue, from Thirty-ninth Street to Bay Ridge Avenue. All three extensions are to be two-track surface lines.

Buffalo, N. Y.—Application will soon be made to the City Council by the International Railway Company for a franchise to lay double tracks and operate cars through Franklin Street from Chippewa Street to Allen Street, ½-mile.

Jackson, Tenn.—The Jackson Railway & Light Company has received permission from the City Commission to construct a double track on Main Street from Market to Royal Street.

Tacoma, Wash.—The County Commissioners have approved the transfer of the franchise held by the Tacoma Railway & Power Company to the Pacific Traction Company. The latter company will extend its line from the State Hospital for the Insane to Steilacoon.

TRACK AND ROADWAY

***Edmonton, Alta.**—Plans are being prepared by E. W. Bowness of the Edmonton Power Company for the development of a municipal power system, including railway, to cost about $500,000.

***Flagstaff, Ariz.**—It is reported that Gen. M. H. Sherman, Los Angeles, contemplates the construction of an electric railway from Flagstaff to Grand Canyon, 70 miles.

Fresno (Cal.) Interurban Railway.—Work has been begun by this company on the construction of its 11-mile extension from Barton Vineyard to Centerville. It is expected that the line will be completed and in operation about June 15.

Martinez & Concord Interurban Railway, Martinez, Cal.—This company was authorized on May 15 by the Railroad Commission of California to issue securities preliminary to constructing a line from Martinez to Concord. The first unit of the line will extend from Martinez to Government Ranch, 6½ miles. The Commission's order is made contingent upon the company's obtaining the necessary franchises. The securities authorized are 600 shares of stock to be sold at $80; $125,000 of first mortgage bonds to be sold at $90, and $125,000 cumulative participating bonds to be sold at par and the proceeds to be used in retiring the first mortgage bonds. [April 29, '16.]

Washington & Old Dominion Railway, Washington, D. C.—It is reported that this company is considering the construction of an extension in Virginia.

Miami (Fla.) Traction Company.—A report from this company states that it has placed an order for steel rails for a 1-mile extension.

Tampa & Eastern Traction Company, Tampa, Fla.—Preliminary surveys are under way for this company's proposed line from Tampa to Lakeland, 33 miles. It is reported that the contract for the construction of the line has been conditionally awarded to the Utilities Construction Company, Norristown, Pa. F. L. Cooper, Tampa, Secretary. [May 6, '16.]

Chicago Heights (Ill.) Street Railway.—A contract has been let by this company for the construction of a line on Fourteenth Street from Wentworth Avenue to East End Avenue.

Decatur Railway & Light Company, Decatur, Ill.—This company, a subsidiary of the Illinois Traction System, Peoria, Ill., will extend its Eldorado Street line from William and Seventh Streets north to the tracks of the Wabash Railway Company.

Southern Traction Company, Bowling Green, Ky.—This company reports that it has purchased material for the construction of about a half mile of track.

Louisville (Ky.) Railway.—Announcement is made by T. J. Minary, president of the Louisville Railway, that the Madison Street extension, connecting with the Chestnut Street line, will be placed in operation on June 1.

Paducah (Ky.) Traction Company.—A report from this company states that it has placed contracts for the construction of double track on Broadway between Eleventh and Seventeenth Streets, in place of the present single track. The company will use 80-lb. 7-in. rail in place of the present 60-lb. rail.

Winnipeg (Man.) Electric Railway.—It is reported that if the city withdraws its demand for the construction of a line on Talbot Avenue, the Winnipeg Electric Railway will double track its line on Main Street from the north end limits to a point beyond Kildonan Park.

United Railways & Electric Company, Baltimore, Md.—It is reported that this company will construct a 1-mile extension on Liberty Heights Avenue.

Mankato (Minn.) Electric Traction Company.—A report from this company states that it will probably construct an extension into North Mankato this fall.

Kansas City (Mo.) Railways.—Work has been begun by this company on the reconstruction of its Summit Street line from Thirty-third to Thirty-eighth Street.

Interborough Rapid Transit Company, New York, N. Y.—Bids were opened by the Public Service Commission for the First District of New York for the construction of Route 31, a part of the Eastern Parkway line. The lowest bid was submitted by Dennis E. Conners, New York, at $1,356,000.

New York Connecting Railroad, New York, N. Y.—The Public Service Commission of the First District of New York has authorized the issue of $8,000,000 in bonds by the New York Connecting Railroad to be used for general construction purposes. The bonds are to be issued to yield 4.5 per cent and will mature in 1953.

New York (N. Y.) Municipal Railway.—During the week the Public Service Commission for the First District of New York opened bids for the construction of Sections Nos. 1 and 4 of Route No. 8, the Fourteenth Street-Eastern subway. The lowest bidders were respectively Booth & Flinn, Ltd., at $2,527,295, and Mason & Hanger Company, Inc., at $1,847,174. Section No. 1 extends under Fourteenth Street, Manhattan, from Sixth Avenue to about Irving Place; and Section No. 4 is in Brooklyn, and extends under North Seventh Street and Metropolitan Avenue from Bedford Avenue to Manhattan Avenue. This line is for operation under the dual system contracts by the New York Municipal Railway Corporation. The river tunnel, Section No. 3, is already under contract and work is progressing. On June 5 the Public Service Commission will receive bids for the supply of about 90,000 tons of structural steel for use in the construction of several portions of the dual system rapid transit lines. The commission will go into the open market for this steel, and the construction contractors will merely put in bids for erection, the city furnishing the steel.

Goldsboro Electric Railway Company, Goldsboro, N. C.—This company states that it is in the market for material for the construction of a 2-mile extension, including three railroad crossings and one complete Y.

Northern Ohio Traction & Light Company, Akron, Ohio.—Work will be begun at once by this company on the Winfield Way extension in Canton, and it is expected that the line will be in operation by July. The company is renewing its tracks on Bowery Street from Thornton Street south, and on Bowery Street between Exchange and Wooster Avenue.

Toronto (Ont.) Civic Railway.—This company has awarded a contract to the United States Steel Products Company at $2,120 for the supply of a special trackwork layout for its St. Clair Avenue carhouse extension.

Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa.—Work on the improvement of this company's lines has been begun. The tracks are being overhauled and new ballast distributed. It is estimated that the improvements will involve an expenditure of $40,000.

Pottstown & Phoenixville Railway, Pottstown, Pa.—In addition to improvements to its rolling stock, this company plans other improvements to its property within the next few months which will aggregate the expenditure of about $50,000. New 86-lb. rails will be laid west of Manatawny Street and east of Montgomery Street. The construction of an annex to the big auditorium at Sanatoga Park is well under way, and it is expected that the structure will be completed the latter part of this month.

Reading (Pa.) Transit Company.—It is reported that this company will lay 600 tons of new rails in Reading and West Reading this year.

Dallas (Tex.) Standard Traction Company.—This company will construct about a half mile of track in Mount Auburn addition.

Houston (Tex.) Electric Company.—This company will move its tracks on the Fannin Street Extension line for a distance of about 300 ft., to relieve obstruction to the entrance of Hermann Park. The change will cost the company approximately $3,000.

Princeton (W. Va.) Power Company.—This company reports that its extension to Bluefield will be placed in operation about July 1. The line will have connection with the Appalachian Power Company for entrance to Bluefield.

Wisconsin Interurban System, Madison, Wis.—A report from this company states that it will soon begin construction on 110 miles of its proposed system. Contracts totaling about $600,000 have recently been let to Maney Brothers & Company of Oklahoma City for the first 12 miles of line extending on Washington Street, Madison, to Middleton. The franchise calls for the completion of this section by Dec. 31, 1916. The company plans to have the line completed from Madison to Janesville, 38 miles, by Dec. 31, 1917; from Madison to Portage, 37½ miles, by Dec. 31, 1918, and from Madison to Prairie du Sac, 23 miles, by Dec. 31, 1918. Further extensions are contemplated to connect Prairie du Sac, Richland Center and Viroqua, 74 miles; Madison, Sun Prairie and Fond du Lac, 75 miles, and Sun Prairie and Watertown, 25 miles. It is expected ultimately to reach Merrill, Wis. J. E. Jones, Washington Building, Madison, president and general manager. [March 11, '16.]

SHOPS AND BUILDINGS

Kewanee & Eastern Electric Railway, Kewanee, Ill.—It is reported that this company has purchased a site on School and North Streets, Henry, between Third Street and the river, for the construction of a new station.

Springfield (Mass.) Street Railway.—Work will be begun at once by this company on its new Hooker Street carhouse. The building will be 205 ft. x 190 ft., one story high, and will be of brick and concrete construction. The carhouse will include repair shops, storerooms, an assembly hall, locker room, barber shop and restaurant. The cost is estimated at about $250,000. It is also expected within this estimate to remodel the present carhouse at Carew Street to a considerable extent.

Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, Cincinnati, Ohio.—This company's carhouse at North Bend, containing five cars, was destroyed by fire on May 16. The loss is estimated at about $20,000.

Lake Erie & Northern Railway, Brantford, Ont.—Plans are being made by this company to construct a station at Brantford. The structure will be one story high and will be located over the tracks at the southwest corner of Colburn and Water Streets, with a 38-ft. frontage on Colburn Street and 76 ft. on Water Street. New England, Colonial style, red brick and limestone trimmings are to be used for the exterior, the roof being of green slate. The interior of the building will be finished in Canadian ash, while the walls and ceilings of the main waiting room are to be plastered and finished with plastered cornices. The floors are of concrete. The tracks will pass beneath the main floor of the building, with platforms, express and baggage accommodation at the lower level. The main floor will contain a waiting room, a women's retiring room and lavatory, men's lavatory and ticket and telegraph offices. The cost is estimated at $25,000.

POWER HOUSES AND SUBSTATIONS

Connecticut Company, New Haven, Conn.—The J. G. White Engineering Company has received a contract from the Connecticut Company for the construction of a new $100,000 power house in New Haven, referred to on page 1013 of this issue.

Fort Wayne & Decatur Traction Company, Decatur, Ind.—This company will close its power house and carhouse at Decatur and will be furnished power at Fort Wayne, where all repairs will henceforth be made.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich.—It is reported that this company contemplates the construction of a hydroelectric plant at the junction of the Pine and Manistee Rivers, near Wexford.

United Railways, St. Louis, Mo.—The Kirkwood Board of Aldermen has granted a permit to the United Railways to construct a substation at Washington and Fillmore Avenues, Kirkwood.

Interborough Rapid Transit Company, New York, N. Y.—This company has placed an order with the General Electric Company for nine 4000-kw. rotary converters and nine 4200-kva. transformers.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—The new 20,000-hp. addition to the Lowellville power house of the Mahoning & Shenango Railway & Light Company, construction of which was begun last October, has been placed in operation. The plant now has a capacity of 40,000 hp.

Rutland Railway, Light & Power Company, Rutland, Vt.—This company is installing a frequency changer in its Cleveland Avenue substation to convert the 25-cycle electric power generated at the Mendon and Carvers Falls station into 60 cycles.

Wisconsin Valley Electric Company, Wausau, Wis.—This company reports that it has a new power house and generating station under construction.

Manufactures and Supplies

BRAND TO MARK TIMBER QUALITY

Branding of timber has been specified through a cooperative arrangement on lumber specifications by the Illinois Society of Architects and the manufacturers of Southern pine lumber. The adoption of these specifications for lumber to be used in buildings in Illinois will give the owners an assurance that structures in which branded timber is used will be adequate to meet estimated load requirements. The brand will also be a mark and a guarantee that the timber is of a certain quality. The action of the Illinois Society of Architects met with such immediate approval that it is quite possible that a national standard specification of this kind will be adopted.

It is also of interest to note that in connection with these specifications the Illinois Society of Architects has recognized the results of the work recently done by the Forest Products Laboratory of the United States Department of Agriculture, namely, that it is possible to distinguish longleaf pine from shortleaf pine by certain visible characteristics. The results of this investigation were only made known in December, 1915, consequently they were not taken into account by the new specifications for dense Southern yellow pine recently adopted by the American Society for Testing Materials and the American Railway Engineering Association. The specifications of these two societies, however, have been accepted by the Illinois Architects Society as the correct measure for the structural qualities of timber. The architects' specifications also differentiate between timber requiring strength and durability and that requiring strength without reference to durability. These characteristics are provided for through a minimum heart requirement where durability is essential and an optional heart requirement where durabilty is not so necessary.

ROLLING STOCK

Louisville (Ky.) Railway is reported to be in the market for additional cars.

Kansas City (Mo.) Railways are remodeling several cars in their shops.

Illinois Traction System, Peoria, Ill., is in the market for 100 box cars, sixty hopper-bottom coal cars and forty flat-bottom gondola cars.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., is buying three all-steel interurban passenger cars and one steel underframe express car.

Cincinnati, Lawrenceburg & Aurora Electric Street Railway, Cincinnati, Ohio, lost five large cars in a fire on May 16 which destroyed the carhouse at North Bend.

Des Moines (Iowa) City Railway is remodeling forty old city cars at its own repair shops. This company is also overhauling six coal cars which will be made into side-dump cars for interurban roadway service.

Valley Railways, Lemoyne, Pa., are in the market for four 40-ft. semi-steel trolley cars with plain arch roofs and a seating capacity of forty-four, equipped with trucks, motors and air brakes.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of October 23, 1915, as having ordered ten car bodies from the Southern Car Company, has recently ordered fifteen additional car bodies from the same company.

Northern Ohio Traction & Light Company, Akron, Ohio, has placed in operation in Canton five of the new steel pay-as-you-enter type cars. The work of rebuilding the large cars now in use in Canton to pay-as-you-enter type has been started, five of the cars being sent to the G. C. Kuhlman Car Company's shops to be remodeled.

Pottstown and Phoenixville Railway, Pottstown, Pa., is reported to have ordered from The J. G. Brill Company, for service in Pottstown, six double-truck, all-steel, convertible, pay-within cars, to be equipped with Westinghouse HL control and 632-B motors. The cars will be similar to those now operated by the Third Avenue Railway, New York, N. Y., and are to be delivered about August 1. Two cars of the same type have been ordered for the Phoenixville division. The company plans to withdraw the small single-truck cars upon delivery of the new cars. Ten complete National air equipments have been ordered for these cars and others now in service in Pottstown. Two 39-E trucks have also been ordered from The J. G. Brill Company for delivery by July 1.

Detroit (Mich.) United Railway, noted in the ELECTRIC RAILWAY JOURNAL of April 22 as having ordered eight 53-ft. 11-in. motor cars and eight trailers of the same length from the G. C. Kuhlman Car Company, has specified the following details for this equipment:

	Motor Cars	Trailers
Seating capacity	54	60
Weight of car body	32,000 lb.	32,000 lb.
Bolster centers, length	29 ft. 9 in.	29 ft. 9 in.
Length of body	42 ft. 9 in.	42 ft. 9 in.
Length over vestibule	53 ft. 11 in	53 ft. 11 in.
Width over sills	8ft. 3¾ in.	8 ft. 3¾ in.
Height, rail to sills	38⅛in.	38⅛ in.
Body	Wood	Wood
Interior trim	Quarter-sawed oak	Quarter-sawed oak
Headlining	Agasote	Agasote
Roof	Monitor removable hoods	Monitor removable hoods
Underframe	Steel	Steel
Air brakes	West.A.M.M..	West.
Cables	West.	
Conduits and junction boxes	West	
Control	West. HL.	
Couplers	Tomlinson radial, spear head type	Tomlinson radial, spear head type
Curtain fixtures	Forsyth No. 88 ring fixtures Rex All-metal rollers	Forsyth No. 88 ring fixtures Rex All-metal rollers
Curtain material	Pantasote	Pantasote
Destination signs	Hunter illuminated vestibule	
Door engines	Nat'l Pneumatic for rear entrance and exit doors only	Nat'l Pneumatic for front entrance and exit doors only
Fenders	Ry. Standard	Ry. Standard
Gears and pinions	West.	
Gongs	Ry. Standard	
Hand brakes	Peacock	Peacock
Heaters	Peter Smith hot water No. 1C	Peter Smith hot water No 1C
Headlights	G. E. D-16-Y	
Journal boxes	Standard C-60	Standard C-60
Motors	4 West. 557 A, inside hung	
Registers	Ohmer	Ohmer
Sanders	Ry. Standard with O-B Sander valves	
Sash fixtures	Nat'l L. W. sash locks	Nat'l L. W. sash locks
Seats	Hale & Kilburn No. 11A	Hale & Kilburn No. 11A
Seating material	Main compartment dark green frieze plush; smoker, dark green leather	Dark green friese plush
Step treads	Am. Mason Safety-Steel & Carborundum	Am. Mason Safety
Train signal	Consol.	Consol.
Trolley retrievers	Knutson No. 2	
Trolley base	U. S. No. 14	
Trucks	Standard C-60	Standard C-60

TRADE NOTES

McGuire-Cummings Manufacturing Company, Chicago, Ill., built the Des Moines (Iowa) City Railway cars described in the ELECTRIC RAILWAY JOURNAL of May 20.

Acme Supply Company, Chicago, Ill., has removed its general sales office to larger quarters located at Suite 1110-1113 Steger Building, 28 East Jackson Boulevard, Chicago.

E. N. Lake, Chicago, Ill., consulting engineer, has been retained by the Kansas City (Mo.) Railways to investigate its power requirements and prepare plans for future line and substation extensions.

The J. G. Brill Company, Philadelphia, Pa., has received a contract for nine sets of trucks (eighteen) for use on the new express cars of the Bay State Street Railway. The trucks are designed for 35,000-lb., king-pin load.

Holden & White, Chicago, Ill., general sales agents for the Garland ventilator, have just received, through their Eastern representative, the U. S. Metal & Manufacturing Company, an order for 400 Garland ventilators from the Public Service Railway, Newark, N. J.

Curtain Supply Company, Chicago, Ill., writes that it has the order for the curtain fixtures to be supplied to the new Des Moines front and center entrance cars, described in the issue of this paper for last week. These cars will also be supplied with "Rex All-Metal" rollers.

Henry M. Cleaver, for some years advertising manager of the Niles-Bement-Pond Company, New York, is now located at the Pond works of the company, Plainfield, N. J., to the affairs of which he will devote himself exclusively in the future. The advertising department is in charge of D. M. Crossman, heretofore assistant advertising manager.

American Brake Shoe & Foundry Company, Mahwah, N. J., at a meeting of its board of directors, elected Otis H. Cutler, chairman of the board of directors and William G. Pearce, president of the company to succeed Mr. Cutler, who retired from the presidency. James S. Thompson, William S. McGowan and Clifton D. Pettis were elected additional vice-presidents.

Gary Tube Company has been incorporated with a capital stock of $100,000 for the purpose of constructing the National Tube Company's $25,000,000 steel plant at Gary, Ind. Robert W. Campbell of Chicago heads the list of incorporators. The Gary Tube Company will be part of the National Tube Company, a subsidiary of the United States Steel Corporation.

Unit Railway Car Company, Newton, Mass., is having a new type of self-propelled car built by the Laconia Car Company. This car is steam-driven, with an engine and boiler similar in construction to those used in the Stanley automobile, although, of course, of greater capacity. The directors of this company are as follows: Freelan O. Stanley, Francis E. Stanley, P. H. Gentzel, Carlton S. Stanley, Prescott Warren and Edward M. Hallett.

Dexter Metal Manufacturing Company, Camden, N. J., has taken over the interests, plant and good will of Merritt & Company, together with all their modern facilities for the manufacture of steel lockers, shelving, etc., and have installed a new department for the manufacture of wire guards of all descriptions and ornamental brass and iron work. William A. Parent, formerly general manager of Edward Darby & Sons, has resigned to become general manager of the Dexter Metal Manufacturing Company.

Smith-Ward Brake Company, New York, N. Y., has received orders to equip with brake adjusters the following cars: Springfield (Mass.) Street Railway, ten cars; Reading Transit & Light Company, Reading, Pa., fifteen cars; Holyoke (Mass.) Street Railway, ten cars; Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, ten cars; Rhode Island Company, Providence, R. I., fifty cars; Scranton (Pa.) Railway, ten cars; Schenectady (N. Y.) Railway, sixteen cars; Binghamton (N. Y.) Railway, sixteen cars, and Chicago & Milwaukee Electric Railroad, Highwood, Ill., fifteen cars.

Frankel Connector Company, Inc., New York, N. Y., announces that the electrical department of the Frankel Display Fixture Company has recently been incorporated under the first-mentioned title to carry on the manufacture of Frankel solderless connectors, testing clips and other electrical specialties. The connectors are described in the "Equipment and Maintenance" department of this issue. The company is also manufacturing a line of connectors for panel boards to replace soldered terminal lugs for front and back connections. The office and factory of the Frankel Connector Company, Inc., are located at 177-179 Hudson Street, New York City.

J. M. Fitzgerald has resigned as manager of the signal department of The Railroad Supply Company, Chicago, and has associated himself with O. S. Flath, forming the Alger Supply Company, 550 Peoples Gas Building, Chicago. The latter company will handle railway and electrical supplies. It now represents the Electrical Sales Company, sole distributers of the Schwarze bells and other products, Signal Accessories Company, sales agents of various signal materials and supplies, C. H. Whall, fiber, and the Chausse Manufacturing Company, manufacturers of kerosene vapor torches. This latter product is particularly adapted for preheating welding work.

E. T. Sawyer, who has been associated with the Commercial Acetylene Railway Light & Signal Company for over eight years, has resigned to accept a position as sales engineer with the Edison Storage Battery Company. Mr. Sawyer, from about 1901 to 1904, was with the Western office of the Dressel Railway Lamp Works of New York and the Star Brass Manufacturing Company of Boston. He later spent four years in the employ of the Acme Ball Bearing Company as manager of the railway department. His first three years in the employ of the Commercial Acetylene Railway Light & Signal Company were spent as Southern manager. For the last five years he has been connected with the main office at New York.

The Barrett Company, New York, N. Y., having been convinced that with the workmanship properly safeguarded a Barrett specification roof will last for a minimum period of twenty years without repairs, will henceforth give a twenty-year surety bond guaranty without charge on all Barrett specification roofs of fifty squares or more in the United States and Canada, in towns of 25,000 and over, and in smaller centers where its inspection service is available provided the roof is laid by a roofing contractor satisfactory to the company and in strict accordance with the Barrett specifications dated May 1, 1916, and subject to the inspection and approval of the Barrett Company. This surety bond will be issued by the U. S. Fidelity & Guaranty Company of Baltimore.

Sherwin-Williams Company, Cleveland, Ohio, foreseeing the difficulties of importing dyes from abroad, has developed extensive facilities for manufacturing dyestuffs at its dry color works at Chicago. It had previously erected a tar distillation plant which produced some of the important basic materials used in the manufacture of dyes. This plant was quickly enlarged and expert chemists were engaged to install and operate complete and efficient works for the production of finished dyes. These works are now in operation and are producing daily an output of paranitraniline and betanaphthol of quality equal to the best that has been imported. Additional equipment will shortly be installed which will double the output, and orders are now being accepted for the surplus not required in the company's own color works. The company is also booking orders for para reds and is also actively engaged with plans for the production of many other important dyes.

ADVERTISING LITERATURE

A. & F. Brown Company, Elizabethport, N. J., has issued its 1916 catalog on "Transmission Machinery" which fully describes its castings, pulleys, hangers, etc.

Bessemer Limestone Company, Youngstown, Ohio, has issued an illustrated booklet on "Bessemer Block" which describes its plants, methods of manufacture and the progress of Bessemer block in the paving brick industry. The illustrations show a number of installations, among which are several railway scenes. "Bessemer Wire-Cut-Lug Paving Brick" is the title of another booklet recently issued by this company, describing the advantages of wire-cut-lug brick over repressed brick.

National Pneumatic Company, New York and Chicago, has just brought out a 200-page cloth-bound book entitled "Door and Step Control," both manual and pneumatic systems. The large number of installations shown, the great variety of operating conditions to which this company's control has been adapted and the auxiliary devices used in connection therewith, such as interlocking safety door control, make clear what remarkable strides have been made in getting the all-inclosed car over the line quickly and safely. The description of the manufacturing methods makes it plain that modern door and step control demands highly specialized machinery and engineering ability. Among many other features of this publication is a series of diagrams showing the layout of door and step control for a great variety of cars to aid the user in the selection for a given car design. The book also describes briefly National pneumatic control for ventilator sashes, garage doors and other miscellaneous purposes. Electric railway men who have not received a copy of this book are urged to write for it to the National Pneumatic Company.

NEW PUBLICATION

Official Proceedings of Third National Foreign Trade Convention. Secretary, National Foreign Trade Council, India House, Hanover Square, New York, N. Y. 500 pages. Buckram, $1.50, postpaid.

This compendium of information on foreign trade subjects is supplied without charge to all delegates, but a limited edition is also placed on public sale. The book is a verbatim report of the addresses by leaders of American industry and the practical and constructive discussion of the most important phases of foreign trade by the 500 prominent business men who attended the convention in New Orleans on Jan. 27-29, 1916.

Electric Railway Journal

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Consolidation of Street Railway Journal and Electric Railway Review

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SPLIT VS. SOLID GEARS

The establishment of permanent shop practices is, no doubt, an excellent ideal. Applied in moderation (to paraphrase one of Mark Twain's remarks about marriage) it may be safely advocated, but among its possible results is the chance of losing sight of the real aim of mechanical engineering which, in the end, consists in the use of constructions that are demonstrated to be best from the broadest economic viewpoint, involving not only convenience but also reliability, length of life, and final cost. A case in point will be found in the retention of the split gear on motor-driven axles of electric railway cars to an extent that is by no means restricted, notwithstanding the fact that experience has shown the split gear and key to be a thoroughly non-permanent construction. Admittedly this method of applying gears possesses the great advantage of flexibility, permitting repairs or changes to be made by hand instead of involving the use of the hydraulic press as required where the gear is solid and must be pressed on or off the axle like a wheel. However, the latter construction possesses simplicity, and thereby it acquires ruggedness and reliability, now that the modern gear has a life usually equal to or greater than that of the wheel. Although it is much easier and less expensive to "tinker" with the split gear, a broad comparison of the final results attained by the two constructions shows that the solid gear is infinitely preferable. That any consideration should be given to the former type, therefore, aside from the temporary practice necessitated on roads that are gradually displacing it, indicates the anomalous situation of obscuring the true ideals of engineering practice behind the exigencies of local custom, and this is something that the industry would do well to avoid.

STEPLESS DOUBLE-DECKER

The stepless double-deck car, which for two or three years has been operated more or less experimentally in America in the cities of New York, Pittsburgh, Columbus and Washington, now appears for the first time, according to our records, on a foreign street railway system, the Vienna Municipal Tramways, in a type described and illustrated elsewhere in this issue. Although the double-deck car has not yet won a definite place in transportation since in the United States, and may never do so, if it should gain a position here it will undoubtedly be only with a low-floor body construction, as that insures greater safety, higher schedule speeds through the quicker handling of passengers, and a sufficient reduction in car height so as to avoid overhead obstructions. Abroad, outside of Great Britain and some of its colonies, the double-deck car has not been much more popular than in this country, in spite of the fact that the narrow streets have offered an inducement for cars to develop vertically rather than longitudinally. Hence the introduction of the low-floor, double-deck car in Vienna, one of the few cities on the continent where double-deckers have been used in the past, is of special interest. Although the seating arrangements of the new Vienna car are novel, the total passenger capacity is considerably less than that of similar models in the four American cities above mentioned, owing to the restrictions in width imposed by the limited double-track clearances in Vienna. This handicap, however, has been partly overcome by the ingenious provision of a bow-window arrangement for the sides of the upper deck, thus making possible the installment of a back-to-back longitudinal bench which does not interfere with the passing of passengers along the adjoining passageways and which would be impossible in any other construction.

LABEL STANDARD SPECIFICATIONS

In the campaign for a greater use of the association's standard specifications, we believe that much could be accomplished through the medium of advertising. We are not using this word here in its technical sense but in its more general meaning of urging emphasis by users of the fact that the specifications are those recommended as standard by the association. For instance, practically all of the rail mills use the American Electric Railway Engineering Association's grades A and B rail specifications when submitting bids to electric railways, but since the association has no standard form of specifications with a prominently displayed credit line, the manufacturers reprint the association's specifications with their names in large type and the association's name in small type. Consequently, the average purchaser assumes that this specification is the manufacturer's specification and not the specification of his association, and buys the rails accordingly. In every instance, the manufacturer gives the association due credit, and he is hardly to be criticised for printing his concern's name in large type, but the association would promote the knowledge that it had prepared these specifications as well as extend their use if it should publish them in a standard form which could be supplied to all member companies. For a railway company to retype from the Manual, when they are required, the rail specifications or any other specifications is more of a task than it usually cares to undertake. Consequently, it adopts the first printed form of specification that is offered, making interline modifications. These association forms could be kept in stock by the secretary so that copies could be furnished member companies on request and at a price that would pay for the cost of printing. If the member companies could be educated to depend upon the association to this extent, it would not be so difficult to bring about the more general use of the standards now printed in the Manual.

PAVEMENT COST AFFECTS SERVICE STANDARDS

Paving in the track allowance, the heritage of horsecar operation and an unjust burden which only increases the cost of operation at the expense of service, is a subject of ever-increasing worry to the way engineer. In Chicago, for instance, it represented at the beginning of 1914 an investment of $7,373,683, or about one-fifth of the total track cost, yet the pavement maintenance cost was approximately equal to that for the track. Hence it occupies an important place in the budget of every city company, and the proper type of paving for various conditions is a subject of concern to the industry.

In 1915 the way committee of the American Electric Railway Engineering Association was of the opinion that granite block laid on a mortar cushion was best suited as a paving material in the track allowance. This committee refused at that time to go on record, however, with any definite recommendations because there were so many conditions to meet. Where one type of pavement was suitable in one locality it was found to be absolutely unsatisfactory in another. W. M. Archibald, engineer of way Houston (Tex.) Electric Company, in a paper delivered before the recent Southwestern convention, reminds us that, owing to the changed character of wheel traffic in most cities, granite block paving is relatively less advantageous than formerly. A smooth pavement rather than wear value is in demand to-day, whereas a decade ago smooth pavements were objectionable because they were too slippery for horse-drawn vehicles.

It is quite true that the larger proportion of rubber-tired vehicles of the present have introduced new problems, but we are of the opinion that more skilled workmanship with the unit types of pavement will make them meet the demands of the most critical community. For extremely heavy traffic, accurately cut granite block carefully laid on a mortar cushion with grout filler has given an unquestioned account of itself in the larger cities of this country and Europe. Vitrified brick and wood block appear to be equally well adapted for medium traffic streets, but with the latter material more skilled attention is necessary to obviate the objectionable qualities, such as bleeding and buckling. For residential streets where light vehicular traffic obtains, the various sheet pavements, with toothing blocks to form the car-wheel flangeways and stretcher courses to form the pavement brow outside of the track, continue to be popular, and as far as we can ascertain they are satisfactory.

It frequently occurs that railway companies are forced, against their better judgment, to use an unsatisfactory paving material for certain streets. While strenuous objection on their part in cases of this kind may seem impolitic or ill advised, yet as long as the service must carry the burden it appears proper to oppose any change in construction which will increase operating expense. Property holders who are benefited because a railway company pays for a portion of their pavement have no just right to force additional burdens which in turn must affect the quality of the service to the rest of the community. Unless the industry as a whole points out this condition and takes a definite and united stand against it this expense will continue to increase in amount.

Of course, this point is in addition to the general question of the inadvisability of forcing the railways to bear any part of the cost of paving. Relief from this charge affords, to our mind, a very simple means of increasing the fare.

IS TOO MUCH SAND BEING USED?

In a paper recently delivered by Richard T. Fox, general manager Chicago Citizens' Street Cleaning Bureau, before the Western Society of Engineers, some very interesting data were presented relating to the sources of street dust and where the street cleaners pick up the most of it. While this paper was a discussion of a standard of cleanliness for intensive street cleaning, the average of a number of tests indicated that on a basis of 1000 sq. yd. of area, 4.3 lb. of dirt were swept up from the sidewalk, 6 lb. from the roadway between the street railway tracks and the curbs, and 90 lb. in the double-track allowance. In the instance cited the sidewalks were of concrete and the entire street was paved with wood block. While to a certain extent the large quantity of dirt in the track allowance may be attributed to the fact that the rails broke the continuity of the street surface, yet the analysis of the dirt collected at this point indicated that 50 per cent of it was silica or sand. Whether this should be taken as an indication that the railway company was using sand too freely or not, is a question. In any event it appears from the results of this test that the amount of sand used by cars operating on city streets in general may be worth careful study. If sand is being employed too liberally, economies are apparent because the purchase, preparation and delivery of sand on a large system make its cost per unit of quantity a considerable item.

To determine further whether the fine dirt picked up in the track allowance was blown there from other sources or was sand deposited in braking and starting cars, tests were made on other sections of the same street where street railway tracks had not been installed. These indicated a different distribution as well as a reduction in the total quantity of dust found. The total fell from 96 lb. to 12.2 lb. for the same roadway areas. This is equivalent to an increase from 6 lb. to 9.6 lb. per 1000 sq. yd. of roadway between the track allowance and the curbs, and a reduction from 90 lb. to 2.6 lb. per 1000 sq. yd. in the track allowance. While this is an unfair comparison because the dust from the smooth streets is blown away and lodged in the track areas of other streets, yet the marked difference in the quantities in the streets with and without tracks did prevail and, if the subject is carefully investigated, it may afford a means of economizing in the amount of sand used.

RAILWAY LOADS FOR CENTRAL POWER STATIONS

There is ample evidence that the central power companies are going after the railway business vigorously. They have their eye on the steam railroad electrification business, but while that is developing they plan to cover the street and interurban field as far as possible. They have very plausible arguments on which to base selling campaigns, and there are many reasons why railway loads are attractive to them.

The central power companies are in the business to sell electrical energy and are not primarily concerned with the uses made of it. They started in as lighting companies, but lighting is now but one of several fields for their activities. The railway field is especially alluring, because here energy can be sold in large blocks, and railways are managed by men who are trained to appreciate the merits of a good business proposition. The importance of the railway business is illustrated in the case of Chicago, where more energy is now supplied to the electric railways than to all other customers combined. If we assume 3 kw.-hr. per car-mile as the unit energy consumption of a car, and 25,000 as its annual mileage, the annual energy consumption is 75,000 kw.-hr. at the car or, say, roughly 100,000 kw.-hr. at the power house. At 1 cent per kilowatt-hour, here is a business of $1,000 per year per car, one well worth going after.

Moreover, in spite of its fluctuating character, the railway load is a good one, as its load factor is reasonable, even high compared with some classes of load, as, for example, the lighting load in which there is but one daily peak as compared with two in the railway load. There is nothing in the latter to compare with the exciting current losses in lighting transformers, which must be magnetized continually although used but a small portion of each day. Again, the power factor of the railway load is good because rotary converters are used, and these can, if necessary, be overexcited to improve the character of the load in this particular. Lighting load has a notoriously poor power factor at certain times of the day.

The attitude of the railway toward the purchase of power involves considerable of reliability and cost. Continuity of power supply is absolutely vital, and is even more important than cost. The giving over of the power involves considerations of reliability and cost. absolute confidence in its ability to carry out the terms of its contract. There is no doubt a certain insurance, or at least a feeling of assurance, that comes from the possession of the power source, even if the supply of fuel, oil and water must come from without. The question is, then, how much is this insurance or assurance worth as compared with a possible saving in the cost of energy, the total of which is probably not more than one-eighth of the total expense of running the railway.

This whole power matter must be considered from two sides, that of the seller and that of the buyer. As seller, the power company has the plausible argument that, as the railway's primary business is transportation, it can attend to this better if not distracted by a secondary activity or side line, such as electrical energy generation. The central power company claims that on general principles it is obviously cheaper to generate the power required by the railway on top of the lighting and industrial power load than to generate it separately. This follows partly because the peaks of the several components of the load do not occur simultaneously—in other words, there is a certain "diversity." Diversity permits the addition of load without proportionate increase in generating capacity. At the same time, the consolidation of generating capacity of several stations in one permits the use of larger and more economical units, which can be employed under more advantageous operating conditions. Moreover, the use of the latest type of unit conduces to greater reliability, and if the central power company's business is great enough to permit it to use more than one plant reliability is still further assured.

As buyer, the railway has first to be convinced that central power supply is at least as reliable as its own energy, next that it is cheaper. The rub comes in deciding whether or not it is cheaper. The price offered by the power company is definite, exact; the cost of home-made energy is not so easy to determine. The bills for fuel, water, power-house labor, etc., are definite enough, and the energy output can be accurately metered. There are, however, the less tangible elements of overhead charges, especially for management, depreciation and obsolescence, which form an important element of power cost. As the railway must have an engineering staff whether operating a power plant or not, it is quite a question to decide how much additional cost is incident to the power generation. It is, therefore, a far-reaching problem accurately to determine the reduction in expense which will follow the abandonment of power plants to offset the cost of purchased power.

To sum up the situation, it may be said that undoubtedly the combination of different kinds of loads conduces to economy, but before a railway decides to purchase energy its management must be convinced that the railway will reap the benefit in the way of greater reliability and lower cost which should result. It may often prove more economical for the railway to absorb the lighting and industrial power business, or to sell energy to a company which will retail it for these purposes. The latter would be especially true in connection with an interurban railway system. In any case, it is very important for the railway to know exactly what its energy is costing.

Stepless Double-Deck Car Introduced in Vienna

The Author Has Evolved a New Stepless Double-Deck Car Which Embodies an Unusual Seating Plan and Contains Bow Windows on the Upper Deck for Increasing Seating Capacity Without Affecting Track Clearances

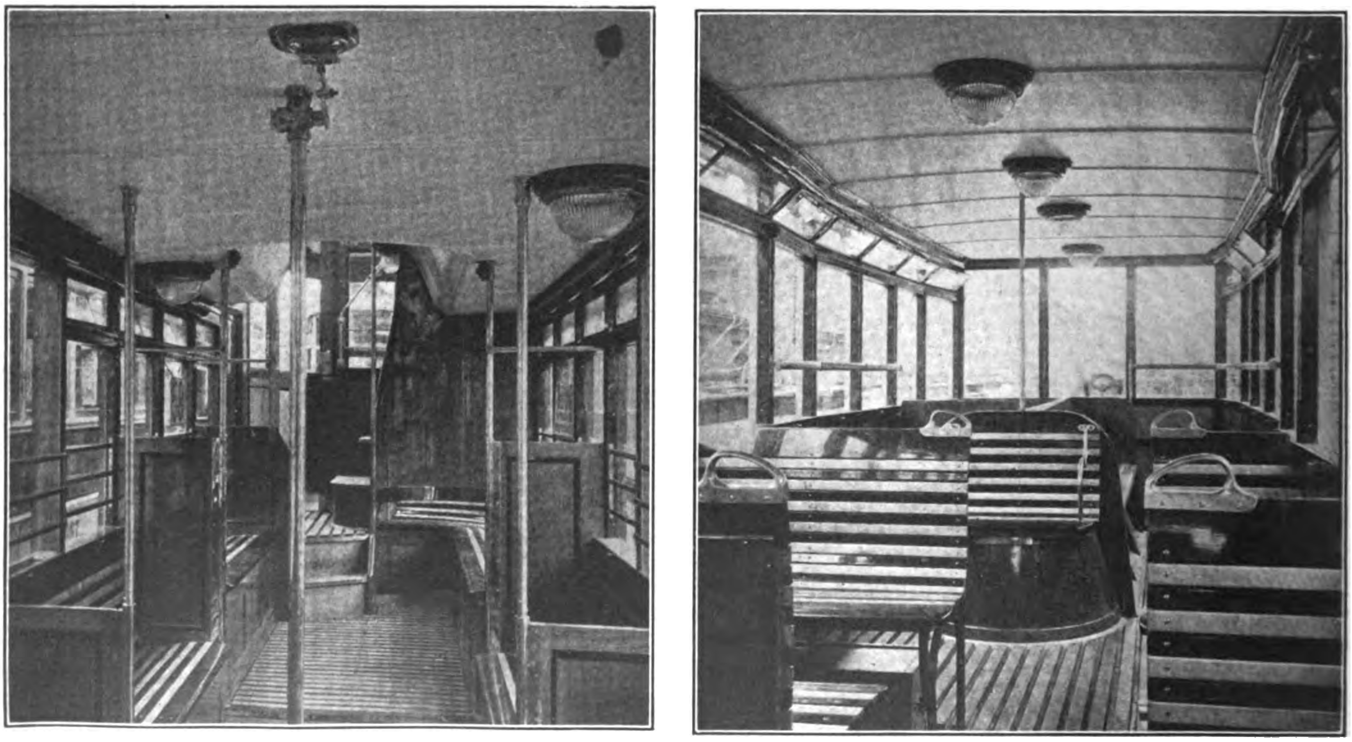
By **LUDWIG SPÄNGLER**
Manager Vienna (Austria) Municipal Tramways

DOUBLE-DECK motor cars, in general, embody the advantage of short length for a given capacity, thus requiring the occupation of only a small area of the street surface. More passengers can be handled, therefore, on one line with double-deck cars than with trains of single-deck cars. The former also permit a much quicker handling of cars at terminals, avoiding the necessity for the coupling up of trail cars. Moreover, double-deck cars have for the same space a much greater seating capacity than trains. In America, where uniform fares are customary, double-deck cars can be used with only one conductor, which results in a great saving in labor as compared with train operation.

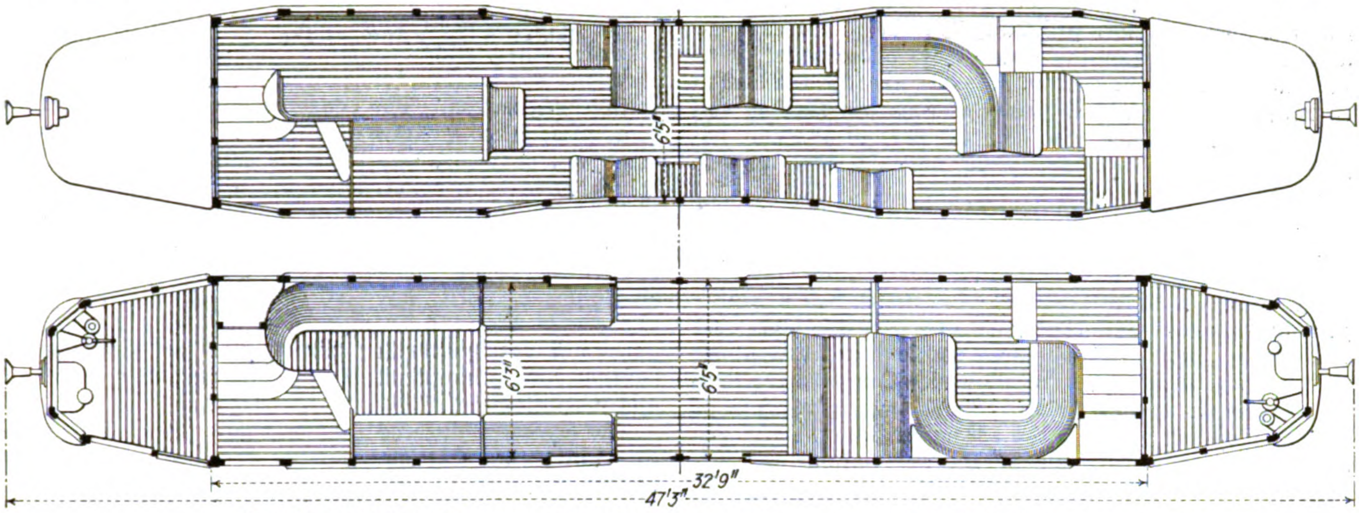
In spite of these obvious advantages, double-deck cars up to this time have found widespread usage only in England. The reason for this may be that, excepting in hot countries, the double-deck car is servicable practically only with an inclosed upper deck. The addition of the inclosed second deck requires a height of at least 15 ft. 9 in., too great for many clearances, and provides too little insurance against lateral upsetting from the force of the wind when rounding curves. The design of the newly-built cars differs essentially in details from the plans followed under somewhat similar conditions in New York and Pittsburgh. In Vienna it was possible to have a height of only 13 ft. 7 in. to 14 ft. 5 in. to permit cars to be stored in the present carhouses. This is accomplished by the use of the low, stepless center entrance. Over the trucks the necessary lowness is obtained in spite of the greater elevation of the floor by a "nesting" of the rows of seats. This is a customary arrangement with longitudinal-seat cars. The cross-seat

WEIGHTS AND CAPACITIES OF VARIOUS TYPES OF VIENNA CARS

	Passenger Capacity							Weight in Pounds			Passengers per 1 M. of Car or Train Length	
	Seating Capacity	Normal Standing Capacity	Normal Total Capacity	Total Capacity with Extra Standing Room	Total Weight in Pounds Including Electrical Equipment	Length Over Buffers, Ft.	In.	Per Seat	Normal Weight Per Passenger	Number of Seats	Normal Sitting and Standing Capacity	Total Capacity with Extra Standing Room
New 14-ft. 5-in. high double-deck car with longitudinal seats...	56	30	86	100	47,628	47	3	855	553	3.9	6.0	6.95
New 14-ft. 5-in. high double-deck car with cross-seats.........	56	28	84	92	48,510	47	3	866	578	3.9	5.8	6.4
16-ft. 9-in. high double-deck car	52	20	72	84	30,870	34	11	595	428	4.9	6.76	7.9
Single-deck motor car..........	22	20	42	56	27,783	35	0	1,263	661	2.07	4.0	5.26
Two-car trains	44	44	88	118	40,564	68	8	922	461	2.1	4.2	5.6
Three-car trains	66	68	134	180	53,361	102	6	809	397	2.1	4.28	5.76



VIENNA DOUBLE-DECK CARS—INTERIOR VIEW OF LOWER AND UPPER DECKS OF LONGITUDINAL-SEAT CAR



Longitudinal-Seat Car

Cross-Seat Car

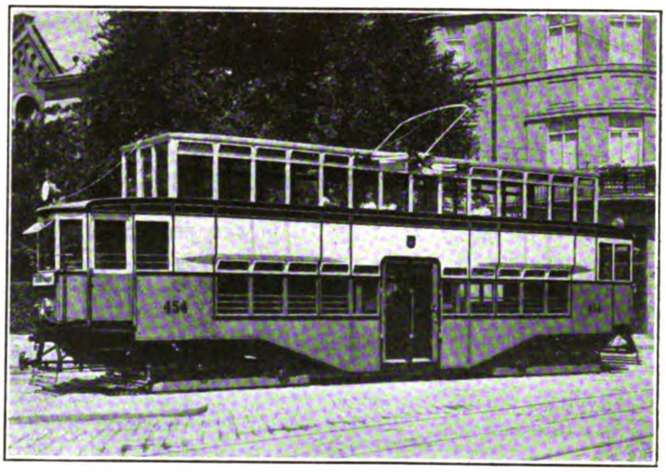
VIENNA DOUBLE-DECK CARS—PLAN OF UPPER AND LOWER DECKS OF LONGITUDINAL AND CROSS-SEAT CARS

car embodies an entirely new seating arrangement, which has also been applied in the auto buses in Vienna. These were described in the ELECTRIC RAILWAY JOURNAL of Jan. 2, 1915.

The longitudinal passageway in the lower deck of the cross-seat car lies entirely one one side, while the longitudinal passage in the end of the upper deck lies along the opposite side. On the upper deck, above the lower side passage, is arranged a curved bench, shown in one of the accompanying illustrations the floor underneath which is cut away in order to utilize the space for the stairway. Between this bench and the staircase is placed a cross-seat for two persons, under which the floor is likewise cut away. This extends across to the connection of the passageway with the head of the stairs on the other side of the car. At this point there is also an arch in the roof of the lower deck beneath which one can stand easily.

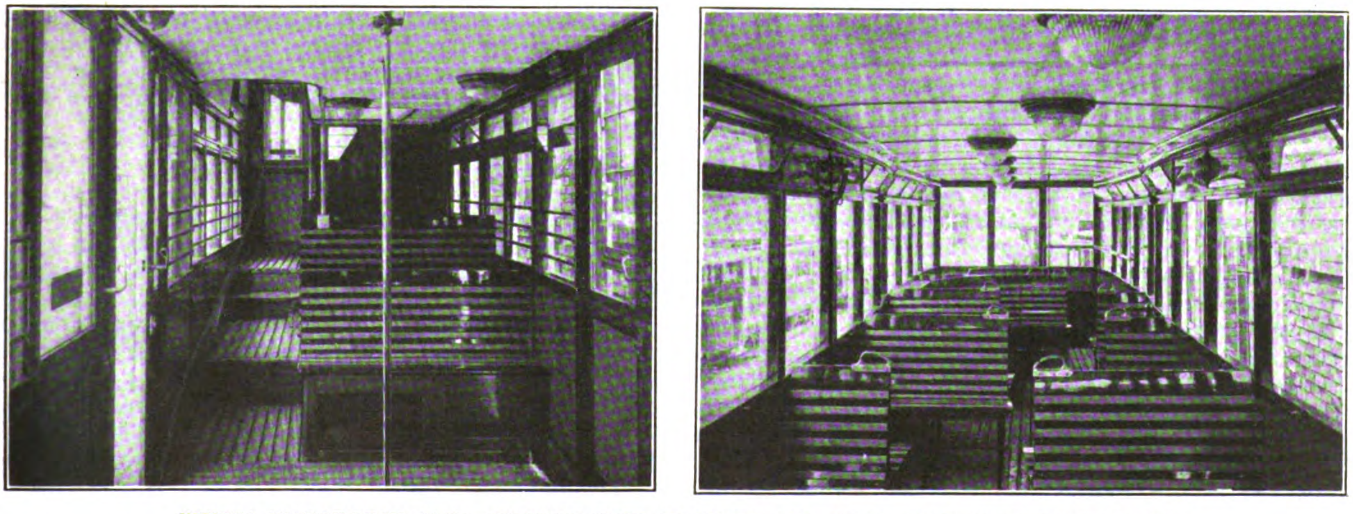
In the lower deck, underneath the passageway of the upper deck, are arranged benches, which consist of a U-shaped bench in the elevated portion of the lower deck, next to which, toward the center of the car, is a cross-bench, and then another cross-bench, the base of which is on a lower level. A step is provided between the central and end portions of the lower-deck floor in order to allow clearance for the trucks.

The new design would be of particular value for wide cars, because a large seating capacity can be provided by the cross-seats. In Vienna these double-deck cars had to be built very narrow on account of the narrow spacing between double tracks, and their operation was only possible with the longitudinal-seat car by widening the portions of the sides of the upper story directly over the trucks into the form of bows, two on each side of the car, as shown in the exterior view. This form of construction does not prevent two cars from passing on curves. In the cross-seat car these bows could have been omitted.



VIENNA DOUBLE-DECK CARS—EXTERIOR VIEW OF CROSS-SEAT CAR, SHOWING BOWS IN UPPER DECK TO OVERCOME CLEARANCE LIMITATIONS

The stairs leading up to the upper story are arranged crosswise and directly above the trucks, and are unusually convenient and easy to mount. At each end of the



VIENNA DOUBLE-DECK CARS—INTERIOR VIEW OF LOWER AND UPPER DECK OF CROSS-SEAT CAR

car are compartments providing for the motorman and also furnishing standing room for passengers. The movement of passengers at stops is greatly facilitated thereby, because there is plenty of room for loading and unloading in the low-lying central part of the car, adjacent to which are long, wide aisles leading to the stairs.

The side framing of the car is of steel posts, so connected by suitable framing with the upper-deck floor as to enable the floor construction to be built low.

The exterior of the car, as illustrated, has a highly pleasing appearance. The cars are very popular with the riding public in Vienna, particularly the upper deck on which smokers are allowed. Comparative data as to weights and capacities of the various types of Vienna cars are given in the accompanying table.

The designs were made by the author and are patented in America.

Electrical Distribution as Discussed by N. E. L. A.

Committee Reports Presented at Chicago Convention Last Week Give Present Status of Progress in This Direction

THE thirty-ninth convention of the National Electric Light Association was held in Chicago last week. Several topics of value to railway men were discussed, principally relating to power purchase, generation and distribution. Abstracts of some of the reports were given in last week's issue of this journal. Others are given herewith.

Electrical Apparatus

The keynote of the recent work of the committee on electrical apparatus has been standardization, particularly with regard to sizes, voltages and taps for transformers. Attention was directed in its report to the fact that during the past five years the capacities of single generating units have increased more than threefold.

On the subject of minimizing noise in substations, the following design features were mentioned: The foundations for the apparatus should be separate and distinct from the walls of the building to prevent the transmission of noise. Where possible, the walls should be built with air spaces to form a cushion to impede the direct transmission of noise. Windows should be omitted from the walls of the substation building as a further means of avoiding the transmission of noise. Substations provided with forced ventilation should be carefully designed to avoid the transmission of noise to the outside through the ventilating system. In some cases it is required that the air passages be equipped with baffles to prevent the transmission of sound. Methods of installation which materially assist in a reduction of noise include the use of felt pads under transformers, regulators, etc., or the isolation of noisy apparatus in separate soundproof rooms. It was believed by the committee that manufacturers pay too little attention to the reduction of noise in apparatus.

An interesting development in the starting of heavy rotating elements of large machines, such as synchronous converters, is the application of a high-pressure oiling system to bearings where it is desirable to reduce the starting current to a minimum. Oil may be forced to the bearings at sufficient pressure actually to raise the rotating element out of mechanical contact with the bearings so that it floats on a film of oil. The high pressure is shut off as soon as the machine starts.

The application of single-phase service to transportation and other fields frequently involves the use of synchronous condensers for power factor correction and voltage regulation. The construction of these involves some unusual conditions in certain situations, such, for examples, as where one phase is grounded. Such machines have been constructed for direct application to 11,000-volt systems requiring insulation suitable for use on a 19,000-volt three-phase system. The difficulties involved in converting three-phase energy into single-phase energy have led to the development of the phase converter. As compared with a straight motor-generator for converting three-phase to single-phase current, the phase converter is cheaper, more efficient and more flexible.

The committee stated that two new pieces of laboratory apparatus may now be considered as standardized for general use, namely, the harmonic analyzer and the cycle recorder. The analyzer provides an efficient and accurate method for determining the components in an alternating current or emf., which otherwise would require tedious mathematical processes. The cycle recorder is used in testing the time elements of high-accuracy relays and circuit-breakers. Its pointer commences to revolve one step per cycle the instant that power is applied to the test circuit. Its particular field is in measuring elapsed intervals of time too short to be satisfactorily observed with a stop watch, and where readings in steps of one alternation are sufficiently accurate for the purpose in view.

Improvements in electrolytic lightning arrestors during the year have included a new form of electrolyte which may be operated at higher temperatures, namely, up to 135 deg. Fahr. In the application of electrolytic arrestors for d.c., low-voltage protection, a charging gap has been added to the equipment, with arrangements for closing the gap for daily charging. A new lightning arrestor for use in d.c. generating stations, or for the protection of railway equipment was also described. It consists of a condenser in parallel with a resistor and both in series with a spark gap between line and ground. The improvement consists in the use of a flat plate condenser with a new insulating wax of much higher dielectric strength than paraffin. For the protection of railway equipment and station apparatus up to 1500 volts, a condenser of 1 m. f. capacity is used, while for line mounting, a 0.3-m. f. condenser is used. The gap may be safely short-circuited as the resistance of the condenser shunt is high.

Considerable advance has been made in the past year in the construction of switchboard apparatus to improve the product from the point of safety to the operator. This has included the isolation of dangerous parts by inclosing and screening, or by placing all large parts at the back of the boards and equipping switches with indicating tell-tale lights or signs. The committee described and illustrated in its report a number of sample safety devices.

Underground Construction

The report of the committee on this subject was largely devoted to details of conduit construction, cable installation and cable testing. The process of making "stone" conduits, the material for which is fine limestone screenings and Portland cement in proportions of 4.75 to 1, was described. This conduit is made in lengths of 5 ft. and of an internal diameter of 2½ in., and a wall thickness of 5/8 in. It is laid with a minimum of 1 in. of concrete between ducts and between layers, and with a 3-in. concrete envelop. One company has installed 10,000,000 ft. of this conduit.

The committee described a new type of cable joint in which ingenious insulating forms are used for separating the conductors of a cable. These forms are constructed of thin sheets of mica cemented together and made up over an iron core. A porcelain spacer at each end holds the separators symmetrically about the three conductors and centrally in the lead sleeve. Another type of joint, known as a vacuum joint, was also described. In this the insulating material is forced into the sleeve and all air is eliminated by exhausting the interior of the sleeve to a high vacuum.

An apparatus for testing cables was also described by means of which it is possible to measure direct current in a single-conductor cable without opening the circuit. The instrument consists of two parts, a coil and a meter. The coil is an iron ring wound with a large number of turns of small wire, and having a hinged section which opens to permit the ring to be slipped over the conductor. In the core is a small air gap in which a polarized magnet is pivoted. This magnet is free to turn according to the polarity of the core poles terminating at the air gap. When the coil is slipped over a conductor carrying a direct current the core is magnetized and the needle is deflected and makes contact completing an electric circuit through a relay and indicator. Current from a battery is sent through the coil to neutralize the effect of the current in the conductor, and a condition of neutralization is indicated by the polarity indicator. The current necessary for this purpose, which is measured by an ammeter, is proportional to the current in the conductor. The apparatus comprises an adjustable resistor for use in varying the current in the coil.

The committee also described a pothead for use in connecting underground cables with overhead lines. It was stated that some companies using multi-conductor terminals made of iron have had trouble due to heating caused by eddy currents when the terminal is used on cables carrying alternating current. This trouble has been overcome by making the metal forked cap of the terminal of non-magnetic material. The committee directed attention to the importance of cooling of duct lines under certain conditions, some cable failures having been shown to be due to overheated cables. The temperature of a duct of any given construction will vary with changes with the character of the soil through which it runs. A line which gives no trouble from overheating in moist soil might overheat in dry or sandy soil. Attempts have been made to produce artificially the conditions favorable to rapid heat dissipation, but as yet none have shown results to justify general adoption. One of these is the use of a porous tile drain laid in a trench above the conduit line. Another is the sprinkling of the duct line.

OVERHEAD LINES AND INDUCTIVE INTERFERENCE

In view of the importance of the movement toward public regulation of line construction, the committee on overhead lines and inductive interference devoted its report entirely to this subject. The histories of the national joint committee on overhead and underground line construction and of the Bureau of Standards National Electric Code were traced, the latter being covered in considerable detail. In the opinion of the committee, the effect of the safety code on the industry, if widely adopted and enforced, will be to eliminate or restrict inadequate construction and improper operating methods. On the other hand, there has been widespread apprehension of unwarranted increases in construction cost and restrictions of development. While there has been considerable opposition to the general proposition of having a safety code, and while the association has been criticised for assisting through its representatives in the preparation of such a code, it is the opinion of the majority of the committee that some degree of public regulation is inevitable. Hence, the influence of the association can more advantageously be directed to assuring that the regulatory measures adopted contain a minimum of unwise features than to conducting a campaign of probably fruitless opposition.

The committee concluded its report with a summary of the most important of the state commission developments in this field.

Safety Exhibit at Aurora

More than 7,000 People Inspect the Exhibit of the Aurora, Elgin & Chicago Railroad—Safety Lectures to School Children

A COMPREHENSIVE yet inexpensive safety exhibit conducted by the Aurora, Elgin & Chicago Railroad at Aurora, Ill., was visited by more than 4000 adults and 3000 children. Safety bulletins, posters and placards in sufficient number to appeal to persons in every walk of life were collected by H. B. Adams, the company's safety supervisor, and arranged on the walls of a vacant storeroom in the business district of Aurora. This material was exhibited for more than six weeks, and attention was attracted to it through the co-operation of the newspapers, which were supplied with material of news interest throughout the period of the exhibition. The safety supervisor and assistants were in charge of the exhibit, which was open daily from 1 o'clock to 9 p. m. The newspaper stories attracted the public at large, and special arrangements were made with the school authorities to permit the school children to visit the room and inspect the exhibit during school hours. The railway furnished special cars for this purpose, and practically all the school children in Aurora visited the exhibit. In a safety-first lecture to each group of pupils who visited the exhibit, attention was called to the significance of the various posters and signs. In these lectures an effort was made to impress the safety idea upon their minds, with examples and explanations of what should and should not be done under many different conditions in order to avoid accidents.

THINK SAFETY FIRST
SAFETY

A VIEW OF THE AURORA, ELGIN & CHICAGO RAILROADS SAFETY EXHIBIT

Safety supervision on the Aurora, Elgin & Chicago Railroad has been put on a permanent basis, and the safety supervisor devotes all of his time to this work. He holds periodical meetings with the employees to teach them safety-first principles and has spent much of his time in an effort to educate the public to form the safety habit. The exhibit above described was a step along this line. In addition to this, much time has been spent among the school children teaching them safety principles, and this work has had the hearty co-operation of the school authorities. Effort has also been made to impress upon automobile drivers the responsibility which rests on them for their own protection, as well as for the protection of others. Violators of traffic ordinances and careless drivers, when observed, are first warned and then informed that legal action will follow a second offense. The work of the safety department is reflected in the greatly reduced number of accidents, demonstrating that the expense of maintaining a safety organization is fully warranted.

Central Power Station Service for Electric Railways

Railways Paid Central Power Company in Chicago Nearly $5,000,000 Last Year, About 23 Per Cent of Total, and Used More than Half of the Energy Generated

At the March meeting of the Engineers' Society of Western Pennsylvania, Peter Junkersfeld, Commonwealth Edison Company, Chicago, Ill., read a paper on "Electric Service Problems and Possibilities." In this paper, among other things Mr. Junkersfeld gave some recent data regarding the supply of power to electric railways in Chicago which are of particular interest in view of the fact that in Chicago the Edison Company furnishes all of the power to the electric railways. The following figures which he gave summarize the situation.

During 1915 in Chicago the income from railway business was $4,870,000; from commercial power business, $4,690,000; from commercial lighting business, $7,622,000, and from residence lighting business, $3,700,000. Of the total income there was paid for taxes and municipal compensation the sum of $1,582,000; the payroll with an average of 4175 employees was $3,796,900, and there were paid for the use of the money employed in the business $1,890,000 for bond interest and $3,667,110 in dividends to 3000 stockholders.

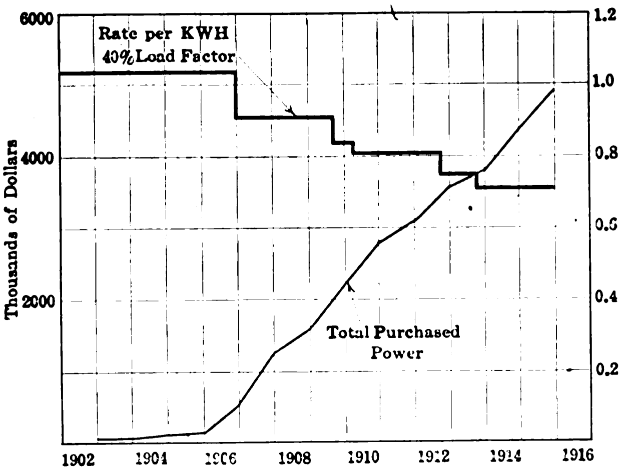


CHART SHOWING INCREASE IN TOTAL COST OF PURCHASED POWER AND DECREASE IN UNIT COST FOR ELECTRIC RAILWAY SERVICE IN CHICAGO

The quantities of energy supplied to the several classes of service were as follows: For street and elevated railways, 680,112,000 kw.-hr.; for commercial electric service, 326,728,000 kw.-hr.; for domestic use, 53,284,000 kw.-hr., and for electric automobile charging, 14,300,000 kw.-hr. The company supplies 100 per cent of the available street and elevated railway business, about 35 per cent of the possible domestic business, about 30 per cent of the commercial electric service, and about 10 per cent of the possible electric automobile service assuming that the present 60,000 horse vehicles were replaced with 30,000 electrics.

The accompanying diagram shows the rate at which energy is purchased for electric railway purposes, on a basis of a 40 per cent load factor, which is slightly less than the present load factor. This rate has fallen from slightly more than 1 cent per kilowatt-hour between 1902 and 1906 to slightly more than 0.7 cent per kilowatt-hour for the past two years. The total cost of purchased power for electric railways has increased at an almost uniform rate since 1906 from about $200,000 to nearly $5,000,000. More than one-half of the nearly 1,200,000,000 kw.-hr. generated last year was sold to the electric railways. Due to the use of improved generating machinery, the number of pounds of coal burned per kilowatt-hour has fallen from about 7 in 1902-1903 to about 2.7 in 1915, the total coal consumption during this period increasing from less than 300,000 tons to about 1,600,000 tons. The rate of coal consumption in the latest units averages about 1.95 lb. per kilowatt-hour as contrasted with 7 lb. in 1903. These figures are for Illinois coal with about 10,000 B.t.u. per pound.

The full text of Mr. Junkersfeld's paper and the discussion which followed its presentation will appear in volume 32 of the Proceedings of the Society.

In this connection, it is interesting to note that in the 1916 report of the committee of the N. E. L. A. on energy supply for electrification of steam roads, of which Mr. Junkersfeld is chairman, further data in regard to the power situation are given. An abstract of other parts of this report appeared in last week's issue of the ELECTRIC RAILWAY JOURNAL. The report states that the railway peak in Chicago for the winter of 1915-1916 was 203,560 kw. and it occurred between 5.30 and 6 p. m. on Jan. 6, 1916. The light and power peak amounted to 155,670 kw., and it occurred between 4.30 and 5 p. m. on Dec. 22, 1915. The total of these peaks, if they had occurred at the same hour, would have been 359,230 kw., but the greatest load on the combined system amounted to only 337,900 kw. and it occurred on Nov. 29, 1915. This shows a "diversity" of 21,330 kw., or 6 per cent.

If the steam railroads of Chicago were electrified they would require from the central power company a power supply with a peak amounting to about 30 per cent of the present combined peak. By the time such railroad terminals could possibly be electrified the combined peak would be much larger and the percentage smaller. The railroad maximum load occurs in the morning and has a diversity as compared with the combined peak of 10,000 kw. The load factor for the day, based on the one-hour peak, is 62½ per cent for the steam railroad requirement only, whereas the light and power and street and elevated railway requirements show a load factor for the day of 59.3 per cent, and the combined system a load factor of 62 per cent. This distinctly shows what the beneficial effect of the electrified steam railroad requirements would be upon the present central power company load.

The suburban service of the electrified steam railroads in the Chicago district makes the annual load factor less than would be the case in some smaller-sized city, for the steam railroads there do not have such a pronounced morning and evening peak in suburban service. This pronounced suburban peak will, of course, be found in ten or twelve of the large cities in the country.

Sydney City Railway, New South Wales, Australia, has two new types of car under consideration, with accommodations for 100 passengers seated and 166 standing, and ninety-eight seated and 100 standing, respectively.

Some Problems of the Electric Railway Industry*

Slight Increases in Required Standards of Service or Labor Costs or Slight Decreases in Fares Seriously Affect an Electric Railway—The Interest of the Public in Proper Transportation More Vital than It Usually Realizes—Ways in Which It Can Help

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IT has been suggested that an appropriate matter for discussion at this time is the very general but very important question: "What is the matter with the electric railway industry, and how may the situation be improved?" Without proposing to attempt any rigorous treatment of a subject so involved and of such significance as this, it may still be within the province of these remarks to discuss some of the problems of the industry and perhaps to be able to say in conclusion: "These things among others are significant as adverse factors to the development of the industry."

It has become increasingly apparent during the last few years that the electric railway business is not particularly prosperous. An examination of the returns earned in the electric traction industry shows that for a number of years they have been steadily decreasing in this State. For example, the average rate of return has been 6.5, 5.5 and 5.25 per cent during three consecutive eight-year periods. While this is a specific answer to the question, "What is the matter with the industry?" it is merely preliminary to the more pertinent inquiry as to why the net earnings in the industry have been steadily decreasing. This situation is so general and the factors entering into it vary so little from place to place that a diagnosis and some prognosis may be made in general terms.

INCREASES IN OPERATING EXPENSES AND INVESTMENT RATIO

It has been generally recognized that electric railways are continually furnishing more service, better service and very much more expensive service for the same or a smaller fare and have, in fact, in many instances, long since passed the point where the fare equalled the cost of the service. A considerable part of the increased quantity of service, or increased length of ride, has followed the expansion of cities and the consolidation of lines, with the attendant interchange of traffic. This addition to the quantity and quality of service has not been accompanied by added revenues.

The demands of growing communities have imposed many unremunerative and unnecessary expenditures upon the street railways. Paving must be laid, and streets must be graded and maintained. Streets must be cleaned and sprinkled and snow removed. Extensions of service must be made where little traffic exists, even though every passenger is carried at a loss. Equipment must be abandoned for later types, even though neither the company nor the community is able to absorb the economic loss resulting from the change. Tracks are required to be idle during the hours of the night when, but for a false pride on the part of the community, they might be permitted to carry express and freight and thus assist in the relief of an intolerable traffic congestion during the hours of the day. Autos are permitted to park in the streets. In one city a recent survey showed 72 per cent of the area on a number of downtown streets so occupied. These streets have one railway track and are 40 ft. between curbs. Of this 40 ft., 28 ft. was being used as a public garage. Such practices result in crowding all moving vehicles into the track zone to the demoralization of schedules, the delay and vexation of patrons and the substantial increase of cost of operation.

Nor have these community requirements resulted only in increased operating cost. The required capital additions to property have been unproductive. From the published reports of the Boston Elevated Railway, for example, it is evident that its investment ratio has increased in twenty years from 3 to 6. That is, it now requires twice as many dollars to earn $1 of revenue as it did twenty years ago. Some of this investment has, of course, been useful in lowering operating costs, though the operating ratio has not been greatly lowered. If we capitalize the net earnings in 1914 at the rate of return earned twenty years ago, an investment value $40,000,000 less than the actual investment is found. That is, the net earnings of the company in 1914 on an investment of more than $100,000,000 did not exceed the earnings on $60,000,000 at the rate of twenty years before. Nor is this case exceptional. The reports of the Public Service Commission of this State, together with those of its predecessor, show that the investment per revenue passenger for all Massachusetts electric railways is now almost twice what it was twenty years ago.

Many of these tendencies are well known and have been pointed out and discussed for many years, but no systematic study has been made of their individual effect on net earnings and their probable future importance. A few typical factors exercising an adverse influence on electric railways and their influence on cost may be more critically examined.

STANDARDS OF SERVICE

Within the last ten years the matter of quality of service, measured by so-called standards of service, has received an increasing amount of attention and will doubtless continue to do so in the future. There have been styles in standards, and a great variety of conditions have been imposed by regulating bodies in attempts to adjust features of electric railway service which had been made the subject of complaints. To these requirements can be ascribed a considerable part of the growing insufficiency of earnings.

It will be well to consider some of the factors which have brought the question of service standards into prominence. It must be admitted that, from the standpoint of the passenger, any service other than that which provides him with a seat is more or less unsatisfactory. The patron, it appears from experience, cannot be expected to consider such questions as the ability of the company to furnish a seat for every passenger, and he is constantly reminded of standards of service because of the discrimination which is apparent whenever one passenger in a car must stand. It is immaterial that this standing passenger might have had a seat by waiting for the next car, the fact remains that he sees others seated while he himself stands, and this is a constant aggravation.

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*Abstract of paper read before the New England Street Railway Club, Boston, Mass., on May 25, 1916.

Actually, of course, the public has little or no accurate knowledge as to what constitutes reasonable service. Leaving out of consideration the ventilation and heating of cars, style of steps and seats, near-side and far-side stops and other matters upon which it cannot be expected that there would be agreement, there remain such things as headways, speed and available seats upon which it would be expected that the opinion of the passenger would be of value. A recent study of this question indicates, however, that such opinion is most unreliable. In one case where it was possible to submit a number of questions to a group of people, under conditions favorable for such an examination, two of the questions asked were: "What is the average headway between cars?" and "What in your opinion is a reasonable headway?" The time of day and place were given so as to make the replies as definite as possible. The answers showed a wide variation, as was to have been expected. It is of at least equal interest that the average figure given for a reasonable or satisfactory headway was approximately that of the schedules then in effect, while the estimates as to the actual headway were considerably greater. In other words, reasonable service was better service, but when expressed in figures the result was existing service.

In another case the question was asked: "How many people constitute a comfortable load for a car seating fifty?" The conditions were here further defined by specifying different times of the day, for each of which answers were to be given. The maximum answer was to the effect that 150 people would comprise a comfortable load, and the minimum answer was thirty, a range quite sufficient to justify almost any standard of service if the opinions of the patrons could be used as a basis. Two-thirds of the answers were based, according to the statements of those who made them, on the number of passengers in the car, that is, probably on the imagined amount of space available for each. Of the answers sent in 15 per cent were based on the matter of ventilation, and 6 per cent on difficulty experienced in boarding and leaving cars. Many similar instances could be cited, but these will suffice to indicate that the judgment of the patron as to what constitutes good service is not, and should not be expected to be, of much service in establishing standards. It indicates the low value of opinion testimony in service cases.

One of the peculiarities of the electric railway industry is that it has but one grade of service. The steam railroad has the advantage over the electric railway in this respect. It has been permitted to differentiate between the classes of service it renders. It has been possible to vary speed and accommodations for commutation as compared with through service. It has been enabled to differentiate in fares and accommodations as between the all-stop and the limited train. There is a vast difference in revenues received from carrying one passenger 10 miles in a coach on a local train and that received for carrying one passenger 1000 miles in a Pullman drawing room on an especially fast train. Many of the patrons of street railways would be glad to pay an additional fare if additional service could be purchased therefor, but with a few exceptions, and these in interurban operation, no attempt has been made to provide different classes of service. Here and there attempts have been made to adjust fares to the quantity of service, if not the quality, but these are still in the experimental stage and are having some difficulty in overcoming the real estate man's slogan of "one city, one fare," which has worked such hardship on the carriers who have made city expansion possible.

In the earlier years of the industry it was expected that growth in density of traffic would occur, with an attendant betterment in net earnings. Yet, in 1915, there were fewer revenue passengers per mile of track in this State than there were a quarter of a century before, and despite the increase in size and speed of cars, offset no doubt in part by the greater average length of ride, the number of revenue passengers per car-mile was less by 12 per cent than twenty-five years before. With service growing faster than traffic, it is obvious that the changing standard of service must have a pronounced effect upon the financial results of operation. It has been easy to say and to prove that cars have been crowded, and it has been equally easy for commissions to say that more cars should be run. It has frequently been assumed that it is possible to provide a seat for every passenger, and to a considerable extent the cost of rendering such service has been overlooked. Gradually, however, opinions have been modified to take into account the financial ability of the company to render service. Out of the confusion of standards there is gradually emerging this idea: "Reasonable service is that service which the public is willing and able to pay for." It is of interest, then, to examine in some detail the matter of what it costs to render additional service.

THE EFFECT OF INCREASED SERVICE—AN EXAMPLE

Let us assume an electric railway plant representing an investment of $20,000,000. The annual operating revenue will be taken as $4,500,000—all from passenger service—and operating expenses, including taxes and replacement insurance, as $3,500,000. The net of $1,000,000 is sufficient to pay 5 per cent on the investment. This is not a reasonable rate of return, but it is typical, and the assumptions will stand. The company owns and operates 225 miles of track and at times of heaviest traffic has in service some 450 cars. The service is good, but due to the low earning power of the property it is difficult to get money for new equipment and extensions. At the times of heaviest travel and at the heaviest points on the lines, about as many passengers will be standing as seated. Now suppose that an order is issued, of either the headway type or the seat ratio type, requiring 10 per cent more cars in service during the heaviest two hours in the morning and the heaviest two in the afternoon. The investment must be increased by $800,000 for new cars and power equipment, and the operating expenses, including taxes and replacement insurance, will be increased by $138,000 per year, all of which must come out of net earnings. The rate of return is thus decreased from 5 per cent on $20,000,000 to 4.14 per cent on $20,800,000. The significance of these figures is this, that the difference between 4.14 per cent and 5 per cent represents more than $3,500,000 of property made unproductive to its owners, while the rate of return on the remaining property is held at the very low rate of 5 per cent.

Again, suppose the increase in service were made to cover not only the four rush hours, but all periods of the day. The cost of operation exclusive of return on investment would be increased by some $375,000 per year, with a resulting decrease in rate of return from 5 per cent to 3 per cent. This would be equivalent to the confiscation of some $8,500,000, or more than 40 per cent of the investment.

It is quite likely, also, that these demands for increased service would be accompanied by requirements to extend lines into unremunerative territory, to construct crosstown lines of the type which the railroad man characterizes as "suckers" instead of "feeders," and to extend transfer privileges so that the situation is thus further aggravated.

These figures are given for the purpose of emphasizing the narrow margin in the traction business and to show how sensitive the returns are to even slight changes in services. One answer to the question: "What is the matter with the traction industry?" is that any business with an investment ratio as high as that in the electric traction industry is dependent for its success upon a more careful study of costs than has been usual in the past. It is obvious that when a business is earning but the most meager returns, experiment is a hazardous procedure, and it is especially important that careful study be given to the effects of proposed service orders before they are entered. By very conservative figures a 10 per cent increase in service may serve to render unproductive or confiscate 40 per cent of the investment. This in itself demands that great care be taken by those in whose power the matter lies, to see that the service prescribed be within the financial ability of the company to render.

EFFECT OF INCREASED LABOR COSTS AND LOWER FARES

In addition to the changed character of the standards of service demanded at the present time, another tendency is seriously hampering the growth of the traction industry. This is the increased cost of labor and materials. With the increasing rise in prices, the nickel fare has had less purchasing power. With the increased price in the cost of living, moreover, there have been increased demands for adjustment in the wages paid labor in all industries. Manufacturers and producers have been able to meet these by an increase in the price of the commodities they sell. Under present limitations of rates of fare such an adjustment of revenues and wages has not been possible in the street railway business. The street railway differs from other public services in that it is a very large employer of labor. The greatest part of its payroll consists of that expended in platform wages, and the continued increase in platform wages is one of the most important factors affecting the future development of the industry.

Returning to the hypothetical electric railway which was used in computing the cost of additional service, it will be noted that there is paid annually some $965,000 for platform labor, or at the rate of about 26½ cents per hour. Suppose this average wage is raised by 13½ per cent to 30 cents an hour. The cost of operation is increased by $132,000 per year, or nearly the amount of the increase in operating expenses following an increase in the service of 10 per cent for four hours per day. Reversing the comparison, the cost of decreasing the service 10 per cent during rush hours is equal to an increase of 5 cents per hour in platform wages, or an increase in the return on the investment from 5 per cent to 5.9 per cent. These figures, it should be borne in mind, are based on the operation of a hypothetical plant in which, in so far as possible, average and normal conditions were assumed to prevail. Unit costs, it is believed, are not widely different from those current during the past year in the New England states, but it must be understood that the conclusions here reached are based on and relate to no particular property.

It is believed that the point has been reached on many important electric railways where demands for increased wages have reduced the real net earnings below those corresponding to the legal rate of interest; and wage arbitration awards are becoming as important from the standpoint of preserving the integrity of the property from confiscation as are some of the problems for which the law gives jurisdiction to the regulating commissions.

A slightly different presentation of this point may be of interest. The property above considered now has a passenger revenue amounting to $20,000 per mile of track per year. Assume that the community grows and that traffic becomes more dense, the passenger revenue reaching $30,000 per mile of track in the course of a number of years. If the standards of service remain unchanged, that is, if the average patron receives the same service then as now, and it is assumed that he will, although experience would indicate that he will receive much more service, the earnings available for return on investment will increase by some $4,000 per mile of track per year. But, in the meantime, it will have been necessary to increase the investment by some 20 per cent, so that the increase in gross earnings of 50 per cent, or $10,000, per mile of track per year may be expected to yield not much more than $3,000 per mile of track, applicable to the payment of interest or dividends, to improvements in the service, or to increases in the wage scale. If, however, the wages have been increased meanwhile, by no more than 5 cents per hour, the entire increase in net earnings will be thereby absorbed, and the return on investment will fall short by $75,000 of meeting the present rate of return of 5 per cent. In other words, an increase of 50 per cent in traffic density would yield less than a 20 per cent increase in platform wages, if existing standards of service and dividend rates are to be maintained.

Two other factors which have been much discussed are the possibility of competition by motor vehicles and reductions in the rate of fare. The former possibility, while it has had a far-reaching effect upon the financial condition of many street railways throughout the country, does not under present conditions appear to be permanent. Where the gasoline-driven vehicle has been compelled to perform in even a limited degree the functions of the common carrier, it has proved unremunerative and has largely disappeared. Claims for reduction in the rate of fare are not now as pressing as they were in years past. If we assume, referring again to our typical property, earning under present conditions a 5 per cent return on an investment of $20,000,000, that its operations are subjected simultaneously to these demands: (1) an increase of 10 per cent in the service; (2) an increase in platform wages to a rate of 35 cents per hour, and (3) the sale of six tickets for 25 cents, we find that the property, after nearly $1,000,000 additional investment, would fail by $350,000 per year to pay operating expenses and taxes.

EFFECT OF INCREASED FARES

We have thus far considered the effect of increases in service and increases in platform wages on cost, and it has been observed that a relatively small increase in either may amount to the confiscation of a substantial portion of the property. In other industries, if better or more service is desired, the purchaser expects to pay a higher price and, as has been frequently demonstrated, an increase in the wage scale in manufacturing establishments is followed almost without exception, and immediately, by an increase in the selling price of the commodity produced. It is then of particular interest to observe what would be the result of an increase in the rate of fare. There is ample evidence that increased fares for a time at least decrease the riding of some classes of patrons. The decrease, moreover, is effected in the short haul or more remunerative part of the traffic.

It is usually very difficult to analyze the results of changes in rates of fare, because of the very many factors other than rates of fare which affect the riding habits of individuals and communities. Such studies as have been made seem, however, to indicate that within the limits of 6 cents and 3 cents as the rates of fare, an increase in fare, although resulting in decreased riding, is nevertheless accompanied by an increased gross revenue, and a decrease in fare likewise results in decreased revenue although riding is increased. In other words, the effect on the number of rides is not sufficient in either case to offset the change in rate of fare. In one city where opportunity was given to study the question in some detail, it appeared from the records of twelve years that in but seven of the twelve periods was a reduction in rate of fare accompanied by an increase in riding habit or an increase in rate of fare by a decrease in riding. That is, in only slightly more than half the cases was the expected result obtained.

Speaking still in terms of the hypothetical plant which has been considered in connection with increases in service and increases in platform wages, it will be assumed that a 20 per cent increase in rate of flat fare will yield only a 10 per cent increase in revenue, due to a falling off in riding of 9 per cent. This will be accompanied by a lowering of operating expenses if the service is reduced, so as to maintain it at the same standard as at present, or, if the same service is maintained, it will be equivalent to an increase of 9 per cent in the standard of service. This increase in fares might be so distributed as to result in (1) a 9 per cent increase in the standards of service; (2) an increase of 5 cents per hour for all platform labor, and (3) an increase in the rate of return earned by the property. It is significant that in accordance with this distribution the owners would receive a 6 1/3 per cent return instead of the present wholly unremunerative return of 5 per cent. In other words, the result of a 10 per cent increase in revenue and a 9 per cent decrease in passengers and car-miles would be absorbed in a wage increase of 5 cents an hour and an increase in return to slightly more than 6 per cent.

The Interest of the Public in the Question

These conclusions are not pointed out in a spirit of pessimism. On the contrary, it is a sign of promise that the dangers and difficulties of electric railway operation are becoming known and are being carefully studied. While the industry can never be one of large profits, it can well be one where investment is protected and where a reasonable return can be assured to the investor. The public is entitled to all the service it is willing and able to pay for, and it is to the interest of the operator to see that the patron gets what he pays for. Just here has lain much of the difficulty of the last decade. "How much does a given service cost?" "Does it cost more than is received for it?" "How much would it cost to render additional service?" These questions cannot be answered with ease. Perhaps the best that can be done in many cases is an approximation, but so long as the ultimate test of the reasonableness of the rates and service of a public utility is whether the owners are being properly recompensed for the property they have devoted to a public use, it will be increasingly necessary to undertake to answer these questions. If the margin of profit is large, unskilled hands can control the business with relatively small danger of disaster, but when the return is so low as it is in the electric traction industry, the greatest skill and care are necessary to preserve solvency.

Nor are the conditions outlined presented as an argument for increased revenues of electric railways on the ground that "the laborer is worthy of his hire," but rather because the efficient operation of transportation agencies is essential to city growth and any failure of our street railways to be an economic success results in a loss to the community far greater than the loss to the investor. Real estate values are determined by transportation facilities. In one city recently a survey was made of assessed property values on streets upon which street railways are located and on adjacent streets. The comparison disclosed that the value of frontage on streets with street car facilities was 2.15 times the value of that on adjoining streets. It is difficult to measure by any money standard the cost of congestion due to curtailed transportation facilities. The slums are due primarily to lack of rapid ingress and egress from the city. Adequate city planning requires the development of suburbs and auxiliary business centers in close contact with the center of the metropolis. The growth of such centers is necessary to the healthy expansion of the city. We are all aware that they are not possible where transportation is inadequate. The fundamental problem of city planning is not the establishment of widths of streets, the regulation of heights of buildings, housing, forestation, municipal art or ornamental street lighting, but the planning of transportation. Just as proper drainage is the essential factor to consider in the construction of the highway or roadbed, so transportation facilities are fundamental to intelligent city planning. And as compared with these tremendous benefits to the community which come with adequate transportation we may consider the remarkably small part which street railway fares play in the patrons' yearly expense budget, ranging, as has been pointed out by the bureau of fare research, from 2.6 per cent for families in New York City having incomes of less than $500 to 1.2 per cent for families with incomes of $1,500. Co-operation of street railway agencies and the communities they serve will result in far greater gain to the community than to the investors in street railway securities.

The Proper Direction for Co-operation

It is possible briefly to outline the steps along which such co-operation must proceed:

First. The increase in earnings where street railways are now earning inadequate returns so as to make it possible at least to attract new capital into the development of the industry. Increased earnings do not necessarily mean increased fares. They may possibly be secured by removing the many burdens foreign to the business that are now imposed upon it by municipalities, particularly taxes, special assessments and unremunerative capital expenditures. Municipal aid should, in fact, be given to provide public improvements which permit more rapid service.

Second. The development of rational standards of service, or a definite understanding of what is adequate service. This has been possible in the gas and electric business, and the public is satisfied that such standards are all the industry can afford. Lack of such standards is responsible for the ever-increasing demands for more accommodation. Public understanding of such rational standards is necessary. It must be recognized that street railway service is cheap, that it cannot provide facilities immediately when they are desired, that it serves the community and not the individual, that the community's habits and not the street railway create congested periods of traffic and that the right-of-way for the street car serving the majority of the community must be preserved by enforced city ordinances, if rapid service is to be obtained.

Third. Co-operation in meeting the problem of increased cost of material and labor. It may be necessary for regulating commissions to fix standards for allowances for operating labor and return on capital in terms of operating revenues, increasing revenues where increased wages are necessary. In the Middlesex case in this State your commission found, as one of the factors necessitating an increase in fares, wage increases resulting from an arbitration. This points clearly to the fact that the matter of wages and revenues cannot be permanently dissociated and should not be dissociated even temporarily.

Fourth. The establishment of rates or a system of fares in conformity with service which will insure the future development of the industry, limiting the tendency of increased transfer privileges and length of haul for the single fare. This leads to the consideration of the possibilities of the zone system of fares. The zone system may not be as practicable a solution as a gradual increase in rates of fare with the increase in the service area under certain conditions, but it appears in some places, at least, to have been the most effective method of solving some of the more pressing problems of the industry.

Fifth. The scientific rearrangement in many places of routes, the differentiation of through and local routes and the establishment of limited stops to conform to a predetermined plan of city development.

In conclusion, the purport of these remarks is this: The trouble with the electric traction industry is that the revenue is limited and that continual demands on the part of the city for unremunerative investment, on the part of the patrons for additional service and on the part of labor for higher wages have reduced the return on investment to a point where capital is reluctant to engage in the industry and to a point where further burdens of investment, of additional service or of increased wages are likely to confiscate a considerable portion of the investment. To what relief individual traction companies are entitled rests, of course, on determinations of cost, including a reasonable return upon utility capital invested in the business. If revenues are not increased by arbitrary changes in rates of fare the reasonableness of municipal burdens, the reasonableness of wage increases and the necessity of municipal aid must be determined by the necessity of maintaining such a reasonable return on utility capital. The street railway business does not differ from other commercial enterprises. It cannot grow without new accretions of capital, and these cannot be obtained unless the returns are sufficiently high to compete with other forms of investment.

Fare Questions Discussed in Boston

Following Mr. Doolittle's Paper, R. W. Perkins, President Shore Line Electric Railway, Described the Copper Zone System of That Company

A LARGE attendance was present at the meeting of the New England Street Railway Club in Boston on May 25. Following the presentation of Mr. Doolittle's paper, published on the preceding pages, R. W. Perkins, president of the Shore Line Electric Railway, Norwich, Conn., spoke of the satisfactory results obtained by the use of the copper-zone system on that property.

Mr. Perkins said that the zone system of the Shore Line Electric Railway is applied on 240 miles of the road and affects intimately about 200,000 people in eastern Connecticut. The Connecticut law permits a company to advance its rates, and then follows its justification before the Public Utilities Commission, whereas in Massachusetts the advance follows the approval of the commission, the procedure being reversed. The Connecticut plan gives a company courage to go ahead and discuss its needs while reaping the benefit of at least a temporary increase in rates.

With the exception of one case, the company met with no serious difficulty in the fare increase on the whole 240 miles of its lines affected. A final decision has not yet been received from the commission, but the outlook seems hopeful in the light of the hearings. The company also had a hearing before the Interstate Commerce Commission on a portion of the property which is interstate and looks for a favorable outcome. Mr. Perkins said that he did not know of a property in New England that is not justified in an advance of passenger rates, but the institution of a flat 6-cent fare carries with it many difficulties. Most of the Shore Line company's difficulties were smoothed out by talks before the chambers of commerce and business men's associations in the different towns. The company feels the results in a change in rate which means a change in gross, which is practically reflected in the net. The increase of gross which comes from an increased service is very different from an increase in gross which comes primarily from an increase in rate. Better results can be obtained by several or many companies seeking fare increases than one or two.

The speaker emphasized the value of Mr. Doolittle's book on fare problems to the electric railway manager seeking a favorable rate decision. He touched upon the lack of detail knowledge of some of the legal advisers representing remonstrants, pointing out that the favorite policy of such lawyers is to attempt to disqualify the statements of company witnesses. "The whole work of such a lawyer," said Mr. Perkins, "is nothing more nor less than a fishing expedition, and you have got to do everything you can to put it up in the right light to the commission. And I will say right here that our commission is a reasonable commission, meaning to do absolutely the right thing." The copper-zone system is the solution of the problem, in the speaker's opinion.

Regarding extensions, Mr. Perkins said that he has recently been purchasing material in Norwich for two or three extensions of lines. If these had been built under the old nickel-zone system, the company would simply have been obliged to give additional service as the result of additional investment and would not have had a penny of revenue to take care of the added investment. With the smaller increment of fare and smaller unit of service, it is able to get recognition for every piece of track built.

In the Norwich city system there are lines radiating from specific centers. The company charges a nickel fare in two short zones, or two zones for a nickel fare —a minimum fare of 5 cents in any two zones of the system. The result of this is that a person riding from Niantic to Taftville, the other end of the 2-cent zone system, travels 2.29 miles for 2 cents with a transfer, but he pays 5 cents from Niantic to a specific center, and if he rides between the two points he pays 8 cents. Therefore, he rides through four zones for 2 cents each, and if he rides through one short single zone to the other he pays 5 cents; if he journeys from Taftville out half way to Niantic he pays through three zones, 6 cents, and this rule is used on every two zones of the system. The speaker said that he believed that the zone system is bound to become general. Nothing is so discriminatory as the old 5-cent fare, where a passenger rides for 5 cents beyond a certain point and then rides beyond, paying another 5 cents, and making 10 cents for perhaps 3 miles. Under the zone system the man who rides just over the line pays 6 cents, so that between Norwich and New London the company gets 24 cents. A through ticket is sold in order to make up for the man who rides just over the end of the first zone.

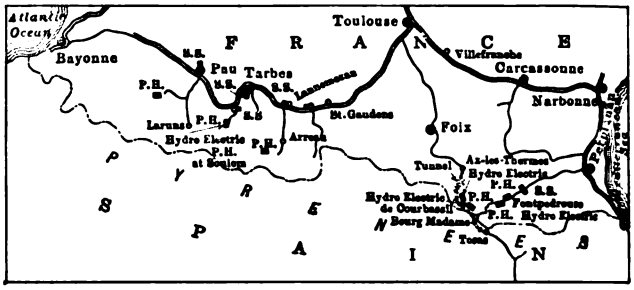
New Locomotives for the Midi Railway

Eight Electric Locomotives Rated at 1500 H.P. Are Being Built for This Extensive Electrification Project in France in Preparation for the Reconstructive Period Which Will Follow the War

THE Midi Railway, which operates in southern France and to the frontier of Spain, is having built at the present time eight single-phase locomotives designed for both freight and passenger service on its electrified lines, this extension of the electrical equipment on a governmental railway system being obviously in preparation for the reconstructive period which must come after peace has been declared in Europe. The new locomotives are intended for the system's western group of electrified lines and they will ultimately be placed in service on the main line from Toulouse to Bayonne on the Atlantic Coast.

Each locomotive will have a continuous rating of 1500 hp. and a one-hour rating of 1800 hp. at a maximum speed of 62 m.p.h. It will be of the 4-6-4 type, having bogie trucks at the front and rear, with three mechanically independent driving axles. The wheelbase will be approximately 15 ft., and the six motors on each locomotive will be of the doubly-fed type. The motors are mounted in pairs, each pair being geared to a quill surrounding one of the driving axles and connected to the drivers by helical springs, clearance being provided between the quill and the axle, so that vertical movement of the drivers is independent of the motors. The locomotive cab will have several compartments, one at each end for the motorman, another for the electric boiler for the steam heating system, another for the motors, transformers and accessories, and still another compartment for the high-tension switches. A passage 20 in. wide will be left on each side of the apparatus in the cab.

Current collection at the trolley, which carries 12,000-volt, 16 2/3-cycle current, will be effected by two pantographs, the current being stepped down to the voltage required for the motors by two transformers. Each locomotive will be required to handle a train weighing 300 metric tons, including the locomotive, at a minimum speed of 53 m.p.h. on grades of 0.5 per cent. On grades of 1.6 per cent a speed of 37 m.p.h. is required with a 200-ton train, and on the ruling grade of 3.2 per cent a speed of 31 m.p.h. will have to be made with a 160-ton train. The locomotives are to be capable of holding back on the down-grades a load equal to that called for on the up-grades, the motors acting as generators and delivering current either to the line or to resistance. The electric brake equipment will thus have to permit a 160-ton train to descend the 3.2 per cent grade at speeds ranging between 31 m.p.h. and 6 m.p.h., but the electric brakes will be operative only at speeds below the higher figure.



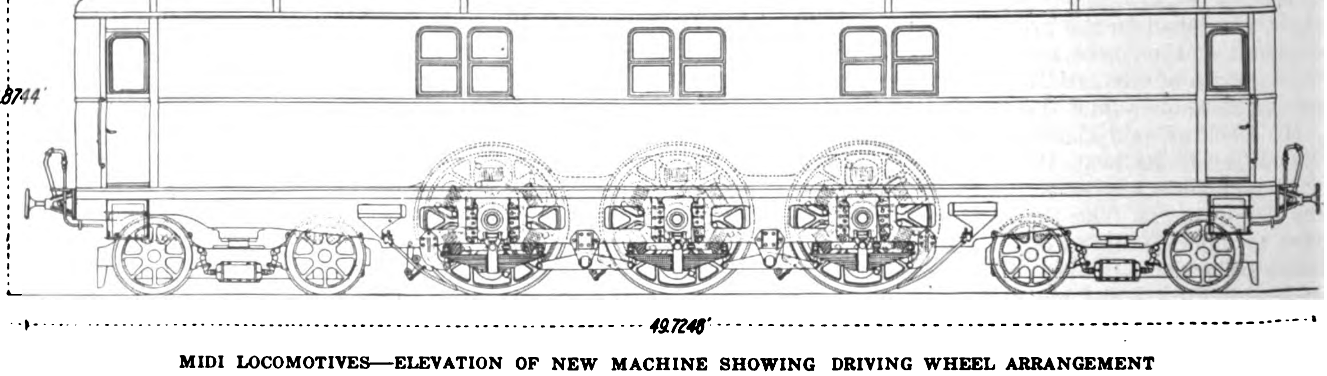
MIDI LOCOMOTIVES—MAP SHOWING GROUPS OF ELECTRIFIED LINES

The forty-eight motors for these locomotives, each of which is of 300 hp. at 790 r.p.m. with 312-volt, 16 2/3-cycle current, are being built in this country, because of the crowded condition of work at the Havre shops of French Westinghouse Company with which the order for the locomotives was placed, the construction of the motors being transferred to the East Pittsburgh plant of the Westinghouse Electric & Manufacturing Company. Under ordinary conditions it would have been necessary to have the entire equipment made in France, but as a result of the existing war conditions the French government gave the manufacturers permission to have the material for the locomotives made wherever it was most convenient.

Development of Midi Electrifications

The use of single-phase locomotives for this project is the result of an interesting process of development. Single-phase power has been used on the Midi Railway since 1908, when 10 miles of track near the Mediterranean coast were equipped with apparatus for 4000-volt, 16 2/3-cycle operation. After two years of experiment, authorization was given for the electric equipment of 175 miles of single track. Of this, 70 miles were on main lines and 105 miles on intermediate branches. The work was divided into two groups, the eastern one of which extends from Perpignan to Villefranche, approximately 30 miles, and includes a 34-mile direct-current, third-rail extension to Bourg-Madame, as well as a section which is a part of the main line from Toulouse to Barcelona in Spain. The western group includes 33 miles of main-line double-track from Montrejeau to Pau, and also 220 miles of single-track branch-lines in the same section.

For this trackage the railway company requested bids for electric locomotives from various manufacturers of electric equipment in France, reserving the right to return the locomotives to the builders if they



MIDI LOCOMOTIVES—ELEVATION OF NEW MACHINE SHOWING DRIVING WHEEL ARRANGEMENT did not fully meet the specifications. The bids of six companies were accepted, and the locomotives furnished were subjected to special tests during the years 1911 and 1912. As a result of the tests, which were made on a 15-mile section of the line, three of the locomotives, including the one furnished by the French Westinghouse Company, were accepted.

The latter type of locomotive was equipped with two single-phase, 600-hp., 15-cycle, 327-r.p.m., 410-volt motors connected to a jackshaft by means of twin gears, connection from the jackshaft to the main driver being made by means of a Scotch yoke and connecting rods. This initial locomotive is now working in freight service on the Lourdes-Tierrefitte line, one of the branches where maximum speeds of 44 m.p.h. are attained, and it is as a result of the excellent performance of the machine that the railway placed the order for the eight new locomotives described in the foregoing paragraphs.

One of the major reasons for this extensive electrification was the availability of large amounts of hydroelectric power. The eastern group of lines is supplied by several hydroelectric plants, of which one on the Tet River delivers three-phase power at 60 cycles, 600 volts to a substation at Villefranche, where it is converted from three-phase to single-phase power at 16 2/3 cycles and 12,000 volts. This substation also supplies power to the 800-volt direct-current equipment on the Villefranche-Bourg-Madame line. Another hydroelectric plant on the Tet River is equipped with two 1375-kva., 16 2/3-cycle, 500-r.p.m., 12,000-13,500-volt single-phase generators, and in addition there is a power station at Fontpedrouze and another at Porte in the valley of the Caroe, to furnish stand-by service. The power for the western group of lines is supplied by a hydroelectric station located near the village of Soulom, where there are two waterfalls of great height. The equipment of this station includes six 3500-kva., single-phase, 6000-volt, 16 2/3-cycle generators. Three of them operate at 500 r.p.m. and three at 320 r.p.m. The voltage is raised to 65,000 for distribution to four substations, where it is reduced to 12,000 volts for the trolley. Two other power stations are projected. One of them, at Eget on the Aure River, will contain four 3500-kva., 16 2/3-cycle, 6000-volt, single-phase generators, and the other, which will be located at Orleans, will supply power to the Transpyrenean line from Dedous to Aronanos.

Entertaining the Sunday School Class

The Task of the Chicago Elevated Railways in the Maintenance of Rolling Stock Described

AN interesting bit of public relations work was recently done by H. A. Johnson, master mechanic Chicago Elevated Railways, who entertained a class of twenty-five from one of the Oak Park Sunday Schools with a trip over some of the elevated railway lines and an inspection of the repair shops. This class, whose members' ages range from fifteen to fifty, has regular outings and accepted the invitation of Mr. Johnson with a view to gaining a better knowledge of city transportation methods.

The party was carried in one of the new all-steel trains, which was run from Oak Park to the city, then around the Union Loop and over the south side lines to the terminus of the Kenwood division. From here the train was run back to the city and over the northwestern division to the large shops at the Wilson Avenue terminal. The train was run directly into the shops, and then Mr. Johnson gave the party a little talk on the mechanical features of the cars.

The nature of his talk is of particular interest in showing how the confidence of the public may be gained when a fuller knowledge of railway company affairs is obtained.

Mr. Johnson first addressed the ladies with regard to the care of the cars from the standpoint of cleanliness. He said that the ordinary housewife with a five-room apartment considered it quite a task to keep clean ten or fifteen windows, but he had 42,000 windows to wash. Moreover, the duty of scrubbing floors in a home was onerous, but what would the housewife think if she had 600,000 sq. ft. of floor to scrub, as much floor as would ordinarily be in 1200 apartments. Mr. Johnson then pointed out the bigness of the equipment maintenance task by stating that if all the elevated railway cars in Chicago were coupled together, they would make a train 15 miles long, and that during the evening rush hours seats were available for 83,000 people. Here were more than enough seats for every man connected with all branches of the United States army. In fact, the entire army could all be transported by the Chicago Elevated Railway at one time, every man could have a seat, and there would be seats left.

Mr. Johnson then spoke of the number and possibilities of road failures of equipment. During 1915 there were 893 small delays due to equipment causes, and yet more than 50,000,000 car-miles were run. That meant about 57,000 car-miles per failure. "Do you realize that you can ride the equivalent of a trip twice around the world with an average of but one delay due to equipment?" he asked, and then said he wished his automobile would make that kind of a record. He then pointed out that reliability of service was not a matter of chance. It was the result of a thorough system of inspection and maintenance. He also spoke briefly of the general mechanical organization of the road and how cars were inspected regularly at short periods and received a general overhauling at longer periods. The party was then divided into groups and shown through the repair shops by the foremen, who acted as guides. Attention particularly was drawn to the size of the axles, wheels and the motor. It was pointed out that the trucks and motors, that is, the running gear of the car, weighed half the total weight of the car.

Next a demonstration of the automatic safety track trips was made in the terminal yard, showing how these trips set the air and stopped the train without any act on the part of the motorman. The reason for the "dead-man" handle on the controller and the automatic acceleration features were also explained and their action illustrated. To convey an impression of the power of the braking system on a train, the brakes were set and the current put on the motors. Even with 300 or 400 hp. applied, the brakes still held the car. Later the safety overload action of the circuit breakers was demonstrated by throwing the controller into multiple with the air brakes set on a standing car.

The general feeling conveyed to Mr. Johnson's guests on this trip, as evidenced by their remarks, was one of increased confidence in the elevated railway service.

Precautions which have been taken in case of Zeppelin raids almost led recently to a strike of the Northampton (England) Tramways. The tramcars ceased to run at 8 p. m. and this led to a reduction of the working hours and a consequent loss of the wages to the drivers and conductors of the cars of from 7 shillings to 8 shillings ($1.68 to $1.92) per week. An offer by the tramway committee to pay half rates for the lost time was declined. After further consideration the committee agreed to the demands of the employees.

Interstate Utility Capitalization

R. E. Heilman Points Out the Desirability of Federal Control Over the Securities of Interstate Utilities

THE May issue of the *Journal of Political Economy* contains an interesting review by Ralph E. Heilman on control of interstate utility capitalization by state commissions, the defects of the present chaotic conditions and the remedy therefor by placing the capitalization of interstate utilities under exclusive federal control. According to Mr. Heilman, capitalization, unlike rates and service, does not easily lend itself to control upon a geographical basis. The problem seems to be twofold: first, as to the degree of control exercised by a state through its commission over the issuance by a domestic corporation of securities which represent expenditures upon, or are secured by liens upon, property outside the state; and second, the degree of control thus exercised over the issuance by a foreign corporation of securities which represent expenditures upon, or are secured by liens upon, property within the state.

SECURITIES OF DOMESTIC AND FOREIGN CORPORATIONS

In regard to domestic corporations, the principle is actually applied by some commissions, that such a corporation must secure authorization for the issuance of all its securities from the state of its creation, even though some or all of the proceeds are to be used in other states. The Massachusetts Railroad (now the Public Service) Commission, the Vermont Public Service Commission and the Ohio Public Utilities Commission have acted along this line, as well as the Maryland Public Service Commission, although the Maryland Court of Appeals has held that the commission could exercise no jurisdiction whatever as regards securities the proceeds of which were to be spent outside the State. On the other hand, the New Hampshire Public Service Commission maintains that its approval is not necessary for the issuance of securities by domestic corporations, in so far as the proceeds represent expenditures outside the State.

That the mere fact of foreign incorporation does not preclude a commission from passing upon securities issued to acquire equipment or property within the state is the position of the California, Missouri and Arizona commissions. The Illinois Public Utilities Commission holds that foreign incorporation does not prevent control of capitalization, in so far as the securities are protected by a lien upon property situated within the State. This commission has approved bond issues the proceeds of which were to be spent largely in other states, but which were secured by a mortgage upon property situated in part in Illinois. The views of the Georgia and the New York second district commissions, however, differ from the preceding. While the Georgia commission has held that the issuance of stocks or bonds of foreign corporations was entirely beyond its control or the control of the State, it has indicated that the right to mortgage or encumber property might be restricted by the State in which such property was located, regardless of whether the corporations were foreign or domestic. The New York commission above referred to appears to take substantially the same position.

DEFECTS OF PRESENT SYSTEM

The results of this difference of opinion and variation of power are confusing and unsatisfactory. Frequently an issue of securities must be approved by two or more commissions, with the possibility of lack of agreement as to the amount or terms of issuance. It is asserted that there has been an inclination on the part of some commissions to insist that a certain portion of the proceeds should be spent within their state as a condition of their consent to the issuance of securities. Another defect is the fact that authorization is often given when the approving commission has no adequate means of acquiring at first hand the information upon which its decision rests. As to expenditures outside the state, a commission must ordinarily rely either upon the representation of the applicant or the findings of the commissions in the other states.

To Mr. Heilman's mind the conclusion that existing methods are inadequate is strengthened by a consideration of the special problem of control of capital stock issues and debentures or unsecured bonds. It is difficult if not impossible to understand how one state can regulate the issuance of capital stock by a foreign corporation, even though the proceeds of such stock are to be spent within the state, or the issuance by a foreign corporation of bonds not secured by a mortgage upon property within the state. Such powers have been actually conferred upon the commissions of several states and are being exercised, but as yet there has been no authoritative judicial determination of this problem. While prediction is dangerous, Mr. Heilman thinks that it is to be expected, in view of the long line of unvarying decisions, that the courts will regard the attempt to regulate stock and debenture issues of foreign corporations as abortive. In such an event it would prove impossible to prevent such corporations from over-capitalizing utility properties without some alteration in the existing system of regulation.

PROPOSED REMEDIES

Mr. Heilman notes that various remedies had been suggested for the present unsatisfactory condition. For example, it has been proposed that the regulation of capitalization be left entirely to the parent state, but such a state is often little concerned with the operations of its offspring, and many important companies are incorporated under the laws of several states. Again, it has been suggested that the various states could prohibit the placing of property within the state under a general mortgage with property outside the state. In view of established methods of railroad financing, however, this would be inadvisable, for it might prove exceedingly inconvenient to a corporation to divide its securities into several issues so as to have each cover simply the property within a particular state, and it might prove difficult to sell the securities thus divided if the entire property were an operating unit. Furthermore, this proposal would not simplify the problem of controlling the issuance of capital stock by foreign corporations. A third suggestion has been that the states could require all corporations owning and operating utility property within their borders to be domestic corporations. The general application of this policy would solve the problem as far as intrastate properties were concerned, but to break up the great interstate systems into fragments each owned by a separate corporation domiciled in a separate state would surely be futile.

The foregoing considerations, in Mr. Heilman's opinion, point conclusively to the desirability of federal control over the securities of interstate utilities. With all intrastate properties owned and operated by domestic corporations, so that their capitalization would be subject to the control of the state in which the property was situated, and with the capitalization of all interstate properties subject to exclusive federal control, there would be no possibility of disagreement between commissions, no conflict arising from differences in state laws, no issuing of authorizations based on the findings of other commissions and no legal difficulties upon the grounds of foreign incorporation.

Instructing Motormen in Louisville, Ky.

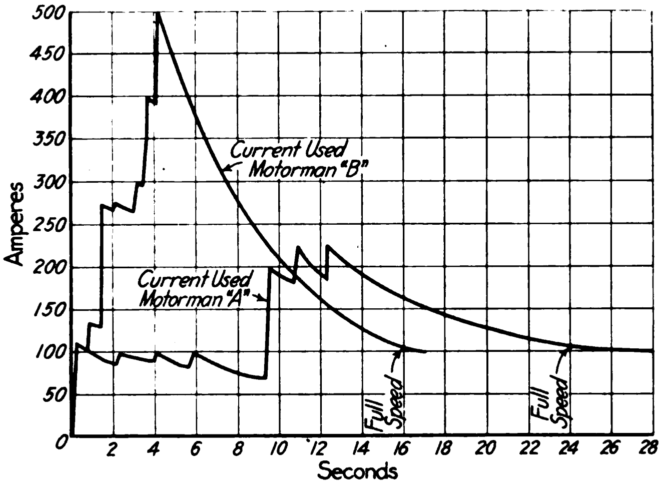
School of Efficiency and Economy in Use of Car Equipment Has Been Established by Louisville Railway

A PROFITABLE course of instruction in the economical use of car equipment has been inaugurated by the Louisville (Ky.) Railway for its 1000 motormen and conductors. This school of efficiency and economy is an outgrowth of the safety-first school started by the railway company in May, 1914.

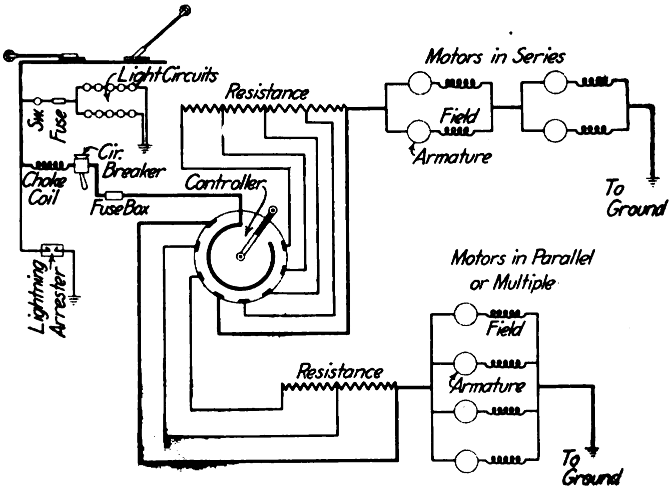
F. H. Miller, superintendent of motive power, lectures to the classes on the saving of power and equipment by efficient operation. He is heard once a month by a class of motormen and conductors, together with carhouse foremen and inspectors who attend the lectures in rotation. The motormen and conductors attending the school, one from each carhouse, are selected by ballot the month previous and form a committee for the month. As new men are selected monthly all of them will eventually have the benefit of personal instruction.

Lecture summaries prepared originally by the instructor for his reference alone have evolved into charts on stiff cardboard, 30 in. x 40 in., on which are printed in letters ¾ in. high the principal points to be brought before the members of the class. These summaries, the text of which is reproduced herewith, can easily be read by the men from their seats in the lecture room. They have proved unusually effective in making the fundamental details clear.

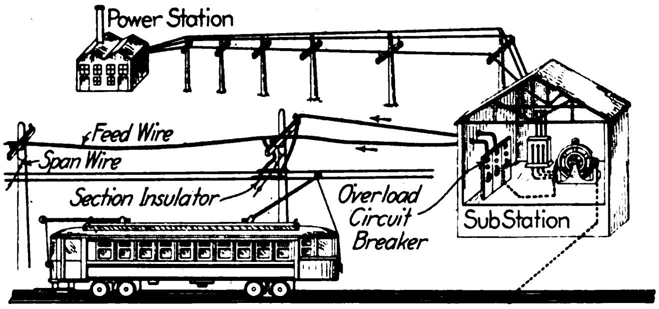
In connection with the cardboard forms, charts on car wiring, motor and controller wiring and power distribution from the power house and substation, as well as charts showing power saving through the economical use of current in accelerating cars, are used by way of illustration. These charts are reproduced herewith. Interlineations on the cardboard forms, in type visible only to the instructor, indicate to him when his remarks are to be inforced with reference to any of the charts.



LECTURE CHART FOR DEMONSTRATING SAVING IN CURRENT THROUGH PROPER ACCELERATION



CAR WIRING DIAGRAM USED FOR INSTRUCTING PLATFORM MEN



POWER DISTRIBUTION DIAGRAM USED FOR INSTRUCTING PLATFORM MEN

Charts Used in Instruction on Economical Use of Car Equipment on Louisville (Ky.) Railway

1. Obey rules and regulations that have been made only after years of trial and experience, as they are the best yet devised to take care of all conditions. Operate your cars and car equipment under these rules, as if the cars and car equipment were your property and any damage done to them or misuse of them came out of your own pocket, for it does in a way, as the company's prosperity means your prosperity.

2. Using controller improperly:
   (a) Opens circuit breaker and scares passengers.
   (b) Wastes power.
   (c) Burns out controller or motors.
   (d) Injures car equipment.
   (e) Causes car to jerk.

3. Having brakes and controller on at the same time:
   (a) Wastes power.
   (b) Injures motor equipment.
   (c) Makes unnecessary brake-shoe wear.

4. Coasting as much as possible:
   (a) Saves power.
   (b) Prevents accidents.
   (c) Saves brakeshoes and motor equipment.

5. Starting all cars at once after blockade or after power is off line:
   (a) Opens circuit breaker on trolley feeder at substation.
   (b) Reduces trolley voltage.

6. Moving under overhead switches, crossings and brakes with power on:
   (a) Causes motors and car to jerk.
   (b) The arcing wears out trolley wheel and line material.

7. Approaching electrically controlled switch at too great speed·
   (a) Means taking the wrong track with possible accident, in case switch does not operate.
   (b) Produces unnecessary wear of brakeshoes.
   (c) Consumes unnecessary power.
   (d) Is dangerous because car behind may have turned switch.

8. Renewal of car equipment costs approximately as follows:

(a) Controller	$178.00
(b) Armature	220.00
(c) Wheel	21.10
(d) Trolley wheel, 6 in.	1.25
(e) Renewing fingers in controller	4.25

9. Cost of replacing car parts figured in cash fares, not allowing any part of these fares to go to wages, taxes, accident claims, interest on use of money, insurance or depreciation:

	Cash Fares
(a) Grinding and replacing flat wheel	20-80
(b) Repairing and replacing a grounded controller	15-25
(c) Renewing car safety gates after a collision	40-80
(d) Losing a broom three-quarters good	5
(e) Renewing overhead crossing block	160
(f) After split switch, replacing car with wreck car, in addition to delay to line	24

10. Report all defects in cars, track or linework as definitely and as soon as possible:
    (a) Most important repairs are made first where several reports come in at the same time.
    (b) This saves longer delays by permitting making of repairs before they stop the service.

11. Assist other departments as much as possible:
    (c) Run slowly over track undergoing repairs, or under trolley wire being renewed or repaired, pulling trolley pole down to roof of car when requested to do so.

12. Stop your car and let the emergency wagon pass when ringing gong, with similar to treatment of fire department apparatus. Go slowly over special work, both overhead and track. Always have trolley pole trailing. Keep hand on trolley rope when in doubt as to trolley jumping.

13. Taking care of a broken trolley wire:
    (a) If on the ground get it off the rail first.
    (b) Attach pick-up to end, lift off the ground and, if possible, to one side so that cars can pass.
    (c) Stay with broken wire until next car arrives so that no one will run into it.

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

ASSOCIATION NEWS

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

Company Membership in the Association Is Growing Rapidly—Federal Relations Committee Urges Protest on Certain H. R. Bills—Abendroth Recommends Appraisal of Cost of Training Employees

New Company Members of American Association

More than 100 manufacturers and others had up to and including May 31 joined the association under the provisions of the constitutional amendment adopted at Chicago on Feb. 4, 1910. The names of these arranged alphabetically, are as follows:

Alcott, Edward, Manassas, Va.; Aluminum Company of America, New York City; American Abrasive Metals Company, New York City; American Brake Company, St. Louis, Mo.; American Brake Shoe & Foundry Company, New York City; American Engineering Company, Philadelphia, Pa.; American Railway Guide Company, Chicago, Ill.; American Railway Supply Company, New York City; American Steel Foundries, Chicago, Ill.; Archbold-Brady Company, Syracuse, N. Y.

Barbour-Stockwell Company, Cambridge, Mass.; Bates Expanded Steel Truss Company, Chicago, Ill.; Bishop Gutta Percha Company, New York City; Brill Company, The J. G., Philadelphia, Pa.; Bronze Metal Company, New York City; Buda Company, Chicago, Ill.

Chattanooga Armature Works, Chattanooga, Tenn.; Cheatham Electric Switching Device Company, Louisville, Ky.; Chicago Pneumatic Tool Company, Chicago, Ill.; Cleveland Fare Box Company, Cleveland, Ohio; Consolidated Car Heating Company, Albany, N. Y.; Curtain Supply Company, Chicago, Ill.

Dayton Fare Recorder Company, Dayton, Ohio; Dayton Manufacturing Company, Dayton, Ohio; Drew Electric & Manufacturing Company, Indianapolis, Ind.; Drouvè Company, The G., Bridgeport, Conn.

Edwards Company, The O. M., Syracuse, N. Y.; ELECTRIC RAILWAY JOURNAL, New York City; Electric Service Supplies Company, Philadelphia, Pa.

Falk Company, Milwaukee, Wis.; Federal Signal Company, New York City.

Galena-Signal Oil Company, Franklin, Pa.; General Electric Company, Schenectady, N. Y.; Gest Company, G. M., New York City; Globe Ticket Company, Philadelphia, Pa.; Gold Car Heating & Lighting Company, New York City; Goldschmidt Thermit Company, New York City; Grayson Railway Supply Company, St. Louis, Mo.; Griffin Wheel Company, Chicago, Ill.; Gwilliam Company, The, New York City.

Hale & Kilburn Company, Philadelphia, Pa.; Heywood Brothers & Wakefield Company, Wakefield, Mass.

International Register Company, Chicago, Ill.; International Steel Tie Company, Cleveland, Ohio.

Jewett Car Co., Newark, Ohio; Johnson Fare Box Company, Chicago, Ill.

Keith Car Company, Sagamore, Mass.; Kenfield-Davis Publishing Company, Chicago, Ill.; Kerite Insulated Wire & Cable Co., New York City; Kerschner Company, Inc., W. R., New York City; Keyes Products Company, New York City; Koury Company, C. M., Atlantic City, N. J.

Lackawanna Steel Company, Lackawanna, N. Y.

Morden Frog & Crossing Works, Chicago, Ill.; McQuay-Norris Manufacturing Company, St. Louis, Mo.

Nachod Signal Company, Louisville, Ky.; National Brake Company, Inc., Buffalo, N. Y.; National Lock Washer Company, Newark, N. J.; National Pneumatic Company, New York City; Nuttall Company, R. D., Pittsburgh, Pa.

Ohio Brass Company, Mansfield, Ohio.

Pantasote Company, New York City; Post & Company, E. L., Inc., New York City.

Q. & C. Company, New York City.

Rail Joint Company, New York City; Railway Audit & Inspection Company, Philadelphia, Pa.; Railway Improvement Company, New York City; Railway Materials Company, Chicago, Ill.; Railway Roller Bearing Company, Syracuse, N. Y.; *Railway Signal Engineer*, New York City; Railway Track Work Company, Philadelphia, Pa.; Rooke Automatic Register Company, Providence, R. I.

St. Louis Car Company, St. Louis, Mo.; St. Louis Frog & Switch Company, St. Louis, Mo.; Seymour Portable Rail Grinder Company, E. P., Waltham, Mass.; Sherwin-Williams Company, Cleveland, Ohio; Simmen Automatic Railway Signal Company, Buffalo, N. Y.; Smith Heater Company, Peter, Detroit, Mich.; Smith Ward Brake Company, New York City; Southern Exchange Company, New York City; Southern Wheel Company, St. Louis, Mo.; Standard Paint Company, New York City; Standard Varnish Company, Port Richmond, S. I., N. Y.; Star Brass Works, Kalamazoo, Mich.

Taylor Electric Truck Company, Troy, N. Y.; Texas Company, New York City; Thompson & Son Company, W. I., Cleveland, Ohio; Tool Steel Gear & Pinion Company, Cincinnati, Ohio; Trolley Supply Company, Canton, Ohio.

Union Switch & Signal Company, Swissvale, Pa.; Universal Lubricating Company, Cleveland, Ohio.

Vacuum Car Ventilating Company, Chicago, Ill.; Valentine & Company, New York City; Van Dorn Coupler Company, Chicago, Ill.

Wendell & MacDuffie Company, New York City; Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; Westinghouse Traction Brake Company, Wilmerding, Pa.; Wheel Truing Brake Shoe Company, Detroit, Mich.; White Company, Cleveland, Ohio; Wisch Service, Inc., P. Edward, New York City; Wood Company, Charles N., Boston, Mass.

Yale & Towne Manufacturing Company, New York City.

Committee on Federal Relations

As chairman of this important committee, Arthur W. Brady, president Union Traction Company of Indiana, has this week sent to the members of the American Association a letter calling attention to House bills H. R. 9216 and H. R. 9047. These bills are now pending in Congress, and if passed would seriously affect electric railways.

Bill H. R. 9216 amends the hours of service act, approved on March 4, 1907. It was favorably reported with amendments on May 17, 1916, by the House committee on interstate and foreign commerce. While apparently intended simply to reduce from nine to eight the hours of service of signal and switch operators, the amendment is so worded as to include motormen and conductors of interurban roads engaged in interstate commerce by classing them with dispatchers in case they receive or report orders by telephone. The committee requested a hearing on this bill but through a misunderstanding it was not held. The committee requests interested companies to get into touch with their Congressmen.

The committee also prepared in pamphlet form a memorandum setting forth the effects of this bill, if passed, upon the interurban railways. Copies of the memorandum were placed in the hands of all members of the House committee and sent to the members of the association.

Bill H. R. 9047 was introduced on Jan. 14, 1916, and is now in the hands of a sub-committee of the House committee on interstate and foreign commerce. Its purpose is to regulate car clearances, the side clearance being limited to not less than 3 ft., excepting at station or freight-house platforms, and overhead clearance to not less than 6 ft. The committee on federal relations has requested that the bill be so amended as not to apply to electric railways, and it is suggested that member companies communicate their views to their Congressmen.

Arc Welding Discussed in Denver

The Denver Tramway section held its thirty-sixth regular monthly meeting on May 18, this being the last assemblage for the season. The attendance at the meeting was 100. After a few introductory remarks, President W. G. Matthews read the names of five new members, three being motormen, one a conductor and the fifth the foreman of the paint shop.

The principal speaker of the evening was G. M. Robinson of the General Electric Company, whose subject was "Arc Welding." A lively discussion followed the presentation of the paper.

Public Service Section

The address delivered by Thomas N. McCarter, president Public Service Corporation of New Jersey, at a joint meeting of the electric railway, gas and electric company sections connected with the Public Service Corporation, has been printed by the corporation in attractive form for distribution to those in attendance at the meeting. This address was abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for May 6, 1916, page 874. The joint meeting was held on the eve of the opening of the Public Service Terminal.

Milwaukee Section Discusses Appraisals and Employees' Activities

Secretary E. H. Olsen reports that a regular meeting of company section No. 1, was held on May 25, 1916, at which the two papers abstracted below were presented.

H. G. Abendroth reported on behalf of the committee on appraisals, his report being devoted to five divisions of the company's property, namely, land; roadway and track; buildings, fixtures and grounds; rolling stock, and materials and supplies. Each of these subjects was treated separately and appropriately illustrated.

Mr. Abendroth called attention to two new developments in valuation and appraisal-making; perpetual-priced inventory, and cost of training employees. He believed that an up-to-date record of value, based on physical appraisal and actual records, is invaluable, and further that accountants and engineers could render a great service in the development of practical ways and means for keeping a perpetual priced inventory of property.

The cost of training employees was referred to as a new element of value in public utility appraisals. It was believed that in a cost-reproduction value, consideration should be given to the fact that a utility has a trained staff of employees and that this is an element of value just as much as the early losses from operation, which are allowed as a part of the investment in the form of going value.

Bert Hall, welfare secretary, read the report of the committee on employees' co-operative activities. Original research work was undertaken by the committee and statistics were gathered from various sources to permit a comparison between what other public utility corporations were doing along this line and the co-operative activities in effect by this company. Mr. Hall took up first the matter of conservation of health, stating that "It is an indisputable fact that any co-operative activity which promotes the health, happiness and well-being of a large number of persons living in any community will react upon that community in a beneficial way."

From the data which this committee had assembled it was shown that mutual benefit associations group themselves into four distinct classes:

1. Associations in which the members pay a certain amount of dues and to which the company contributes to some extent. In no case does the contribution by a company under this class of associations exceed the total amount paid in by the individual members.

2. Associations in which membership is divided into classes according to the salaries received. In a typical case of this kind the dues range from 30 cents to 90 cents per month, the benefits from $7 to $12.50 per week, and the death benefit from $300 to $600. The company under which this association operates stands the cost of clerical work, rentals, etc., and pays in an amount equal to one-half of the dues paid by the individual members.

3. Associations to the funds of which the individual members contribute nothing, the entire expense of sick benefits and death benefits being borne by the employing company.

4. Associations maintained entirely by employees and to which the employing company contributes nothing in the way of money, but may contribute rental of quarters and some clerical help.

The organization of a women's auxiliary of the Employees' Mutual Benefit Association, and the work which they have been engaged in was dwelt on briefly. Membership in this auxiliary is made up of female members of the families of employees who have done much to assist in caring for the sick, performing household duties, and generally making conditions most favorable for a speedy recovery.

The educational work carried on, recreational activities, the steadily increasing number of shareholders in the building and loan association, the enlargement of the scope of the benefit association to provide medical attendance to dependents, the employees' loan fund, pension system, etc., were all briefly discussed with the aid of lantern slides.

Hampton Company Section

A special meeting of Company Section No. 10 was held on May 12 at Newport News. The guest of honor was President C. L. Henry of the association, and in addition Col. W. S. Copeland, editor *Daily Press*, Newport News, and Hon. Harry Houston, speaker of the House of Representatives of Virginia, were present and made a few remarks. After the meeting refreshments were served. Sixty members and guests attended.

C. Loomis Allen, president of Allen & Peck, Inc., and past-president of the association, introduced Mr. Henry. The latter's talk was along the lines of what company section work really means to the employee both from a social and an intellectual standpoint. He said that the employee, and particularly the trainman, must at all times have the good-will of the public.

Portland Section

Company section No. 9, recently organized by employees of the Cumberland County Power & Light Company in Portland, Me., is now well on its feet. The second meeting was held on April 11 with an attendance of 100. Capt. G. E. Fogg spoke on "Preparedness." After the talk local entertainers had the floor, and later a supper was served under the direction of C. H. Houghton of the hall and supper committee.

The third regular meeting of company section No. 9 was held on May 9 with an attendance of 125 members. It was preceded by a supper and followed by two six-round boxing bouts between soldiers from two of the local forts. Five new members were taken into the section. The principal speaker at the meeting was J. W. Belling of the General Electric Company, who spoke on "Electric Car Equipment."

COMMUNICATIONS

Psychological Tests for Motormen

DALLAS CONSOLIDATED ELECTRIC STREET RAILWAY COMPANY.
DALLAS, TEX., May 25, 1916.

To the Editors:

In the editorial appearing in your issue of May 20, entitled "Psychological Tests for Motormen," wherein reference is made to a paper read by me before the Southwestern Gas & Electrical Association, you conclude with the following paragraph:

"The plan is certainly an ingenious one, although we believe that many managers will consider that careful observation of the action of a man in actual service of the road will be at least as valuable as that with a test model."

I wish to state that I heartily agree with you as to the importance of observing a man's action in the actual service of the railroad, but I would call your attention to the fact that my paper dealt with the selection of employees and did not go into the subject of their training, which is quite a large subject in itself.

Our one idea in adopting these tests was to reduce, in so far as possible, the number of men whom it would be necessary to put on the cars as students. From this small number we expect to secure a higher percentage of first-class trainmen.

P. W. GERHARDT,
Superintendent of Transportation.

Selection of Employees

NEW YORK STATE RAILWAYS
ROCHESTER, N. Y., May 25, 1916.

To the Editors:

In his paper on "Scientific Selection of Employees," read before the Southwestern Association, and abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for May 20, page 943, Mr. Gerhardt emphasizes what should be the foundation of accident prevention work, the selection of the employee. To go a step further, the sub-foundation is the selection of the man who selects the employee. The reason for this is that, in the absence of any exact criteria, a man will select his employees as he would his friends, men who are congenial and have similar habits and inclinations. For when a man sizes up another he uses himself as a basis of comparison, consciously or unconsciously. This truth is realized, doubtless, though not expressly stated by Mr. Gerhardt, as is shown by his selection for an employing officer of a type of man who would make an excellent trainman. Such a man would instinctively reject all applicants whose appearance or manner of approach, allowing for differences in education, did not come up to his own standard of neatness and courtesy.

The upper age limits and the limits of height and weight are largely arbitrary, depending on local conditions. Beyond about thirty-five years of age, inexperienced men are apt to be slow in learning and fixed in their habits. Again, when a pension scheme is established, it is undesirable to employ men whose period of active usefulness will likely fall below an established minimum. I believe that a low age limit of twenty-five years instead of twenty-one years is better for motormen, as the men above this age are more settled and better realize their responsibilities. Married men, especially, are not so likely to make changes, and results in practice have shown that the changes in personnel among motormen are very much fewer than among conductors, for whom the lower age limit is twenty-one years. Where hand-brake equipments are used, motormen must have sufficient weight and strength to handle them without undue fatigue, whereas with air equipment much lighter men may be employed. Smaller men as a rule are more active and can think more quickly than heavy, "beefy" men, and are therefore more desirable as motormen when it is possible to use them.

The time required to make out an application is a good test of education and mental ability, but it cannot be applied too strictly, except, perhaps, to conductors, on whom most of the clerical work devolves. Where large numbers of foreigners are employed, it furnishes hardly any clue to a man's ability; it serves chiefly to eliminate illiterate conductors. Motormen are acceptable if they can understand and answer the questions asked and read to them or explained to some extent.

Of the psychological tests, I am not able to speak from experience. I think that the attention test is open to the same objection as the application test, that it would not apply equally to foreigners and native Americans. Allowances should also be made for the mental condition of the applicant at the time the test is made. I should expect considerable difference in the results obtained from a country boy looking for his first city job, a married man with back rent due and an ex-employee applying for reinstatement; although all three might make equally good men when shaken down to familiar routine work.

The observation test seems to apply chiefly to motormen. A similar test could be devised for conductors, with lettered squares to designate stops and numbered colored squares to designate passengers boarding and presenting transfers and coins of various denominations for fare, speed in making change and handling passengers being especially desirable on prepayment cars. A variation might also be made in the test as described by driving the strip at various constant speeds, instead of allowing each man to vary his speed during different portions of the run. This would prevent a man from taking his time when collisions are of frequent imminence and speeding up when he felt he was not taking too many chances. This taking of chances where traffic is light is one of the causes of our most serious accidents.

The judgment test I consider particularly valuable, not only in selecting motormen who will know what to do in case of emergency, but also in getting conductors who can make up their minds on a course of action and pursue it. The conductor who argues over a late transfer, is slow in giving information or hesitates to suppress a nuisance on the car is only too often lost, and creates an impression of incompetence that reflects on the whole service. And only too often can a crew be seen standing around doing nothing or working at cross purposes, when a little initiative and decisive action could replace a car or raise a blockade with a minimum delay to traffic.

When the problem confronting the transportation department is to choose a few employees from many applicants, the standard for employment should be as high as possible, and these psychological tests are of undoubted value in aiding the judgment of the employing officer. But when the problem is to find men of any kind to fill vacancies, the question of paramount importance is whether or not a candidate has any spark of ability that can be fanned into the clear flame of competence by careful and diligent instruction. It then becomes the duty of the employing officer to accept all men who are not obviously unfit for the service and to instruct these men so carefully and to follow up their work so diligently as to reduce the possibility of acci-

dents to a minimum, reserving the right of discharge until the men have shown that, in spite of admonition, additional practice and experience, they are wholly incompetent to perform their duties. Under these circumstances elaborate preliminary tests are not desirable, as the end in view is not so much the elimination of the unfit as the education and evolution of the unpromising recruit into a competent employee.

GEORGE LAWSON,
Supervisor of Employment and Instruction.

Co-operative Education for Employees

THE CINCINNATI CAR COMPANY

CINCINNATI, OHIO, May 29, 1916.

To the Editors:

The article by Prof. A. M. Wilson on "Co-operative Education" in the issue of the ELECTRIC RAILWAY JOURNAL for April 15 is a fair and candid statement of the results accomplished and to be expected under this modern method of training men. Our experience with these students, or "Co-ops" as we call them, has been very satisfactory, and we consider it quite a privilege to have the benefit of the experience under the direct supervision of the originators of the idea.

With the co-operative scheme, the interest shown and opportunity for advancement of the student are supervised by the university faculty, just the same as is the work done by the student, and this supervision is very conducive to real co-operation. In fact, the success of this plan depends largely on the practicality of the university faculty, which in this case leaves nothing to be desired, and there is a punch behind the scheme suggestive of the ungloved hand and entirely different from the popular conception of the bewhiskered professor with a short prayer and a long lemonade for lunch.

We have been impressed with the idea that this scheme quickly determines with surprising economy whether a boy has selected a congenial or compatible occupation, as undesirables in the chosen occupation are quickly detected and eliminated, thus saving the time of all concerned. It is certainly refreshing to have a boy go to work in the morning and see how much real good work he can accomplish during the day, and to notice the beneficial results to himself and to the company. This is true co-operation. This plan puts additional obligation on the company, and calls for a very much broader and more intelligent plan of treating apprentices than has heretofore been followed.

It is a distinct advantage to the manager to incite thought and promote interest in the proper direction among the "Co-ops," just as it is with the regular apprentices. This must be done with discretion, because it is a whole lot harder to find one man with constructive ideas to help the company's business than it is to find two men with ideas enough to help get them in trouble.

There is little or no prejudice against these "Co-ops" from the regular men in the shop, largely due to the early elimination of the undesirables. In fact, it is a matter of pride with a good many mechanics to help these boys and to take an interest in their advancement, realizing that their mechanical skill will hardly approximate that of the regular men with their greater opportunity for its acquirement. The ingenuity of a clever manipulator of the slide rule should not operate to the disadvantage of the man who is equally good with the folding type, because the latter is far more useful and valuable in the shop, and it is shop work that we are talking about.

We all remember very frequent cases of injustice under the old scheme when a boy was compelled to perform labor which contributed little to his acquirement of skill or opportunity for advancement sometimes for months. For instance, it was not unusual for a beardless boy to start in on a bolt-cutter and stay on the job long enough to acquire the necessary tonsorial articles to eliminate whiskers. The hot fish-oil was very conducive to a good crop, and often excited the envy of the bald heads. If the boy during this time learned to sharpen a razor properly by using the hone and strap it was a useful accomplishment and was frequently suggestive of how to sharpen other things, and largely discounted the need of the "safety," especially of the "hoe type."

Under this co-operative scheme the students learn two things which have heretofore not been taught in school. One is how to get positions, and the other is how to get their pay raised, and there is no special objection to this on the part of the company because of value received and results accomplished. Under prevailing conditions, the adoption and extension of this plan of training men is inevitable, and the plan will be appreciated most by those companies which are willing to assume the obligation of helping to train their own men. It will appeal less to those companies whose only thought is where they can get men from other companies, and like the Brown system of discipline, or the premium plan of paying for work done, the results will not be satisfactory unless undertaken by a school with a faculty which thoroughly understands and appreciates the merit of the scheme, and has a disposition to perform the arduous duties in connection therewith. It will require something better than the "Merry Widow" brand of packing to keep the joints tight in this triangular scheme of training men and getting results.

THOMAS ELLIOTT, Vice-President.

Will It Pay?

WHITE PLAINS, N. Y., May 15, 1916.

To the Editors:

When an improvement is under consideration this is the first question asked. It is generally answered by determining whether a capitalization, at a generous rate, of the decrease in operating expenses will exceed the cost of the contemplated changes or additions—this in spite of the fact that the effect upon the net earnings (after interest) is the factor which should control the decision. This factor does regulate the larger decisions, but common practice, in regard to smaller matters at least, bases its guess upon a consideration of the operating expenses and an assumed and wholly arbitrary rate of capitalization.

It is extremely simple, however, to develop an accurate and easily applied formula which will enable a legitimate estimate to replace the habitually illogical approximation. Let us assume the following:

Reduction in annual operating expenses due to improvement $= S$
Replacement charges for improvement $= R$
Capital charges for improvement $= C$
Total charges for improvement $= R + C = T$
Estimated life of improvement (years) $= L$
Customary rate of interest $= r$
Increase in annual net earnings due to improvement $= N$

We must now remember that, as a result of the improvement, increased capital charges equal to rC must be met each year. Also, in the final analysis, a sum equal to $\frac{C}{L}$ should in some way be potentially reserved, charged off or held back in the surplus annually to maintain the integrity of the additional capital investment. Finally, and annual prorate of the replacement charges for the improvement, amounting to $\frac{R}{L}$, should be taken into consideration. The particular method of accounting for these processes is of small importance, as the main fact to be kept in mind is that, consciously or unconsciously, the indicated charges or expenditures must be met.

The following equation may then be written:

$$N = S - rC - \frac{C}{L} - \frac{R}{L}$$

Thereupon, obviously the improvement will pay whenever N is greater than zero. This condition may be expressed thus:

$$N = S - rC - \frac{T}{L} > O$$

or

$$S > rC + \frac{T}{L}$$

In other words, the improvement may be made when the saving in operating expenses exceeds the sum of the increases in interest charges and amortization and replacement expenses.

This is not a discovery, but a reminder of already known and understood facts which are frequently elbowed aside by the illogical form of guessing to which reference has been made. The formula is readily applied and has the virtue of being based upon correct principles. It would be employed more frequently if the ease of its application were more universally understood.

G. L. BURR.

Grid-Resistor Tests

INDIANAPOLIS, IND., May 20, 1916.

To the Editors:

One of your correspondents has inquired on the following points, suggested to him by my article on "Grid Resistor Tests and Standardization Found Important," appearing on page 505 of the issue of the ELECTRIC RAILWAY JOURNAL for March 11, 1916: Were the capacities of the resistors wrong when supplied by the manufacturer, or were the grids used in making repairs of improper capacity which caused trouble? Are any data available on the variation of resistance values of grids cast from metal of different heats? What is the percentage variation allowed from the approximate test data given in Table 1 of the article?

In reply to these questions I would say that in almost every instance where we found it necessary to alter the step resistances and capacities of resistors as originally furnished by the electrical equipment manufacturers, it is safe to assume that such necessity was brought about either for the reason that the manufacturers had not been sufficiently advised in detail regarding the application of the electrical equipments at the time of purchase, or that the formulas used as a basis of calculation with some of the earlier equipments had been superseded as a result of knowledge gained by later experience. As a rule, we have had no occasion radically to change the step resistances or capacities of resistors as furnished with equipments purchased during the last five or six years, which substantially bears out the conclusions set forth above.

A number of years ago we experimented at quite some length with cast resistor grids fabricated from our patterns by a local foundry which possessed a reputation for a consistent quality of product. Notwithstanding the fact that all possible care was exercised in the composition of successive heats, as well as the relative portion of the individual heats from which the grids were cast, the resistance factor was such a variable one that the proposition as a whole was considered unsatisfactory. With both the General Electric Company and the Westinghouse Electric & Manufacturing Company it is our understanding that the permissible variation in resistance of cast grids is limited to a 10 per cent variation above and below normal, but in the assembly of resistors in accordance with the data as shown in Table 1 embodied in the article above referred to, we impose a limitation of 5 per cent above and below the values specified.

EQUIPMENT ENGINEER.

Electric Light and Power Interests Do Not Indorse Safety Code

While Appreciating the Valuable Work Done by the Bureau of Standards, N. E. L. A. and A. I. E. E. Representatives and Others Oppose Adoption of Proposed Code

HEARINGS on the proposed national electrical safety code were held under the auspices of the United States Bureau of Standards, at the La Salle Hotel, in Chicago, Ill., on May 29 and 30. The general sentiment of the men representing the various electrical interests was that if the Bureau of Standards could control the administration of its rules, and could definitely order them changed or suspended, where the cases might justify it after the rules had been made mandatory in certain localities, there would be no objection to the issuance of the code. Representatives of the National Electric Light Association, the American Institute of Electrical Engineers and the Electric Power Club, however, pointed out that such control was entirely impossible. Objections were made not so much to the rules themselves as to the method of their administration.

Municipal inspectors and representatives of State commissions held the floor during most of the two day sessions and the evening sessions. To the commission and inspection department representatives, the rules as they now stand seemed to be in the main acceptable. Steam railroad men, electric railway men, telephone and telegraph representatives, although objecting in some cases to details, also seemed to be favorably impressed with the code. Dr. Rosa of the Bureau of Standards maintained throughout the right of the Bureau of Standards to issue such a code, although admitting that the bureau has no legal authority to enforce it. He said it was not the wish of the Bureau of Standards to foist a burdensome code upon the electrical industry, and that the code as finally amended represented the best co-operative work of the Bureau of Standards and the operating and engineering talent of the electrical industry. The rules in his opinion are reasonable and easily complied with. They will probably be printed and issued for trial some time in the summer after such specific suggestions as are thought fair, and which may be received in writing up to July 1, have been added to them.

The Superior Court at Boston, Mass., has awarded a verdict of 12 cents to Charles R. Darling, Newton, against the Middlesex & Boston Street Railway, in a case resulting from the closure of Norumbega Park last fall. The plaintiff purchased a round-trip ticket into the park, for which he paid 20 cents. The park was closed, and he received a refund of 8 cents on the park admission, but the company retained 12 cents for transportation. The plaintiff was sustained in the lower court. It has not been decided by the company whether to appeal the case to the Supreme Court or to modify the wording of its tickets to meet future situations of this kind.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Some Car Ventilation Ideas

BY R. N. HEMMING
Superintendent of Motive Power Union Traction Company of Indiana, Anderson, Ind.

In the last four years I have been observing closely the performance of car ventilators from a common-sense point of view, based on practical experience with numerous types of car ventilators. In this article I shall not attempt to determine the number of cubic feet of air per hour per passenger, because, after all, that phase of car ventilation is more or less a secondary consideration. In my opinion car ventilation is in its infancy, although there are a number of ventilators on the market that are very efficient in their performance in some respects. None of them, however, seem to fill the mission which they should, namely, that of providing a combined fresh-air intake with an exhaust feature, or a fresh-air intake and a separate exhaust. Many of the ventilators now obtainable also possess the undesirable feature of causing down drafts, and these admit rain into the car. While it is claimed that many of these ventilators possess all of the desirable features, yet practical demonstrations have proved otherwise.

I want to relate some very interesting experiences I have had in the last two or three years in ventilating some all-steel interurban cars. It is hardly necessary to go into the detail of describing the various dimensions of these cars except to state that they were of the three-compartment, single-end type, approximately 60 ft. long and of about the average dimensions in height and width. The first winter that these cars were in service they were equipped exclusively with exhaust-type ventilators. I wish to add here that many ventilator experts are of the opinion that all that is necessary for the proper ventilation of the car is merely an exhaust type of ventilator. When the matter of fresh air is discussed the usual answer is that an ample amount of fresh air is obtained through the cracks at the windows and doors. This was the source of fresh air on our cars, much to our regret and to the discomfort of our passengers.

Our all-steel cars were provided with permanent storm sashes—that is, sashes that could be raised and lowered to meet the requirements of the season. It was found that it was next to impossible for passengers to sit beside the windows on account of the excessive air drafts that came in through the openings around the sashes. So much draft was created during periods of low outside temperatures that the passengers would pull down the curtains and wrap their overcoats about their heads. On the first impulse I was at a loss to understand such a pronounced difficulty of this kind. Upon investigation, however, I found there was no weather-stripping to fill in the gaps between the upper outside sashes and the storm sashes. The cars were immediately provided with weather-stripping, and while this reduced the draft to a certain extent, yet air crept in through the crevices and made sitting close to the window very uncomfortable.

The following winter I removed all of the interior sashes and fitted them with weatherstrips. This practically prevented any air from entering the car around the sashes. After these had been thoroughly weather-stripped, however, the rear end of the car afforded the only means of furnishing the necessary amount of fresh air and, much to my surprise, frost formed around the corners of the rear bulkhead, and at times in sufficient quantity to roll a snowball. The rear bulkheads of these cars were equipped with sliding doors, the vestibules with swinging-type doors and the rear vestibule step wells were also inclosed with trapdoors. The excessive draft which came in through the rear vestibule doors and the bulkhead door made it simply impossible for passengers to sit in the rear four or five seats of the car when the weather was extremely cold. A common-sense analysis of this ventilating condition soon developed the conclusion that these exhaust ventilators were only acting like an exhaust fan in a closed room or a tight compartment. Air had to enter somewhere and it took the path of least resistance. After the possibility of air coming in around the sashes had been eliminated the air had to be supplied through the rear end of the car. In order to mitigate the effect of the draft at this point I put electric heaters under several of the rear seats.

Another objection to exclusive exhaust ventilation was found in the toilets. Here the air was also pulled up through the toilet chute, and it is needless to mention that the obnoxious odors that came through with it made the toilet room almost unbearable, even when most careful attention was given to its sanitary condition. The toilet chutes on these cars were not provided with a water flush, but the drains from the washbowl and the drinking fountain were piped into the closet chute, and thus it was flushed frequently.

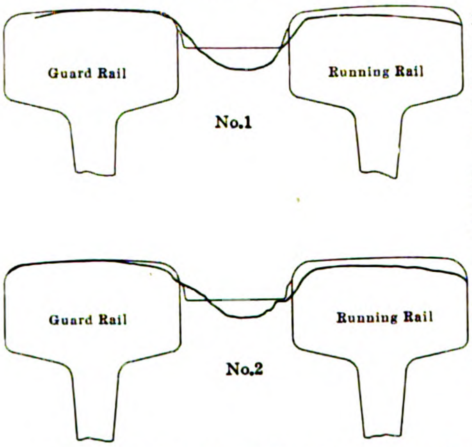
After having this unsatisfactory experience I considered the ventilating problem in a common-sense light. It was evident that in order to obtain the proper kind of ventilation fresh-air intakes were absolutely necessary. There are many types of car ventilators which provide a means of bringing fresh air into the car, either by natural force or mechanical force, but the majority of these are so expensive that it is almost out of the question for the average railroad to consider the installation of such a system. Another important factor to be taken into consideration in the design of a car ventilator is that a ventilator which will work satisfactorily on one type of car is not always adaptable to all other types of cars. Practical observations and tests have shown that the air currents and the vacuum conditions which surround the single unit such as an interurban car, are decidedly different from those experienced in train operation. It has also been found that ventilators which would operate satisfactorily on city cars running at 20 m.p.h. were a total failure on interurban cars operating at 60 m.p.h. Practical tests have also been made on ventilators which have been pronounced very successful on a number of steam railroads, yet when the same ventilator was tested on an interurban car it proved to be a failure.

These thoughts on car ventilation are not based on theory but are the result of practical demonstrations under working conditions. Proper ventilation plays a very important part in car heating, because without circulation of the air throughout the car it is impossible to obtain efficiency from any form of heating system. In this connection I have also found that where an exclusively exhaust-type ventilator is used it creates down draft in the stove and causes coal gases to enter the car, this being due to the fact that the exhaust ventilators, in this instance, created a greater draft than the flue on the stove. This also interfered with the proper combustion of the coal and in turn made it very difficult to keep the car warm. In conclusion, I might elaborate on the air requirements in proper ventilation, but the first thing to consider is the design of a ventilator that will admit fresh air and exhaust foul air. This must be done, however, in a manner that will prevent a car from being uncomfortable to passengers.

Experience with Bolted Flange-Bearings in Kansas City, Mo.

BY A. E. HARVEY
Superintendent of Way and Structures Kansas City (Mo.) Railways

On page 333 of the ELECTRIC RAILWAY JOURNAL of Aug. 31, 1912, appeared a description of a bolted flange-bearing street railway crossing which the Kansas City Railways installed at Eighteenth Street and Grand Avenue in July, 1912. In the same year and at about the same time a similar crossing was installed at Nineteenth Street and Grand Avenue. Recent changes at the latter point necessitated moving this crossing, and conditions were such that it may be of interest to the readers of this paper to know that the actual service has vindicated the use of built-up special work in paved streets.



Location 18th & Grand Ave.
Type of Crossing
Solid Manganese Filler.
Date of Installation
July, 1912.
Cross Section Taken
May, 1914.

No.1
South Rail at ℄ of South-Bound Crossing
Wheelage per Week
18,405.
Total Wheelage to
May, 1914. 1,700,830.

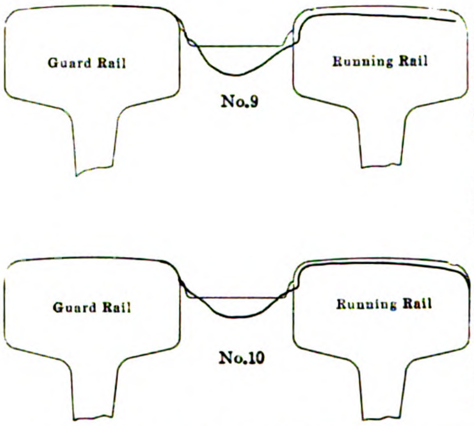
No.2
East Rail of East Track at ℄ of West Bound X-ing
Wheelage per Week
19,376.
Total Wheelage to
May, 1914. 1,860,196.

GRAPHS OF EIGHTEENTH AND GRAND AVENUE CROSSING

This crossing is built of A.S.C.E. 100-lb. rail with cast manganese fillers forming the flangeway floors. The depth of this flangeway was ¾ in., and the depth of the standard wheel flange was ⅞ in. The parts of this crossing were bolted together with extra heavy knee braces and drive-fit bolts. In May, 1914, eighteen months after the crossing at Eighteenth Street and Grand Avenue was installed, sketches were made to show the character and extent of wear. These rail-wear graphs are shown in the accompanying illustrations. It is interesting to note the manner in which the manganese steel filler has flowed under the action of the wheels, as well as the amount of wear that has taken place on the head of the running rail.

A detailed examination of the crossing revealed the fact that in some places the manganese had peened up against the side of the rail head and could be broken off with a chisel. This condition, however, was not objectionable from an operating standpoint, nor so far as has been observed has it been of any disadvantage in the use of the crossing. At the time these rail graphs were taken 1,860,000 wheels had passed over the Eighteenth Street and Grand Avenue crossing, and 1,500,000 wheels had passed over the crossing at Nineteenth Street and Grand Avenue. Both of these are still in service and approximately 3,500,000 wheels have passed over them up to the present time.

Recent changes in the special work at Nineteenth Street and Grand Avenue necessitated moving one of these crossings 10 ft. to one side. The crossing was stripped of the paving, and it was found that structurally it was in perfect condition. There was no indication of a loose bolt, in fact the crossing was so rigid that after all of the ties had been taken from beneath it, it carried the usual traffic. The crossing is shown in

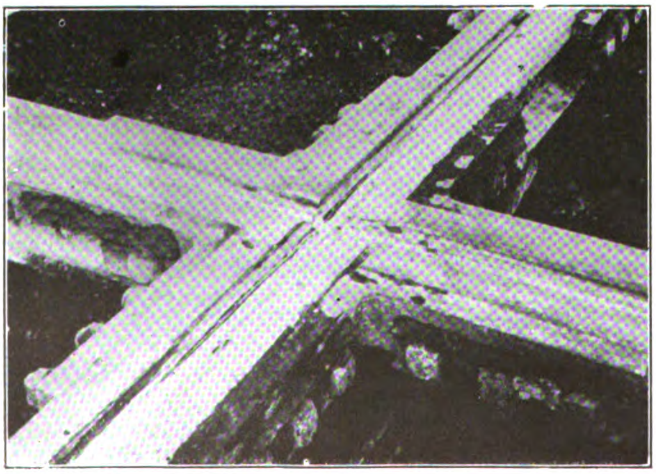


Location 19th & Grand Ave.
Type of Crossing
Solid Manganese Filler.
Date of Installation
November, 1912.
Cross Section Taken
May, 1914.

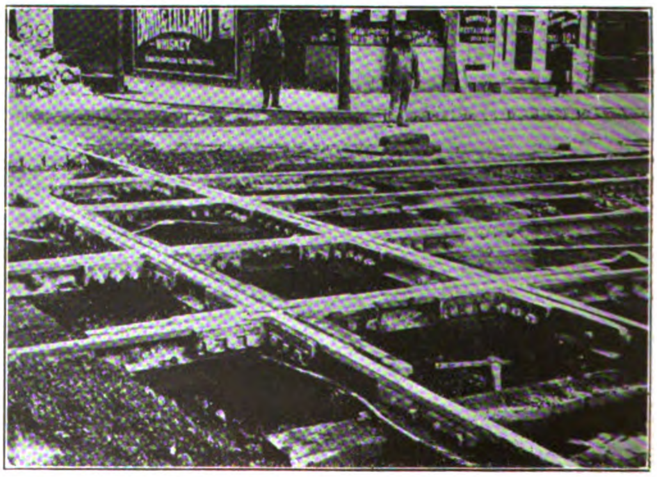
No.9
West Rail of East Track at ℄ of East Bound Track.
Wheelage per Week
19,376
Total Wheelage
to May, 1914. 1,511,328

No.10
North Rail of East Bound Track at ℄ of South Bound Track.
Wheelage per Week
13,406.
Total Wheelage to
May, 1914. 1,435,668

GRAPHS OF NINETEENTH AND GRAND AVENUE CROSSING



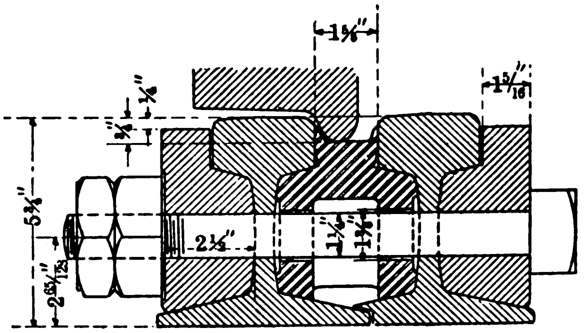
VIEW OF WORN INTERSECTION



VIEW OF SUSPENDED CROSSING

this suspended position in one of the accompanying halftone illustrations where it will be noted that the suspended span in each direction begins outside of the joints connecting the crossing to the running rails. The only repairs necessary to this crossing at the time it was shifted was that of grinding down the head of the running rails in order to restore them to a flanged bearing and to obviate the cutting which had been produced upon the intersecting rails by worn wheel treads. The condition of this crossing before grinding is shown in one of the accompanying halftones.

Another interesting feature in connection with this particular crossing that cannot be explained is that the crossing arched or humped up in the middle of both tracks. This result can only be attributed to the flow of the manganese which probably produced strains between the running and guard rails and tended to arch them about 1½ in. in the middle of the crossing. It is also possible that the pressure of the manganese between the running and guard rails has kept the bolts perfectly tight in this crossing, although they were accurately fitted and driven in place when the crossing was built. In my opinion this crossing is in practically as good condition to-day as it was when it was installed, and many more years of service may be expected from it.



SECTION THROUGH RAILS AND FILLER BLOCK

Since the installation of the two original crossings, more than twenty-five others of the bolted manganese flange-bearing type of construction have been built and put in service, and all of them are giving a very satisfactory account of themselves. In most cases, however, the detailed construction was changed slightly, and instead of manganese fillers being placed between the two rails, steel forgings have been used. Some of these forgings were fitted with an inserted rectangular bar of manganese, which takes the flange bearing of the wheels. In other crossings where a manganese flangeway floor was not available, steel cut from the head of the high-carbon rail was substituted for this purpose. Both types of construction have given perfect service, and the single defect which arose in connection with the original crossing, namely the arching at the middle, has not appeared.

In order to impress on the public the facts regarding the wearing out of car wheels the Detroit United Railway, through its *Electric Railway Service,* gave out the following facts: Last year the railway purchased more than 7000 cast-iron wheels and 1000 steel wheels. The average life of the former is five months and of the latter about two years. The useful mileage of 20,000 for a cast-iron wheel would enable it to make 1350 round trips between Jefferson and Woodward, and Log Cabin. Steel wheels, with a mileage of 100,000, would make 735 round trips between Detroit and Flint, 877 round trips between Detroit and Toledo, and 657 round trips between Detroit and Jackson.

Asphaltic Concrete Pavements

BY D. T. PIERCE
Barber Asphalt Paving Company, Philadelphia, Pa.

More than seventy-five cities are now laying asphaltic concrete pavements. Last year 4,700,400 sq. yd. of pavement of this type were constructed. Evidently a pavement that is growing so rapidly in popularity is one that those who are charged with the building and maintenance of pavements should know something about. There should be in the first place a clear understanding as to what is meant by asphaltic concrete. It is a very loosely used term. In one city it may be applied to a sheet asphalt surface mixture to which is added say 25 per cent of ¼-in. and ½-in. stone. In another city the same name is given to mixtures consisting of 20 per cent of sand of no particular grading, the remainder of the aggregate being ½-in. to 1½-in. stone with perhaps 7 per cent of bitumen. The latter mixture, more properly speaking, is an asphaltic macadam.

Rather than to describe in general terms what is and what is not asphaltic concrete, it will be more illuminating to give here a specification which has the approval of experts and which has produced pavements that have stood up well under service test. Such a mixture as the following may properly be designated as asphaltic concrete:

Sand: The sand shall be a natural bank or river sand, all of which will pass a ten-mesh screen. On sifting, at least 15 per cent shall be retained on a thirty-mesh screen and at least 22 per cent shall pass an eighty-mesh and be retained on a 200-mesh screen.

Stone: The crushed trap rock shall all pass a screen of two meshes to the lineal inch and shall all be retained on a ten-mesh screen, or run of crusher trap rock can be used provided the portion passing the ten-mesh screen is of suitable grading to serve as sand and filler, in which event only sufficient sand and filler shall be added to insure the proper proportion of sand and filler in the mineral aggregate.

Filler: If the screenings do not contain sufficient 200-mesh particles they shall be supplied by the addition of a suitable amount of ground limestone or any other mineral matter (or Portland cement) of sufficient density to produce a powder having a volume weight when ultimately compacted of at least 90 lb. to the cubic foot. It shall be so fine that at least 75 per cent shall pass a 200-mesh screen.

Combining Materials: The sand and rock complying with the above specifications shall be combined in such proportion that the finished mixture shall contain not more than from 8 to 22 per cent of aggregate passing a four-mesh and retained on a ten-mesh screen, and less than 10 per cent passing a two-mesh and retained on a four-mesh screen.

The main advantage of pavements of this type is their relatively low cost. Asphaltic concrete is not likely to rival sheet asphalt in durability, although all we know about it up to the present time warrants the conclusion that it is worth what it costs. The principal saving effected in the use of asphaltic concrete arises out of the fact that the binder course of the sheet asphalt pavement is eliminated, the wearing surface being laid in one course or layer, 2 in. or 2½ in. thick. There is also a saving in the quantity of asphalt required, from 1 to 3 per cent, depending upon the amount of very fine material that is incorporated in the mixture.

It is a mistake to suppose that the making and laying of asphaltic concrete requires less care and skill than the laying of sheet asphalt, although it is true, of course, that a mixing plant will turn out and a street force will lay a larger yardage of asphaltic concrete than of sheet asphalt, owing to the fact that the latter pavement is composed of two different courses—the binder course and the wearing surface. A smaller and cheaper plant may be used for asphaltic concrete than is required for sheet asphalt. Prices vary greatly owing to local requirements, costs and conditions, but the rough estimate may be made that 2-in. asphaltic concrete pavement will average 35 cents per yard less than sheet asphalt.

At its best asphaltic concrete consists of a high-grade sheet asphalt mixture to which there has been added about 8 per cent of ½-in. and about 20 per cent of ¼-in. stone. It will throw considerable light on this subject to present a number of examples of good and bad formulas. Probably the highest type of asphaltic concrete pavement is that laid on Riverside Drive, New York, in 1913, from Seventy-second street to 114th street. This pavement is 3 in. thick and was rolled in two layers on a 6-in. concrete base, the wearing surface having the composition given below. In the table column A gives the average composition of the surface mixture as laid on the street; column B that of the finer portion, excluding the ¼-in. and ½-in. stone and the 4 per cent of bitumen which is estimated as being sufficient to cover this portion of the aggregate.

Composition			A	B
Asphalt cement	110 lb.	Bitumen	8.9	11.1
Portland cement dust	110 lb.	200 mesh	11.9	16.5
Sand	312 lb.	80 mesh	14.5	20.1
Stone screenings	564 lb.	40 mesh	18.6	25.9
		10 mesh	18.9	26.4
		4 mesh	19.1	....
		2 mesh	8.1	....
	1,096 lb.		100.0	100.0

Closely approximating this formula is one under which a large yardage of very successful asphaltic concrete pavement has been laid in Rochester, N. Y.

A third mixture, used in Trenton, N. J., three years ago which has so far proved satisfactory, is this:

Composition			Original Mixture	Finer Portion
Asphalt cement	105 lb.	Bitumen	8.1	10.6
Dust	80 lb.	200 mesh	8.9	13.1
Sand	560 lb.	80 mesh	10.7	15.8
Stone screenings	370 lb.	40 mesh	25.3	37.3
		10 mesh	15.7	23.2
		4 mesh	13.0	....
		2 mesh	17.3	....
		Retained by 2 mesh	1.0	....
	1,115 lb.		100.0	100.0

As an example of asphaltic concrete from which good results have not been obtained and cannot be expected, may be instanced the following from a Georgia city:

Composition			Original Mixture	Finer Portion
Asphalt cement	160 lb.	Bitumen	7.7	9.6
Dust	60 lb.	200 mesh	6.8	10.1
Sand	9 cu. ft.	80 mesh	15.0	22.4
Stone screenings	9 cu. ft.	40 mesh	17.0	25.4
		10 mesh	21.8	32.5
		4 mesh	19.5	....
		2 mesh	12.2	....
			100.0	100.0

This mixture is evidently deficient in bitumen, while the following is deficient in filler and fine sand:

Composition			Original Mixture	Finer Portion
Asphalt cement	140 lb.	Bitumen	8.4	13.5
Stone screenings	400 lb.	200 mesh	3.4	5.5
Sand	600 lb.	80 mesh	2.5	4.0
		40 mesh	26.0	41.7
		10 mesh	22.0	34.3
		4 mesh	20.0	....
		2 mesh	17.7	....
	1,140 lb.		100.0	100.0

In all of the foregoing mixtures natural lake asphalt was employed, and it is not to be expected that the best service can be obtained from a pavement of this type unless there is used an asphalt with a cementing power which does not deteriorate. That a pavement is no better than its asphalt is a truism that applies as well to asphaltic concrete as to sheet asphalt. But despite this fact railways as well as municipalities are sometimes content with asphalt specifications which merely call for certain general characteristics, and do not assure themselves that the asphalt will retain (after incorporation with the aggregate) the qualities which it shows under laboratory test. One simple but essential requirement is that the asphalt after combination with the sand and stone of the paving mixture shall not show a loss of more than 10 per cent in ductility.

The finer portions of asphaltic concrete mixtures may consist of properly graded sand, the finer portion of crushed stone of the proper grading, or a mixture of the two. According to Clifford Richardson, who is perhaps the highest authority on this subject, "the mixtures which have been constructed with screenings, including the fine material, are as satisfactory as those made with sand and clean stone free from the finer portion." The same authority has said that "where laid with skill and care they (asphaltic concrete pavements) present, in the light of the limited service to which they have been exposed, very desirable characteristics. From the writer's experience he is led to believe that there is a great future for this type of construction."

By the expression "limited service" is meant the comparatively short period during which these pavements have been laid, for as to yardage it can hardly be said that our experience is limited. While Rochester has pavements of this type now ten years old, the great increase in yardage has come about since the rendering of the decision of Judge Pollock of the United States District Court of Kansas. It was upon this decision that the so-called "Topeka specification" was based. This decision, it should be pointed out, did not pretend to determine what was a desirable paving specification; it simply held that a certain grading of aggregate did not infringe a patented pavement. Thereupon a number of engineers proceeded to lay pavements in accordance with a formula in behalf of which little more could be said than that it did not infringe a patent.

In the past four years the "Topeka" pavement has gone through an evolution in which it has lost its name and most of its other characteristics and become the asphaltic concrete, of which, as stated, the highest type is represented by the Riverside Drive pavement. This should not be confused with the haphazard mixtures laid under this name, nor with coarse-aggregate sheet asphalt pavements laid without a binder course. Wherever the latter construction has been attempted, notably in Milwaukee under the Socialist regime of three years ago, the result has been uniformly disastrous.

So far as the adaptability of asphaltic concrete in and about car tracks is concerned, it certainly has no advantages over sheet asphalt. Probably the effect of vibration on such pavements would be the same as upon sheet asphalt, while the latter might be expected to resist the effects of moisture better than could be expected from asphaltic concrete.

Bridge Timber Tests in Oregon

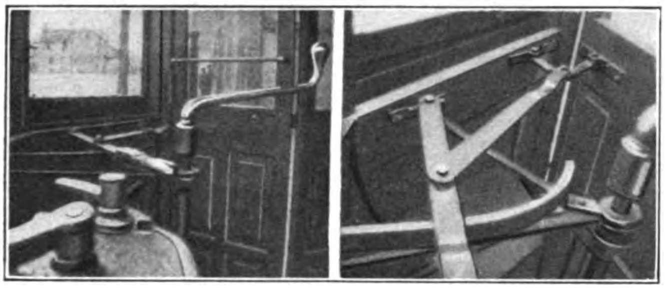
The West Coast Lumbermen's Association, which is made up of the lumber producers of the Pacific Northwest, has entered into a co-operative arrangement with the Oregon Agricultural College, located at Corvallis, for the testing of forty 7-in. x 16-in. x 16-ft. bridge stringers. The purpose of the tests is to establish a grade of bridge stringers to be known as "Selected structural Douglas fir bridge stringers."

The stringers are being broken on a Riehlé testing machine of a rated capacity of 150,000 lb., under what is known as a "three-point" load. On account of an accident to the testing machine, the tests have been interrupted for a short time, but they will soon be completed and a report will be available. The tests are under the general direction of George W. Peavy, dean of the School of Forestry, Oregon Agricultural College.

Inexpensive Door-Opening Device

The accompanying illustrations are of a door-opening device which was designed by B. J. Singleton, master mechanic Trenton & Mercer County Traction Corporation, Trenton, N. J., and which has been placed in service on the cars of that company. Aside from its simplicity it has the virtue of being very inexpensive, having been made for about $1.15.

The novel feature is the use of a wagon cover hinge attached to the door and vestibule frame, as shown. This hinge consists of two plates, to each of which is hinged one end of a jointed connecting piece. A rod attached to the center of the hinge connects with an operating lever placed near the brakestaff. The lever is hinged to the vestibule frame and its weight is partly carried by a curved guide piece made of strap iron.



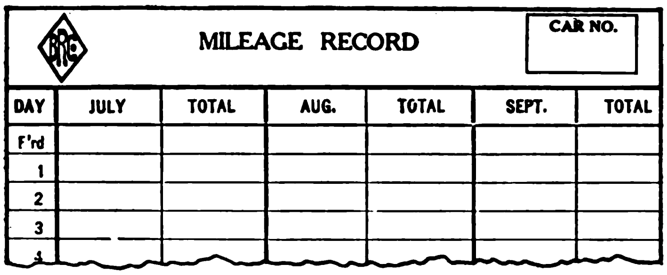
SIMPLE DOOR-OPERATING DEVICE

The motormen who have used the device have been well pleased with it.

Equipment Records on the Binghamton Railway

Recently there has been augurated on the Binghamton (N. Y.) Railway, of which C. S. Banghart is vice-president and general manager, a system of equipment records that is especially suitable to the needs of electric railway properties of moderate size, owing to its simplicity and to the ready availability of the equipment data therein collected. The basis is a card filing system, including the use of 8-in. x 5-in. cards which are kept in a single cabinet, differently colored cards being used to make the different records readily distinguishable.

The most important one, perhaps, is the record of individual mileage of each car, for which figures are entered daily upon a series of cards such as shown in part in the accompanying illustration. The entries are made in the general office, the figures being obtained from special mileage slips that are made out by each conductor at the end of each day's work. These mileage slips give the number of trips that are made on each car, and the mileage is calculated in the office from the known length of each trip.



MILEAGE RECORD

CAR NO.

DAY	JULY	TOTAL	AUG.	TOTAL	SEPT.	TOTAL
F'rd						
1						
2						
3						
4						

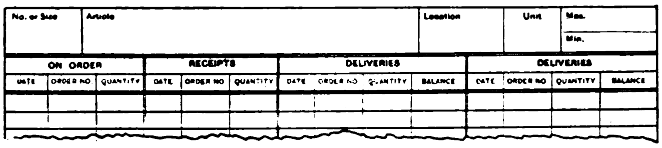
CARD FOR TABULATING MILEAGE RECORD

From these mileage records entries are made as required on the cards for the other records. The latter include an inspection and overhauling record in which entries are made daily in accordance with reports from the master mechanic regarding the cars that have been inspected and overhauled, the mileage being obtained direct from the mileage record card for the car in question whenever such an entry is made. These inspection record cards are filed according to consecutive car numbers, and the form ruling and lettering have been printed on both sides of the card to provide greater length.

A record for car body repairs is also maintained, these cards being arranged in accordance with the car numbers, as is the case with the cards for the record of car trucks. The compressor record cards, however, are arranged in accordance with the numbers of the compressors, and this applies also to the record cards for the controllers.

Cards for wheel records are kept filed in accordance with car numbers, on account of the necessity for having directly accessible mileage figures. The entries on the record card, therefore, apply to one wheel, showing the wheel number and data regarding the condition at application and at removal. On the reverse side of this card there is a form for the record of used and turned wheels, providing for wheels that are not returned to the cars from which they were orginally removed, and such wheels are consequently located in the file only by their individual numbers.

The records of pinions and gears are kept on similar cards but of different colors. Entries are made covering the date in service, the date out of service, the car number, the truck number and the motor number, as well as remarks regarding the cause of removal. The mileage is figured from the above-mentioned car-mileage records, and to facilitate the mileage entries the cards are kept in order in accordance with the car numbers, rather than the pinion numbers.



No. or Size	Article	Location	Unit	Max. Min.

ON ORDER			RECEIPTS			DELIVERIES				DELIVERIES			
DATE	ORDER NO.	QUANTITY	DATE	ORDER NO	QUANTITY	DATE	ORDER NO	QUANTITY	BALANCE	DATE	ORDER NO	QUANTITY	BALANCE

CARD FOR RECORDING SUPPLIES IN STOREROOM

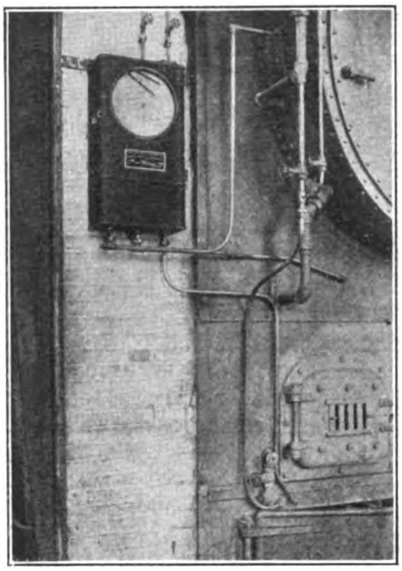
A record is also kept of the trolley wheels that are changed. This provides for the wheel number and other data, including the dates of installation and removal. The mileage is calculated from the mileage made by the car, and records are therefore kept in accordance with the car numbers to facilitate mileage entries.

An especially novel feature of the record system is the inclusion of permanent data covering every car that is operated on the system. This shows the general dimensions, the weight of various pieces of the equipment and the character of the various facilities installed on the car. The record cards are kept in the same cabinet with the other records, so that they may be available for examination at any time in case any question arises as to the details of the car equipment.

The same type of card has been adopted for the storeroom records, and the card index thus provided is used on the perpetual inventory basis, the storeroom record cards being ruled as shown in the accompanying illustration. All deliveries from stock are made upon requisition only, and the records are checked once every six months by taking a stock of the material on hand.

Another feature of the company's records is the application to the incandescent lamps installed on the cars, the desirability of this having arisen because of the very heavy renewals that were recently in evidence. All lamps are now numbered by a pasted sticker which has a number printed upon it, and this identification mark permits the establishment of a record in which is entered the lamp number, the size, the date installed, the date removed, and the cause of removal, the latter being subdivided into four separate classes, namely: burned out, broken, stem broken, bad vacuum. As the old lamp or base must be returned before a new one is issued, this record will, in a short time, display the reason for the large number of lamp renewals and will also serve as a means for comparison between various makes of lamps.

Three Boiler Meters in One



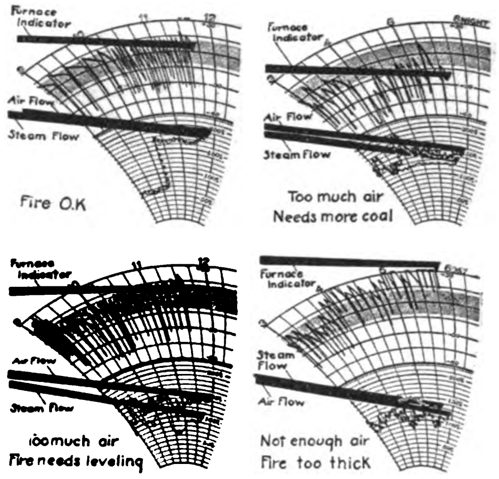
THREE-IN-ONE BOILER METER INSTALLED

A new boiler meter which records the rate of steam output from the boiler, the rate of air flow through the furnace, and the condition of the fuel bed has been put on the market recently by the Bailey Meter Company, 141 Milk Street, Boston, Mass. It is a combination of three separate meters in one casing, each meter drawing its own record in a distinctive color on a 12-in. circular chart.

The steam flow is recorded by the "red" pen drawing a red record in the center section of the chart, the graduations being in per cent of the boiler's rated capacity on a uniform scale. This part of the meter is identical with the steam meter described in the April 1 issue of the ELECTRIC RAILWAY JOURNAL. It operates upon the principle of measuring the pressure difference across a Monel metal orifice placed in the flange of the steam line.

The air flow is recorded by the "blue" pen, located so that it travels immediately in front of the "red" pen and, therefore, produces its record just ahead of the record of steam flow. It is operated by a draft differential between the firebox and the uptake, but instead of reading in terms of draft it reads in terms of steam output. In other words it gives the same reading and draws a record coincident with the steam flow so long as the right amount of air is used for combustion. If the air flow reads more than the steam flow it shows too much air and corresponds to low CO_2; if it reads less than the steam flow it means insufficient air and loss due to unburned gases. This is based upon the principle that air is a fuel just as much as coal is, and a certain evaporation should be obtained per pound of air. This standard is determined for each boiler and the meter adjusted accordingly.

The furnace indicator, drawing a record on the outer section of the chart, shows the condition of the fuel bed. The fire is of the right thickness when this pen is on the shaded band, too thick when above and too thin when below the band. This also is adjusted to individual conditions after extensive tests have been made to determine the best kind of fire to carry. This furnace indicator is operated by draft pressures and is in reality a measure of the resistance of the fuel bed to the flow of air. It should not be confused with the drop in draft pressure across the fuel bed, for it includes the draft pressure in the uptake as well as the firebox and ashpit in such a way as to eliminate the effect due to the intensity of the draft or the rate of flow of air and responds only to changes in condition of the fuel bed. That is, the pen does not move when the damper opening or draft pressure varies from maximum to minimum unless the fire changes, but when the fire burns too thin or develops holes, the recorder shows it regardless of the intensity of the draft.



CHARTS SHOWING CONDITIONS OF FUEL BED

Bureau of Standards Issued Paper on Concrete

The Bureau of Standards, Department of Commerce, has just issued Technologic Paper No. 58, dealing with the properties of concrete and Portland cement mortars, under the title "Strength and Other Properties of Concretes as Affected by Materials and Methods of Preparation." It includes the results of about 20,000 tests on about 300 aggregates consisting of limestone, granite, gravel and trap rock which are used for concrete materials in various sections of the United States. The results are of especial interest to contractors, engineers and others who use concrete, since it points out that with the same aggregates a variation in strength of as much as 100 per cent may result owing to the lack of proper precautions in mixing and placing the material. One of the most important conclusions to be derived from the results is that the use of too great an amount of mixing water, which is common in present-day construction, accounts for many concrete failures. The use of an excessive amount of mixing water may result in a reduction in strength as great as would result from a reduction of 50 per cent in the amount of cement used. The results indicate that proper methods of mixing and fabrication are as important as good cement and aggregate in producing a concrete of the best quality.

The Illinois Traction System, Peoria, Ill., has erected at Evans, Ill., what is said to be an innovation in country grain elevators. The structure is a concrete and steel tank elevator, the round steel tank, 26 ft. in diameter, 45 ft. high and weighing 40,000 lb., being divided into four bins, each containing 3000 bushels. The first story, or working floor, under the tank, is of reinforced concrete with steel support, and the entire structure is ratproof and mouseproof, as well as fireproof.

LONDON LETTER

The Trail Car a War Expedient—Progress of Electrification on Two Lines Recorded—Opinions on Women Workers Differ

(From Our Regular Correspondent)

The Metropolitan Electric Tramways, Ltd., which operates on the northern outskirts of London, is desirous of securing permission to use trail cars on its system. The company has already applied to the Board of Trade for such permission, and the Paddington Borough Council is supporting the application. It is becoming obvious that during the busy rush hours the traffic cannot be handled by ordinary means, and with the present shortage of labor it is impossible to put on more cars. Both the Board of Trade and the various councils of the boroughs through which the tramway system runs, are willing to permit the use of trail cars, such permission, however, to be granted as a matter of urgency during the continuation of the war.

Other cities in England are anxious to adopt the trail car, but feel compelled in certain instances to make experiments to find out whether it is suitable for use on their streets. The tramways committee of the Birmingham City Council is committed to an experiment of this kind, but has as yet arrived at no definite decision. A trail car has been prepared and is now in service, and an early report upon its working is expected. The difficulty of introducing trail cars in Birmingham is accentuated by the narrow gage of the tramways, the comparatively narrow and tortuous streets, and the extraordinarily heavy amount of tramway traffic in some of the thoroughfares. It is only possible to run trailers where there is a loop, and in many cases the running of trailers would involve a redisposition of the tramway terminals, and the provision of the necessary loop. Where impossible to form a loop, the necessity for shunting the trailers so as to bring them to the rear of the ordinary cars, would involve such delay that the purpose of their adoption might be prevented.

The Newcastle Corporation is also making an experiment for the purpose of relieving congestion on its tram routes, but is endeavoring to overcome the difficulty in a different way. Instead of using a trail car, two ordinary motor cars are coupled, after removing one motor from the inside axle of each car. The two cars, therefore, practically become one coupled unit, the controllers on the adjacent center platforms being also removed. One motorman controls the two cars, and each car has a woman conductor.

The progress of the electrification work on the London & North Western Railway's suburban lines is referred to in a recent report by the chief engineer. The section of the new line between Queen's Park and Willsden was opened for traffic on May 10, 1915, when the London Electric Railway service of trains running from Waterloo to Queen's Park via Charing Cross, Baker Street, and Paddington, was extended to Willesden Junction. The work between Chalk Farm and Queen's Park has been delayed by shortage of labor, owing to the war. The bridges and tunnels for the junctions between the new electric lines and the existing lines to Euston and Broad Street are in progress, and the driving of the iron-lined tunnels under Primrose Hill is proceeding steadily, half the length having been completed. The electric power station and repair shed at Stonebridge Park and the six electric substations are complete, and part of the plant has been installed. The carriage sheds at Willesden and Watford are nearing completion. Equipment of the new lines for electric traction between Willesden and Watford is in a forward state.

After experiments extending over some months, electric trains are now running on the Lancashire & Yorkshire Railway between Victoria Station, Manchester, and Bury. At present only a partial electric service is in operation, and the majority of the trains are of the ordinary kind. Each car is divided into two main passenger compartments with a center aisle, fixed and reversible seats being arranged alternately on either side. Timber has been entirely superseded by metal in the construction of the cars.

The Newcastle Corporation Tramway is not making money at present. The tramway committee contemplates increasing the fares for workmen. It seems that at present 186,000 workmen are carried at half fare morning and night, and in some cases at even less than that. Sunday makes no difference in the fares, although the workmen receive extra pay for Sunday work, while the tramway employees have also to be paid an equivalent of time and a half for working the cars. Then, in addition, soldiers are permitted to travel at half fare, and more than 70,000 men in uniform use the cars every week. Thus a total of 256,000 persons enjoy the privilege of traveling at half fare week by week. Whether the proposed increase is necessary, it seems to be an anomalous state of things that a man who is earning good wages should pay half fare simply because he works in a factory, while the clerk or shopman has to pay full fare.

A special committee of the Tramways & Light Railways Association has been formed with a view to facilitating the supply of tramway rails. The March issue of the journal of the association states that negotiations are taking place with the rail manufacturers with a view to securing a supply during the next twelve months. For this purpose, members are asked to furnish the secretary with the minimum quantity of rails and fish plates which are absolutely required for keeping their undertakings going. Manufacturers will shortly quote prices, and it will then be necessary to apply to the Minister of Munitions for permission to roll the rails and grant licenses for delivery.

In a recent report from Mr. Dalrymple, general manager of the Glasgow Corporation Tramways, it is stated that after six months' experience with women drivers he has come to the conclusion that the women are doing very well indeed, and that they have fewer accidents than men. The Corporation has sixty-eight women driving or under training, and a few are being added to the number every week. Mr. Dalrymple states that the general opinion in the city of Glasgow is distinctly favorable to the women drivers, who take their turn of all the routes exactly as the men do. Notwithstanding the unusual conditions of darkened streets and country roads the women are regarded as having made a success of their new calling. The women who are employed by the Glasgow Corporation Tramways as drivers are being referred to generally as "motresses."

In view of the above, it is somewhat anomalous to find it stated by the Tramways & Light Railways Association, in reply to a request from the Board of Trade, that, as a result of circularizing all the company members of the association, women are actually employed as tramcar drivers by only four companies in Scotland and the West of England respectively. The total number employed so far is fifteen women, but as grades are light and the other working conditions generally favorable to the employment of women, the companies hope to increase the number up to 50 per cent of the total, provided the right type of woman can be secured. A few of the smaller companies are considering the matter where the traffic is light and the lines level, but in most cases it is thought unsafe to use women as drivers.

It is also interesting to note that representations have been made to the Board of Trade and the Ministry of Munitions on behalf of the Tramway & Vehicle Workers' Association, urging that women should not be employed as tram drivers. Proposals had been brought forward in some of the large towns that women should be so employed. Other towns would probably follow suit, and the tramway workers felt that strong representations should be made as to the undesirability and the danger of the suggested innovation. Not only male workers, but also the women employed as tram conductors, were opposed to it.

An interesting experiment is being made by C. J. Spencer, general manager of the Bradford City Tramways, in connection with the conveyance of goods over the regular tramway routes. The experiment differs from those of a similar nature in other cities in that the wagon adopted is of the railless traction type, and is fitted with a trolley pole and the usual motors so that it may be propelled along any of the streets where trolley lines exist. In addition, however, it is also equipped with accumulators, so that should it be necessary to depart from a tramway route it can readily do so for a distance of a few miles. The wagon was built on a chassis taken from a railless trolley car. It is driven by two 20-hp. electric motors. The accumulators can be charged when the vehicle is being propelled from the overhead trolley. A. C. S.

NEWS OF ELECTRIC RAILWAYS

DECISION IN CHICAGO SERVICE ORDER CASE

Judge Thomas Taylor of the Circuit Court at Chicago, on May 27 denied the right of the Illinois Public Utilities Commission to issue orders affecting the service and equipment of the Chicago Street Railways. As a result of this decision it is expected that a permanent injunction will be granted in favor of the city restraining the commission from enforcing its order of Sept. 29, 1915, reviewed at length in the ELECTRIC RAILWAY JOURNAL of Oct. 9, 1915, page 775. This opinion was rendered in the suit for an injunction brought by Chicago to restrain the commission from enforcing its order. The opinion states that the commission's order invades some of the rights of the company and the city and that consequently it is a violation of their constitutional rights. In his opinion Judge Taylor says:

"It must be borne in mind that the commission has no jurisdiction over the streets of the city of Chicago; that it has no jurisdiction over the ever-changing traffic conditions; that it has no jurisdiction over foot passengers and vehicular transportation, which constitutes the major part of the use of the streets of Chicago. The street railway situation in Chicago is unique. The companies have had a long and checkered career. They have been affected by the constitution of the State, by many acts of the Legislature, by ordinances of the City Council and decrees and judgments of the court until now under a settlement ordinance they have constituted a coherent system of nearly 1000 miles of street railways paying into the city treasurer 55 per cent of their net earnings."

With reference to the city's claim as to the illegality of the formation of the Public Utilities Commission, Judge Taylor said:

"In the course of argument a number of questions have been raised as to the constitutionality of the act creating the Public Utilities Commission. All of these questions, advisedly, are here left unanswered. The Legislature of the State of Illinois has seen fit to pass the act which provides for the regulation of public utilities, and that act is presumed to be constitutional until it is proved beyond a reasonable doubt to be otherwise."

THOMPSON COMMITTEE RESUMES TRANSIT HEARINGS

After giving its entire time for about ten days to investigating the telephone wire-tapping charges, the Thompson legislative committee on May 31 again took up transit matters. The committee gave consideration to the rumor of a $50,000 bribe hint in connection with the purchase of Brooklyn waterfront property for subway use. Among the witnesses called and questioned regarding this bribe hint were: Sigfried Cederstrom, real estate appraiser for the Public Service Commission; Fairfax Landstreet, chairman of the board of directors of the New York Dock Company; Charles E. Hotchkiss, counsel to the Dock Company; William B. Halm, president of the Dock Company; LeRoy T. Harkness, counsel to the Public Service Commission, and Frank de C. Sullivan, director of the Interborough Rapid Transit Company. Frank Moss, counsel to the committee, in his examination tried to bring out the names of the man soliciting the bribe, but was unsuccessful. On June 1 Joseph S. Auerbach was the first witness and was questioned regarding the bribe hint which was the subject of the hearing on May 31. Mr. Sullivan, who testified on May 31 regarding the bribe hint, was called again and questioned regarding the relations between the Interborough Rapid Transit Company and T. A. Gillespie, who received the contract for third tracking the elevated lines. Mr. Moss tried to get the witness to admit that the Interborough directors withdrew the Stevens contract because of hostile newspaper criticism. Mr. Sullivan denied it. He was opposed to it on general principles as were Mr. Freedman and Edward J. Berwind.

PLAN BETTER SERVICE ON THE KEY ROUTE

At a hearing in San Francisco before the Railroad Commission of California on the petition for permission to purchase new equipment, G. K. Weeks, president of the San Francisco-Oakland Terminal Railways, outlined the company's plans for improved service. The matter under discussion before the commission was the issuance by the corporation of $180,000 of 6 per cent serial equipment notes, maturing semi-annually, in a period ranging from one to nine years, and their sale to underwriters, already secured, at par and interest. With the money thus obtained Mr. Weeks proposes to buy twenty convertible cars each with a seating capacity of fifty-two and twelve cars suitable either for street or interurban service. The former type are to cost $6,000 each and the latter $9,500 each. The total cost of this equipment will amount to $234,000, and after a payment in cash the remaining sum necessary to liquidate the notes will be provided through the setting aside of $200 a day out of the earnings of the road until the cars are paid for. With new interurban cars on a new routeing and an express schedule, Mr. Weeks expects to cut down the running time between the Oakland and Berkeley terminals from thirty to fifteen minutes. Mr. Weeks said that during the height of the jitney competition in Oakland the traction company's receipts decreased $1,000 a day, but since the regulatory ordinance had been enforced the revenues had returned almost to their normal average. He estimated that the Oakland jitneys are not taking in more than $300 a day at present. The application has been taken under advisement by the commission.

TRENTON ARBITRATION BEGUN

After having gone over the ten cases of conductors dismissed by the Trenton & Mercer County Traction Corporation, Trenton, N. J., on the charge of "sniping" fares, Peter E. Hurley, general manager of that corporation, and C. Howard Severs, arbiters respectively for the company and union, have decided that a third arbiter is necessary to settle the differences. The third arbiter will be selected by Messrs. Hurley and Severs in a few days. It was at first thought that the dispute between the corporation and the union could be adjusted by the two arbiters that had already been named.

Mr. Severs and Mr. Hurley first met and went over the cases in a preliminary way. The company claims that its inspectors submitted truthful reports of each case. The union contends that the company seeks to disrupt the labor organization by preferring charges against its officers. The direct cause of the strike was the dismissal of David H. Coleman, president of the union. The company was asked to reinstate him, but refused. Then the union announced that the ten dismissed men would have to be reinstated or a strike would be called and later it sought to enforce its threat by calling the men out.

J. P. Shea, national organizer of railway employees, advised Mr. Severs on different points at issue. They also went over the new working agreement submitted to the company a few weeks ago and again asked the corporation for its reply at once. This agreement will not come up for arbitration at this time should the company object to any of its clauses, but will go over until the "sniping" charges have been settled. The men are now paid 27 cents an hour. They have demanded 34 cents and improved working conditions in the new agreement.

Mr. Hurley has been general manager of the company for several years. Mr. Severs has been a conductor in Trenton for about fourteen years. He was formerly president of the Mercer County Central Labor Union and president of Division No. 540 of the Amalgamated Association. He was recently appointed one of the New Jersey organizers of the American Federation of Labor.

TRACKLESS TROLLEY BILL PASSED IN MASSACHUSETTS

Governor McCall of Massachusetts has signed an act providing for the operation of trackless trolley cars by the Massachusetts Highway Service Company, by street railways or other corporations organized as provided in the measure. Five or more persons may associate themselves by written agreement with the intention of forming a trolley-motor or trackless trolley company. The corporate name assumed cannot be one in use or closely resembling that of any other trolley-motor company or in the judgment of the Public Service Commission so similar to it as to be likely to be mistaken for it. The agreement of association must indicate the object of the company; must specify the terminals of the proposed route, with the approximate length of the latter, and the names of counties and municipalities involved. The capital stock must be stated, and this is fixed at a minimum of $2,000 per mile, or $20,000 minimum total. In general, the laws governing the organization of street railways apply to these companies.

Before any company can operate equipment over such routes, a permit must be obtained from authorities having jurisdiction over public ways, the grant being subject to approval of the Public Service Commision. No such approval can be given for any line, any portion of which is, in the opinion of the commission, "so contiguous or adjacent to the line of any street railway company as to result in a competitive service injurious to the public and to such street railway if the latter is ready and willing and offers to construct and does construct within such reasonable time as may be fixed by the Public Service Commission a line or lines of street railway or a line or lines of trolley-motor or trackless trolley over such public way, which, in the opinion of the Public Service Commission will serve the public as well as would the proposed trackless trolley line described in the petition; and no such approval shall be granted in any event if the Public Service Commission shall be of the opinion that the granting of the same would be unduly injurious to any street railway or trackless trolley line covering the same or substantially the same territory."

Every corporation undertaking to perform the kind of service authorized in the act becomes thereby a common carrier, and the commission has general jurisdiction over it, having authority to permit the suspension or curtailment in whole or in part of the trackless trolley service of any company on account of weather, traffic or highway conditions, or season of year making such suspension or curtailment desirable for the safety of the public or to avoid loss in operation.

FORT WAYNE & SPRINGFIELD REHABILITATION

The Fort Wayne & Springfield Railway, Decatur, Ind., has surrendered its franchises in the city of Fort Wayne and in Allen County and is operating under the indeterminate permit section of the Indiana State laws. The franchise in Fort Wayne had twenty-five years to run and in Allen County forty years. A sale of the entire property has been agreed upon. Charles H. Worden, trustee, will deliver the property to Henry C. Paul, Fort Wayne, when the State commission gives its approval. A hearing on the sale has been held, but the decison of the commission has not yet been rendered because the city of Fort Wayne is opposing the surrender of the franchise, which required paving work and similar municipal requirements to be met. After the transfer of the property takes place it is proposed to change the system of electrical distribution from 6600-volt a.c. trolley to 1200-volt d.c. trolley. Energy will be purchased in bulk from the Fort Wayne & Northern Indiana Traction Company, stepped up from 4000 volts to 33,000 volts, three phase, 60 cycles, and transmitted over a 10-mile transmission line that will be built from Fort Wayne to the mid-point on the interurban line, where a new 1200-volt substation will be built. Four new cars will be required to operate the rehabilitated line.

The Fort Wayne & Springfield Railway operates 22 miles of line connecting Fort Wayne, Decatur, Monmouth and Middletown. Sam W. Greenland of the Fort Wayne & Northern Indiana Traction Company, has been managing the property for the trustee.

CINCINNATI-LOUISVILLE LINE PROPOSED

Negotiations are said to be under way between the Cincinnati, Indiana & Louisville Railroad, a new corporation, and Stanley Shaffer, the receiver of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, by which the new company will use the lines of the latter for a route it expects to establish along the Ohio River through Indiana toward Louisville. This would mean the use of the tracks which the new West End Rapid Transit Company expects to build in Cincinnati to connect the Cincinnati, Lawrenceburg & Aurora road at Anderson's Ferry with the business district of the city. Whether the new company desires to purchase these properties or operate them under a leasing arrangment is not clear. Mr. Shaffer has refused to go into detail regarding the matter. The Cincinnati, Indiana & Louisville Railroad is controlled by Chicago and Cincinnati men, but their identity has not yet been divulged. It is said that the road, if built, will pass through Vevay, Rising Sun and other Indiana towns which are served at the present time only by river steamers.

Cincinnati Traffic Survey Considered.—Frank S. Krug, city engineer of Cincinnati, Ohio, has been directed by the Cincinnati Rapid Transit Commission to make an estimate of the cost of a traffic survey of Cincinnati.

Mr. Taylor Will Report on Pittsburgh Problems.—A. Merritt Taylor, president of the Philadelphia & West Chester Traction Company and former director of the department of city transit of Philadelphia, will begin on June 1 a survey of the transit problems of Pittsburgh.

Union Organizers Denied an Injunction at Columbus.—Judge Dillon of the Common Pleas Court at Columbus, Ohio, refused to issue an injunction to prevent the police department from interfering with organizers of the Amalgamated Association, who claimed that the police prevented them from attending a meeting of street railway men and otherwise interfered with their activities.

Peter Witt Returns Royalties.—On May 26 Peter Witt, former Street Railway Commissioner of Cleveland, returned to the Cleveland Railway a check for $7,800 which had been sent to him as royalties on 156 motor cars of the type on which he owns patents. Mr. Witt wrote that the company and the people of Cleveland never would have to pay him royalties. He is receiving royalties of $50 a car for those used in other cities.

Increase in Wages Granted in Akron.—The motormen and conductors of the Northern Ohio Traction & Light Company, Akron, Ohio, on May 7 decided to accept an offer made to them by Charles Currie, general manager, under which the employees of the Akron city lines will receive 27, 29 and 32 cents an hour, according to their terms of service. The men on the suburban lines will receive 28, 30 and 33 cents an hour and those on the interurban lines 29, 31 and 34 cents an hour. Next year the men on the three lines will receive an increase of 1 cent an hour.

Mr. Mitten Complimented.—T. E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, was paid a well deserved tribute by the Philadelphia *Ledger* in its issue of May 18. In acknowledging Philadelphia's debt to Mr. Mitten the *Ledger* said: "It has been one of the conspicuous achievements of President Mitten's management of the rapid transit company that he has established amicable relations between the company and its men, that their pay has been substantially increased and that their hope of further additions to their compensation rests on the results of their own faithfulness and efficiency."

Maine Road Increases Wages.—Announcement was made on May 22 that the conductors and motormen on the lines of the Cumberland County Light & Power Company, Portland, Me., have been granted an increase in wages of 7 per cent, aggregating about $17,000 a year. Men who have been in the employ of the road one year will, under the new schedule, receive 26 cents an hour; two-year men, 27 cents; three-year men, 28 cents, and four-year men and over, 29 cents an hour. Under the present scale the first-year men receive $2.15 a day; two-year men, $2.25; three-year men, $2.35, and four-year men and over, $2.45.

Strike Averted in Little Rock.—A threatened strike of conductors and motormen of the Little Rock Railway & Electric Company, Little Rock, Ark., was averted May 23 when an agreement was reached between officials of the company and the Central Trades Council. The demands of the men included recognition of the union, increase in wages and reinstatement of employees who were alleged to have been discharged because they joined the union. One of the concessions of the company was an increase in wages of 1 cent an hour. This will change the present rate from 19 to 26 cents an hour to one of from 20 to 27 cents an hour.

Wages of Omaha Employees Advanced.—The Omaha & Council Bluffs Street Railway, Omaha, Neb., effective on June 1, will increase the wages of practically all its employees. The scale which has been in effect began at 24 cents an hour for the first year and increased 1 cent an hour up to five years, after which 28 cents an hour was paid until nine years of service, when the maximum of 29 cents an hour was paid. The new scale provides for a minimum of 25 cents an hour and a maximum of 30 cents an hour, payable after five years of service. The wages of the employees in other departments will be raised in about the same proportion.

East Cleveland Franchise Matter Unsettled.—At a conference on May 26 Fielder Sanders, Street Railway Commissioner of Cleveland, Ohio, informed Mayor W. E. Minshall of East Cleveland that he would not approve a renewal of franchises of the Cleveland Railway in that city at a 3-cent fare. He wants the suburban city to accept a franchise similar to that granted by Lakewood on the west, where the fare within the suburb is 3 cents and between it and points in the city, 5 cents. The franchise on Hayden Avenue, East Cleveland, expires in about one year, but that on Euclid Avenue continues for five years. Mayor Minshall did not intimate that the suburb had changed its plans to oppose the matter.

Safety-First Talks in Toledo.—Victor T. Noonan, head of the safety department of the Ohio Industrial Commission, addressed a meeting of factory managers and foremen at the Commerce Club, Toledo, Ohio, on May 12 and later in the week talked to the foremen of the Willys-Overland Company and to the employees of the Toledo Railways & Light Company. E. R. Kelsey, manager of publicity of the Toledo Railways & Light Company, in a brief talk at the Commerce Club meeting, related the results of the safety work by the Doherty companies. Mr. Kelsey said that four men were now employed to travel over the country and talk safety first. He cited as a concrete example of safety-first work an appropriation of $8,000 recommended to defray the cost of removing danger belts in the Central Avenue carhouse.

Stock for City Service Employees.—The directors of the Cities Service Company, New York, N. Y., have approved a plan by which an amount of the common and preferred stocks of the company have been set aside for sale under favorable terms to employees of the company and its subsidiaries. Each employee of the Cities Service Company or its subsidiaries may purchase stock up to the amount of his annual salary at the rate of two shares of preferred and one of common stock for $300, the stock so purchased to be carried over a period of five years and payments made monthly. At present prices of the stocks the employees under this plan will obtain their securities well below the market. An investment company will be formed to handle the employees' investments owing to the accounting and because of the fractional shares involved. At present the Cities Service Company and its subsidiaries have about 6000 employees.

New Kansas City-Lawrence Line Opened.—The Kansas City, Kaw Valley & Western Railway began on June 1 operating cars on its new line into Lawrence, Kan., from Kansas City, 37 miles. The line is a continuation of that between Kansas City and Bonner Springs. One-hour service is established. The present service is local. The running time between terminals is two hours. Later express service will be added. A Kansas City ticket office and rest room has been opened at 7 West Tenth Street, near the corner where the Kansas City Western Railway has its Kansas City terminus and past which the cars of the Kansas City, Lawrence & Topeka Railway run. The city ticket offices of the Kansas City, Clay County & St. Joseph Railway and that of the Missouri & Kansas Interurban Railway are three blocks south, at Thirteenth and Walnut Streets. The Kansas City, Kaw Valley & Western Railway, which has been locally known heretofore as the Bonner Springs Line, will handle freight, express and baggage in baggage sections of passenger cars temporarily, but will use the local freight station at Hird Street and Grand Avenue of the Strang Line. This station will also be used by the Leavenworth Line.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Association

Applications for staterooms and tickets for the midsummer boat trip of the Central Electric Railway Association are coming in daily, and more than 150 tickets and reservations had been paid for up to May 31. John Benham, vice-president of the International Register Company and chairman of the committee on arrangements, expects that the association's guarantee of 225 will be exceeded, because most of the parties that reserved space for the boat trip last year have taken space for a greater number of people than on the previous trip. The cruise is practically a four days' trip, and will afford an unusual opportunity to see the Upper Lakes at a minimum cost on one of the finest lake cruisers. The committee is anxious to have all who intend to go make their reservations at the earliest possible date.

Illinois Electric Railway Association

The Illinois Electric Railway Association will hold a meeting on June 9 at the LaSalle Hotel, Chicago.

H. A. Johnson of the Chicago Elevated Railways will read a paper on the results obtained from tests of roller journal bearings and field control motors on the road with which he is connected.

O. Bruenauer of the Gurney Ball Bearing Company will present a paper on ball bearing journals.

D. C. Hershberger of the Westinghouse Electric & Manufacturing Company will read a paper on the history and performance of railway motor field control.

W. A. Clough of the engineering department of the General Electric Company will give an illustrated talk on the comparative economy of old and new motors.

H. B. Adams, safety supervisor of the Aurora, Elgin & Chicago Railway, will speak on the subject of safety. At the noon hour the usual association luncheon will be held.

Central Electric Railway Accountants' Association

The program has been announced for the meeting of the Central Electric Railway Accountants' Association at the Hotel Secor, Toledo, Ohio, on June 13 and 14. The executive committee will meet at 9 a. m. on June 13. The regular session will begin at 10 a. m. The presentation of the reports of the executive committee and of the standing committee on passenger and freight accounts will follow. At the afternoon session on June 13 the committee on electric light and power accounts and the question box committee will report. The presentation of these reports will be followed by these addresses:

"The Relation of the Accounting Officer to Other Members of the Official Family," by Ralph R. Bruster, associate editor of the ELECTRIC RAILWAY JOURNAL.

"Office Organization," by Robert H. Lindsey, comptroller of the Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.

On June 14 these addresses will be made:

"Storeroom Systems," by A. Swartz, vice-president of the Toledo & Western Railroad.

"Departmental Expense Statements," by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

The subject "Taxation Problems" will also be discussed.

Financial and Corporate

ANNUAL REPORTS

Duluth-Superior Traction Company

The comparative income statement of the Duluth-Superior Traction Company, Duluth, Minn., for the twelve months ended Dec. 31, 1914 and 1915, follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Railway operating revenues:				
Revenue from transportation	$1,154,906	99.18	$1,289,917	99.42
Revenue from other railway operations	9,539	0.82	7,525	0.58
Total	$1,164,445	100.00	$1,297,442	100.00
Railway operating expenses:				
Way and structures	$141,685	12.17	$131,433	10.13
Equipment	89,854	7.73	92,633	7.14
Power	155,617	13.36	170,268	13.12
Conducting transportation	308,481	26.48	304,530	23.47
Traffic	254	0.02	900	0.07
General and miscellaneous	145,787	12.52	160,225	12.35
Transportation for investment—credit	—672	—0.06	....	....
Total	$841,008	72.22	$859,992	66.28
Net revenue from railway operation	$323,437	27.78	$437,450	33.72
Taxes assignable to railway operation	69,831	6.00	66,519	5.13
Operating income	$253,606	21.78	$370,931	28.59
Non-operating income	15,515	1.33	16,121	1.24
Gross income	$269,121	23.11	$387,052	29.83
Deductions from gross income	172,699	14.83	177,372	13.67
Net income	$96,422	8.28	$209,680	16.16

The revenue from transportation during 1915 decreased $135,011, or 10.4 per cent, as compared to the 1914 results. This showing was remedied a little by a saving of $18,984, or 2.2 per cent, in operating expenses, the decrease being made in maintenance of equipment, power, traffic and general and miscellaneous in spite of increases in maintenance of way and structures and conducting transportation. Taxes showed an increase of $3,312, or about 5 per cent, which was more than counterbalanced by a decrease of $4,673, or 2.6 per cent, in deductions from income, most of this coming from decreased interest on unfunded debt. The net income suffered a loss of $113,258, or more than 54 per cent. The company in 1915 earned 1.04 per cent on its common stock, as compared to 4.28 per cent in 1914, and paid 1 per cent, as compared to 4 per cent.

The loss in revenues was caused by the business depression during the first half of the year and the invasion of the jitney bus, which started in Duluth and Superior in March. This reduction amounted to nearly 20 per cent during the period between April 1 and Sept. 30, which period was theretofore the most profitable during the year. The revenue passengers during the year decreased from 25,912,155 to 23,185,970.

The new plant of the United States Steel Corporation, located about 3.5 miles beyond the western terminus of the company's lines in Duluth, was put in partial operation about Nov. 1. The operation of this plant, and other manufacturing enterprises which will in time be drawn to this vicinity, should add materially to the growth and business prosperity of both Duluth and Superior, in which the company will share.

Expenditures for additions to property and extensions aggregating $92,898 were made during the year. There was expended for renewals and charged against depreciation reserve account $35,016. The depreciation of the company's property during the year was computed at $123,681, which was charged against operating expenses. Under the new classification of accounts depreciation is charged directly under the various operating expense headings, and is not shown separately as before. The 1914 items are, of course, adjusted accordingly.

New Orleans Railway & Light Company

The comparative income statement of the New Orleans Railway & Light Company, New Orleans, La., for the calendar years 1914 and 1915, follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Operating revenue	$6,951,587	100.00	$7,012,124	100.00
*Operating expenses	3,410,773	49.06	3,428,871	48.90
*Net operating revenue	$3,540,814	50.94	$3,583,253	51.10
Revenue deductions—taxes, etc.	776,077	11.17	770,223	10.98
Operating income	$2,764,737	39.77	$2,813,030	40.12
Miscellaneous income and outside operations	55,243	0.79	53,563	0.76
*Gross income	$2,819,980	40.56	$2,866,593	40.88
Income deductions—interest, etc	1,817,987	26.15	1,757,861	25.07
Net income before deducting charges for renewals and replacements	$1,001,993	14.41	$1,108,732	15.81
Charges for renewals and replacements	212,927	3.06	189,618	2.70
Net income	$789,066	11.35	$919,114	13.11

*Not including charges for renewals and replacements shown below.

The gross operating revenue of the company during 1915 decreased $60,537, or 0.86 per cent, as compared to 1914. Owing to a decrease in operating expenses, the net operating revenue decreased $42,439, or 1.18 per cent, while larger income deductions and charges for renewals and replacements made the net income drop $130,048, or 14.15 per cent. The revenue showing was mostly the result of operations in the railway department, where the 1915 operating revenues at $4,198,235 showed a loss of $200,272 from the 1914 results, while the electric department revenues at $1,489,015 and those of the gas department at $1,264,337 displayed gains of $61,720 and $78,015 respectively. Moreover, with operating expenses at $2,342,411 the railway department showed a slight increase of $991, and the electric department expenses at $573,406 an increase of $12,179, whereas the gas department figures at $494,955 represented a decrease of $31,268.

The decrease in net income was due mainly to jitney competition in the railway department which started on Jan. 31, 1915, and continued during the year. The number of cars operated in the spring of 1916 was approximately 40 per cent less than last spring, which tends to bear out the impression that they cannot operate profitably under favorable conditions. On Sept. 29 the city was visited by one of the worst storms on record; the operations of the company were hampered and normal conditions were not restored in all departments until about three weeks after that date.

The amount charged to operating expenses for maintenance during the year was $725,537. In addition to this $244,309 was expended for renewals and replacements, making a total expenditure for maintenance and renewals and replacements of $969,846. There was reserved from income for renewals and replacements $212,927, which resulted in a net charge to renewal and replacement reserve of $31,382. There was expended for construction, improvements and betterments, amounts totaling $859,816, including $229,969 for roadway and line and $3,498 for rolling stock and equipment.

OREGON PUBLIC SERVICE COMMISSION REPORT

The ninth annual report of the Public Service Commission of Oregon states that the total operating revenues of the electric railways in Oregon amounted to $4,663,388 for the year ended June 30, 1915. Of this total $4,092,047 came from passenger traffic, $388,666 from freight traffic and $70,476 from other railway operations. The total operating expenses amounted to $3,014,255, divided as follows: way and structures, $322,236; equipment, $426,983; power, $232,341; conducting transportation, $1,477,882; traffic, $41,587; general and miscellaneous, $513,458, and transportation for investment (cr.), $184. For the combined roads, therefore, the operating ratio for the year was 64.06 per cent. The net operating revenue totaled $1,649,134, and the deduction of $723,879 for taxes left an operating income of $925,235.

SAN FRANCISCO-OAKLAND REORGANIZATION

Committee Believes Franchise Conditions Must Be Bettered Before Sound Plan of Reorganization Can Be Offered

The committee appointed in the middle of 1915 to consider a plan of reorganization for the San Francisco-Oakland Terminal Railways, Oakland, Cal., under date of May 16 issued to security holders a statement saying that before the company can be reorganized on a sound financial basis and before investors can be induced to put new money into the property, there must be a change for the better in the fundamental conditions of the company. No considerable amount of new capital has been obtained since 1911, and it is not to be expected, it is said, that new capital can be obtained until the two following requirements have been met:

1. An adjustment or reorganization of the financial structure of the company. This should wipe out the present complex and conflicting bond issues, with sinking funds which cannot be earned; provide new issues of securities conforming to the standards of the California Railroad Commission which will be available for refunding outstanding securities and for sale from time to time in the future to provide for necessary new construction. Such a reorganization would have the effect of curing existing defaults, which interfere with the economical and effective administration of the property.

2. An improvement in the fundamental condition of the property which will make reasonably secure the investment in the property and therefore make it possible to sell new securities when securities of a proper type shall have been authorized. This involves: (a) Such conditions as will safeguard all capital properly invested in the property, and (b) earnings showing a safe margin over the interest requirements on securities to be sold.

In general, the committee states, the unfavorable conditions confronting this railway property are not materially different from those affecting street railway operation generally throughout California. It seems to the committee that three reforms which should be made are as follows:

1. Automobile competition must be dealt with on lines which are economically sound and permanent. The principal cities in which the San Francisco-Oakland Terminal Railways operate have dealt with the jitney problem in a way which is probably as satisfactory as could be adopted under existing charter provisions and State laws. Capital cannot be expected, however, to have confidence in the street railway business until all competing common carriers are, through the operation of uniform and statewide laws, made subject to the same regulations and charged with the same public obligations as the street railways.

2. Street railways companies in California must be relieved from the present excessive burden of taxation. These companies are required to pay to the State a direct tax amounting to 5¼ per cent of gross earnings. This tax, however, does not relieve them from the obligations of their local franchises, which usually require a payment to the municipality issuing the franchise amounting to 2 per cent of the gross earnings, plus an obligation to do street paving, which under existing standards absorbs approximately 5 per cent of gross earnings. The present city charters in Oakland and Berkeley go further and specify as a condition of new franchises, payments to the franchise-granting municipality beginning at 2 per cent of gross earnings per annum and running up to 5 per cent. It appears that the traction division of the San Francisco-Oakland Terminal Railways is paying to-day in excess of 12 per cent of gross earnings in taxes, licenses and enforced contributions for public purposes, and that in the case of a franchise taken out under the existing city charters this taxation would ultimately exceed 15 per cent of gross earnings. This is a burden which a street railway operating under a 5-cent fare, with universal transfers and paying present-day rates of wages and prices for material, cannot meet except possibly under unusual conditions which do not exist in this case.

3. The present unsound form of franchise must be modified. The existing franchises extend over a limited term only and contain no definite provision as to the disposition, at the end of the franchise term, of the property of the railway company occupying the public streets. The consolidated company now owns and operates under 134 separate franchises maturing at different dates and containing various obsolete and conflicting conditions. For these there should be substituted as soon as possible a blanket franchise which will adequately protect the interests of the public, giving them, if desired, the right to acquire the property at a fair amount should they be so disposed, and in the meantime assuring present investors a fair return on their capital.

This committee had previously worked out a tentative plan of reorganization, but this, while acquiesced in, never was satisfactory to any member. Now it is the unanimous opinion of the committee that before any plan can be evolved which will find favor with the many interests connected with this complicated situation, the fundamental conditions of the company must be bettered. When the suggested changes of the franchises of the company shall have been effected, and the company's fundamental conditions thereby improved to such an extent as to attract the investment of new capital in the company's securities, there can then be submitted to the bondholders a plan of reorganization which will properly protect and preserve the present rights and priorities of all of the various classes of investors. In the meantime, the committee suggests, the company should continue to pay the interest upon its bonds as soon after this becomes payable as it is possible to accumulate funds for that purpose.

PRESIDENT LOREE ON SECURITY OUTLOOK

Although speaking primarily of steam railway securities, the following remarks by President L. F. Loree of the Delaware & Hudson Company, made in the annual report of the company digested in this paper for May 20, may be of interest to electric railway officials:

"A study of the yields upon railway and industrial securities, at recent market prices, indicates that the average investor is relatively still less willing now than formerly to forego the advantage of the somewhat higher yield of the industrials for the sake of becoming the owner of bonds dependent upon railway property. He is apparently unable to find in the railway situation any offset for the fact that, unlike the prices of the products of the industrials, the prices of railway services are closely limited by law and custom and returns to investors sharply restricted in practice, and he turns without reluctance to the field in which the laws of demand and supply are still unshackled and the rewards of economy and efficiency are restricted only to a just share of the gains which they secure. Capital for railway purposes has become more costly, and other capital less costly. The increasing ability of the industrials to make their demand effective is found in the increased earnings of those companies and the ability of many of them to retire securities before maturity. These facts and the large amounts that the industrials have been able to spend to extend their facilities for the purpose of taking care of war orders and increased domestic business contrast sharply with the fact that at the same time, for want of funds, the railroads have been practically unable to extend their facilities. Capital can be obtained only from investors who are confident of receiving a fair return, and adequate earnings can alone give this confidence."

Chicago (Ill.) Elevated Railways.—An extension of the $14,000,000 of two-year 5 per cent notes of the Chicago Elevated Railways has been arranged with the National City Bank, New York. The interest rate will be increased to 6 per cent. The National City Bank and the Insull syndicate, which hold a majority of the notes, have reached an understanding providing for a three-year extension, the National City Bank to take care of the notes presented for payment when they mature on July 1.

Chicago (Ill.) Railways.—The gross earnings that were reported for the Chicago Railways for the first four months of the present year showed a marked increase over those for the same period in 1915. Although this company will have additional fixed charges this year on account of the interest rate on $4,073,000 of purchase money bonds automatically advancing from 4 per cent to 5 per cent, this increase will be offset by a rise in the company's proportion of the residue receipts which under the operating agreement with the Chicago City Railway increases from 59 per cent of the gross receipts of the surface railways to 60 per cent. The basis for this division of the residue receipts of the Chicago Surface Lines was estimated at the time the operating agreement was consummated on Feb. 1, 1914. For the first two years the division was to be 59 per cent for the Chicago Railways and 41 per cent for the Chicago City Railway. At the end of the second year, or Feb. 1, 1916, this ratio was automatically changed to 60 per cent for the Chicago Railways and 40 per cent for the Chicago City Railways. While the earnings are showing satisfactory gains and prospects point to still further increases, the advance in wages to employees, which became effective on May 1, 1915, will increase the operating expenses approximately $1,000,000 during the current year. Under the 1907 ordinances, the Chicago Railways agreed to retire its Series C bonds, maturing in 1927. On Feb. 1, 1916, only $1,399,000 of these bonds were outstanding, having been reduced to this amount by the expenditure of $250,000 annually from the company's sinking fund. It is expected that these outstanding Series C bonds will be further reduced during the current year by about $260,000 if they can be purchased in the open market at as favorable prices as prevailed in 1915.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—The hearing on the application for a receiver for the Cincinnati, Dayton & Toledo Traction Company, filed by Albert D. Alcorn, was completed before Judge Murphy of the Butler County Common Pleas Court at Hamilton, Ohio, on May 27. Arguments will be heard on June 5. Former Governor Judson Harmon testified on the preceding day that he had advised the Cincinnati, Dayton & Toledo Traction Company and the Ohio Electric Railway to adjust the finances of the two in the matter of rentals and the payment of the bonds and interest. Walter A. Draper, vice-president of the Cincinnati, Dayton & Toledo Traction Company, testified that it has $2,700,000 of bonds outstanding and that a bondholders' committee was organized to protect the bondholders. Interest on one issue of $250,000 of bonds will be due on July 1, and the agreement between the two companies will expire on Aug. 1. Mr. Draper said the outstanding capital stock of the company was reduced to $500 in order to reduce its franchise tax to the State. Another officer stated that the assets of the company consist of the property operated under lease by the Ohio Electric Railway and that its only income was the rental paid by the leasing company. Leo J. Van Lahr, vice-president of the Provident Savings Bank & Trust Company, Cincinnati, testified regarding the 5 per cent consolidated underlying bonds of the company. He was not required to state the amount owned by the bank. He is a member of the bondholders' committee. F. A. Healy, secretary of the company, also testified. The suit for a receiver for the Cincinnati, Dayton & Toledo Traction Company, filed by Attorney Oscar P. Grischy, was dismissed by Insolvency Judge Kelley on May 23 on motion of Mr. Grischy. Mr. Grischy expects to file an intervening petition in connection with the Hamilton case filed by Attorney A. D. Alcorn, as described above.

Dominion Power & Transmission Company, Ltd., Hamilton, Ont.—The initial dividend of 2 per cent on the common stock of the Dominion Power & Transmission Company will be paid on $7,714,500 of stock, including the limited preference stock converted into common stock about six months ago, when the 10 per cent dividends to which the latter was entitled were paid up. The dividend just declared was announced as for the six months ended May 30 and is taken as establishing the stock on an annual dividend basis of 4 per cent.

Gary & Interurban Railroad, Gary, Ind.—A cross-complaint in the suit of the Central Trust Company of Illinois and William T. Abbott against the Gary & Interurban Railroad and the Baltimore Trust Company has been filed in the Federal Court at Indianapolis by the Baltimore Trust Company. The company alleges it holds notes against the road and asks foreclosure. It also asks an extension of the receivership to cover the notes and collection of all tolls and revenues, with a view to settling the principal and interest on the notes. Sale of the road is petitioned. The complaint of the Central Trust Company and William T. Abbott alleges the road, which was recently consolidated, has failed to carry out provisions of its merger, and asks it be declared bankrupt.

Interborough Consolidated Corporation, New York, N. Y.—The Interborough Consolidated Corporation on July 1 next will retire $500,000 of its ten year 6 per cent notes dated Jan. 1, 1915. This will bring the amount outstanding down to $2,000,000. At the time these notes were issued, provision was made for a sinking fund of $300,000 a year to provide funds to pay off the bonds at maturity.

Middle West Utilities Company, Chicago, Ill.—The Middle West Utilities Company is prepared to redeem at 100 and accrued interest $3,500,000 of three-year 6 per cent collateral gold notes and certificates which reached their date of maturity on June 1.

Monterey & Pacific Grove Railway, Monterey, Cal.—As a result of the investigation of the California Railroad Commission on its own motion to determine the various elements entering into the value of the property of the Monterery & Pacific Grove Railway, it has been determined that the reproduction cost of the operative physical property as of June 30, 1914, was $137,109, and that the reproduction cost less depreciation of this physical property on this date was $102,541. Allowances of 5 per cent for engineering and 3 per cent for interest during construction were deemed amply sufficient to cover such items. The original cost of the property could not be ascertained, because the books were in such shape as a result of the relations of the various owning companies and this railway that it was impossible to make definite statements of fact.

Northwestern Pennsylvania Railway, Meadville, Pa.—The Public Service Commission of Pennsylvania has approved the application of the Northwestern Electric Service Company for permission to acquire a controlling interest in the capital stock of the Northwestern Pennsylvania Railway. The incorporation of the Northwestern Electric Service Company was noted in this paper March 18, page 581.

New Orleans Railway & Light Company, New Orleans, La.—Meetings of the stockholders of the New Orleans City Railroad, Orleans Railroad, New Orleans & Carrollton Railroad, Light & Power Company, St. Charles Street Railroad, New Orleans & Pontchartrain Railway and the New Orleans Railway & Light Company were held on May 22, and the necessary resolutions were adopted authorizing the agreement for consolidation of the companies in accordance with the plans outlined in the ELECTRIC RAILWAY JOURNAL of May 13, page 925. Immediately thereafter the holders of a small amount of stock of the New Orleans City Railroad served an injunction, which prevented the execution of the agreement for consolidation. In the event that the injunction is set aside, the agreement for consolidation will be executed and the consolidation thereupon will become effective.

Seattle, Renton & Southern Railway, Seattle, Wash.—Judge Frater, in the King County Superior Court, on May 25, ordered the Seattle, Renton & Southern Railway sold under the reorganization plan offered by the bondholders' committee, represented by Attorney John C. Higgins. Judge Frater directed that the bondholders and common claimants pay approximately $150,000 to cover liabilities incurred by the receivers. June 2 was fixed as the date when the deal is to be consummated and the order confirming the sale entered. The bondholders and a number of the common claimants bid $1,200,000, and Attorney F. J. Carver, representing undisclosed clients, also bid $1,200,000 when the road was offered for sale on May 12. The offer of Attorney Carver for his undisclosed clients was held by Judge Frater not a bid in fact, inasmuch as it would be of no force and effect if not accepted by the bondholders and stockholders. In addition to the $150,000 required for the payment of claims mentioned previously, prospective owners will advance $225,000 for improvements deemed necessary. The property has been in the hands of Scott Calhoun and Joseph Parkin as receivers since 1912.

Third Avenue Railway, New York, N. Y.—James A. Blair has been elected a director of the Third Avenue Railway to succeed James N. Wallace, resigned.

Twin State Gas & Electric Company, Brattleboro, Vt.—William P. Bonbright & Company and A. H. Bickmore & Company, New York, N. Y.; McCoy & Company and Russell, Brewster & Company, Chicago, Ill., and H. P. Taylor & Company, Pittsburgh, Pa., are offering at 92 and interest, yielding 5½ per cent, a block of first and refunding mortgage 5 per cent gold bonds of the Twin State Gas & Electric Company dated Oct. 1, 1913, and due Oct. 1, 1953, part of an outstanding issue of $998,100. The bonds are redeemable on Oct. 1, 1923, or on any date thereafter at 105 and interest upon sixty days' notice. Interest is payable in April and October in New York. The Guaranty Trust Company, New York, N. Y., is trustee of the issue.

DIVIDENDS DECLARED

Baton Rouge (La.) Electric Company, 3 per cent, preferred; 3 per cent, common.

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.

Frankford & Southwark Passenger Railway, Philadelphia, Pa., quarterly, $4.50.

Pensacola (Fla.) Electric Company, 3 per cent, preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

Third Avenue Railway, New York, N. Y., quarterly, 1 per cent.

Washington Railway & Electric Company, Washington, D. C., quarterly, 1¼ per cent, preferred.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.						
1m., Mar.,	'16	$158,393	*$106,471	$51,922	$36,178	$15,744
1 " "	'15	160,199	*101,329	58,870	35,410	23,460
12 " "	'16	1,925,685	*1,220,785	704,900	434,868	270,032
12 " "	'15	2,327,394	*1,268,159	1,059.235	434,574	624,661
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.						
1m., Mar.,	'16	$166,936	*$101,660	$65,276	$28,725	$36,551
1 " "	'15	128,701	*85,327	43,374	27,254	16,120
12 " "	'16	1,777,984	*1,086,616	691,367	335,631	355,736
12 " "	'15	1,958,747	*1,096,332	862,414	323,776	538,638
OHIO RIVER ELECTRIC RAILWAY & POWER COMPANY, POMEROY, OHIO.						
1m., Mar.,	'16	$6,562	$4,632	$1,930	$1,662	‡$423
1 " "	'15	5,366	3,728	1,638	1,604	‡427
9 " "	'16	63,773	36,734	27,039	14,387	‡14,286
9 " "	'15	54,133	32,557	21,576	14,922	‡10,211
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH KY.						
1m., Mar.,	'16	$25,725	*$15,955	$9,770	$7,188	$2,582
1 " "	'15	23,306	*15,165	8,141	7,796	345
12 " "	'16	294,586	*178,666	115,920	90,057	25,863
12 " "	'15	299,729	*191,946	107,783	91,684	16,099
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Mar.,	'16	$24,056	*$13,315	$10,741	$7,516	$3,225
1 " "	'15	19,182	*11,339	7,843	7,268	575
12 " "	'16	268,463	*149,405	119,058	87,139	31,919
12 " "	'15	255,204	*162,205	92,999	86,951	6,048
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m., Mar.,	'16	$655,362	*$440,468	$214,894	$184,372	$30,522
1 " "	'15	615,209	*401,582	213,627	181,241	32,386
12 " "	'16	7,603,965	*4,850,755	2,753,210	2,189,950	563,260
12 " "	'15	8,169,611	*4,938,419	3,231,192	2,135,049	1,096,143
SAVANNAH (GA.) ELECTRIC COMPANY						
1m., Mar.,	'16	$65,269	*$45,240	$20,029	$23,344	†$3,315
1 " "	'15	64,393	*42,239	22,154	23,408	†1,254
12 " "	'16	786,035	*521,013	265,022	278,400	†13,378
12 " "	'15	834,579	*545,756	288,823	276,466	†12,357
TAMPA (FLA.) ELECTRIC COMPANY						
1m., Mar.,	'16	$81,928	*$45,224	$36,704	$4,395	$32,309
1 " "	'15	82,268	*42,007	40,261	2,376	37,885
12 " "	'16	989,708	*513,922	475,786	52,202	423,585
12 " "	'15	991,859	*512,744	479,115	53,066	426,049

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*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

MEMPHIS ELABORATES ON CROSSING RULES

In its Bulletin No. 37 for May the Memphis (Tenn.) Street Railway, over the signature of T. H. Tutwiler, president, has elaborated upon rule No. 219, "Street Crossings and Intersections." The company says:

"Of all the rules in our rule book not one is of more importance than rule No. 219.

"No rule in the book has more to do with safety than this one; safety for those using the street, for the passenger on the car, for yourself, and for your company. The rule says:

"'Approach street crossings and intersections with speed reduced to such a rate that car may be quickly stopped if necessary to prevent accidents.'

"'Ring gong vigorously commencing 100 ft. away. Keep a vigilant lookout for vehicles and pedestrians crossing or approaching track.'

"If this rule is intelligently observed our accidents at street crossings and intersections will be greatly reduced.

"The observance of this rule demands that the motorman must be at all times alert. Must at all times keep his head.

"He cannot rely on the other fellow. We know from experience and observation that the users of the streets are careless. That they approach the track without looking, without paying the slightest attention to their own safety.

"The intelligent observance of this rule will save such persons from the results of their own carelessness.

"No man operating a car for this company desires to have an accident; but how many motormen, after the collision at a street crossing has occurred, do not have to admit to themselves at least that had they strictly observed rule No. 219 the accident would never have happened?

"We are all inclined to regard this rule as one affecting only the motorman, as one that the conductor has nothing to do with; but team work is necessary in all car operation, and it applies in the carrying out of this rule as well as all others.

"The conductor can and should help his motorman by calling his attention in a kindly manner to any tendency to violate this rule that he may observe.

"When a man is seen running a crossing too rapidly a safety report will be a gentle reminder that will probably save the man from having an accident, save the man his job, save some person from suffering and save the company from financial loss.

"The conductor can assist his motorman by a close attention to his own duties, and by not giving his go-ahead bells until passengers are safely on or off the car.

"This will enable the motorman to give more attention to the crossing he is about to make.

"I earnestly urge the close observance of this as well as all rules of the company, and the heartiest co-operation and team work between motorman and conductor.

"Our accidents may thereby be still further materially reduced, and we be made to feel that we are doing our full part toward making Memphis a safe and desirable city in which to live."

DECISION IN CONNECTICUT ZONE FARE CASE

The Public Utilities Commission of Connecticut has handed down a decision declaring that the zone fare system, known as the "copper-zone" system, put into effect on Nov. 22, 1915, by the Groton & Stonington Street Railway, is not unreasonable. The commission holds that under the Connecticut law school teachers are not entitled to reduced rates, that the higher rates charged under the zone system will not give an unreasonable return on the valuation of the property and that the fact that the road is leased to another corporation is immaterial in determining what constituted a reasonable fare. Hence, with the exception of four local rates which the commission considered worked some injustice upon the patrons, the new rates were approved. A longer report of this decision will appear in an early issue of this paper.

BAY STATE FARE HEARINGS CONTINUE

In the Bay State Street Railway fare hearing before the Massachusetts Public Service Commission on May 18, cross-examination of the company's valuation expert, R. M. Feustel, was resumed by E. Gerry Brown, Brockton, Mass. The witness said that P. F. Sullivan, president of the Bay State Street Railway, had been the final authority in fixing the rate of 7 per cent as the return to be allowed upon the company's capital. Clients of the firm of Sloan, Huddle, Feustel & Freeman uniformly decide this matter for themselves, the engineers uniformly refraining from expressing opinions as to a fair rate of return. Personally Mr. Feustel said that he did not feel that 7 per cent return was too great on the value of the property assigned in the company's case, especially in view of the fact that in the development of the system there was a substantial amount of property which the company had apparently been unable to write off. This represented certain outlays associated with the change from horse to electric traction, certain power station property and rolling stock. There were also expenditures for public highway construction which could only be partly covered in the inventory. The witness said that practically all his work had been on cases where 7 per cent had been considered the minimum amount of return on the property by the commission. About $2,600,000 should be provided yearly in the case of the Bay State company to provide for maintenance and depreciation, maintaining the present value of the property. The historic cost of the property totalled about $42,000,000, and the estimated accrued depreciation was 31 per cent. The witness stated that the determination of the actual value of the property for rate-making purposes rested with the commission. Taking the original cost new and deducting what had disappeared through wear and tear and obsolescence, the cost less accrued depreciation became $30,260,347 on the Massachusetts property. The estimated reproduction cost new was $43,929,721. The tributary population on the company's 931 miles of track in Massachusetts was estimated at 1,300,402. About 200,000 passengers were carried per mile of track. It was estimated that the company's revenue in Brockton would be increased about $31,000 a year by the new rate schedule, allowing for the use of nine-for-50 cent tickets and loss of traffic due to the installation of the 6-cent fare unit. The population of the Brockton district was 118.000. About 4,360 000 passengers a year were carried on the Brockton city lines.

SERVICE STANDARDS PROPOSED IN WASHINGTON

The Public Utilities Commission of District of Columbia will hold a hearing on June 14 to discuss standards of car loading. A memorandum, giving the results of investigations so far conducted, has been issued to the companies within its jurisdiction. The present suggestion of the commission is to establish a rush-hour standard of 7 sq. ft. per standing passenger, averaged over one-half hour periods, and a non-rush standard of 100 seats per eighty passengers, averaged over one-hour periods.

In computing the number of square feet of standing area of each car, front platforms with no railing behind motormen are not considered as standing area. Only such space of the front platforms equipped with a rail behind motorman as is located behind the rail, assumed extended transversely across the platform, is considered as standing area; the total unincumbered floor area of the car body, exclusive of 10-in. knee room alongside of each longitudinal seat, is considered as standing area. The total unincumbered floor area of back platforms is considered as standing area, except for cars of the prepayment type having a swinging exit door, where the area behind the conductor's railing has been excluded to permit opening the exit door. In computing the seating capacity of cars equipped with continuous longitudinal seats, 17 in. is allowed per passenger. Only such seats as are simultaneously available are included.

For lines operating cars on long headway, it is proposed to extend the standard so that the period of time shall include not less than ten cars. It is also proposed that the companies check the service and submit their records to the commission not less often than once a month, the observations to be made during three consecutive mid-week days. The memorandum states that, from past observations, the railway companies are at present practically complying with the proposed standards, except that during non-rush hour periods, on some lines, during short periods, the service would have to be improved to comply with the proposed standard.

HEARINGS BEGUN IN ILLINOIS TO STANDARDIZE BAGGAGE METHODS

Complaints filed with the Illinois Public Utilities Commission regarding excess baggage charges and the baggage handling practices of steam and electric roads operating within the State have resulted in the steam railroads being summoned by the commission to present evidence. The specific complaint under which action is being taken was filed by the Travelers' Protective Association. Rates for excess baggage in Illinois are cited as higher than those in Indiana. The electric interurban roads have also been summoned before the commission to offer evidence and arguments on the question of reasonable rules, rates, regulations and practices governing the handling of baggage on their lines.

Hearings were held in the commission's rooms on May 25 and 26, but owing to the unavoidable absence of representatives of some of the electric railways another hearing will be held on July 12. The evidence presented by representatives of the electric railways in attendance brought out the fact that most of them were organized under the railroad act which provides for 100 lb. of free baggage with each first-class passenger fare. It was averred, however, that electric railways were unknown in 1888, when the law was passed, and furthermore that the rates of fare charged by them did not permit the handling of baggage free. It was also brought out that a number of the electric railways did not handle baggage at all, others handled it simply as express matter, and still others made a uniform charge of 25 cents per piece of baggage. Witnesses also stated that if electric railways were forced to handle baggage free, they would have to provide space for it on the present cars and perhaps secure additional equipment. Station facilities at the present time were also inadequate. Some roads did not have any waiting stations, while others had made no provision in their stations for handling baggage.

Portland Experimenting with Transfer Machine.—The Portland Railway, Light & Power Company, Portland, Ore., is testing a new device for printing and issuing transfers to passengers.

Hoboken Fare Hearing Postponed.—The hearing on the application to require the Public Service Railway to operate for a 3-cent fare in Hoboken, N. J., set for May 24 and 25 before the Board of Public Utility Commissioners, was postponed until June 23.

One-Man Cars in Vancouver.—L. Clark, district manager of the North Coast Power Company operating in Vancouver, Wash., has announced that the company has decided to operate a one-man car on the Capitol Hill run. If the change meets with success, one-man cars will be placed in service on other lines in the city.

Baltimore Service Standards Under Consideration.—The Public Service Commission of Maryland has under consideration standards of service with respect to the loading of the cars of the United Railways & Electric Company, Baltimore, but no order has yet been entered in connection with the matter.

Curbing the Buffalo Spitter.—At the request of officials of the International Railway, Buffalo, N. Y., the police are vigorously enforcing the city ordinances prohibiting spitting and smoking in street cars. A number of arrests have been made and fines ranging from $5 to $50 have been imposed by City Court judges for violations of this section of the penal code.

Company Publication Started in New Orleans.—*Energy* is being published monthly by the associated employees of the New Orleans Railway & Light Company. The first issue appeared in April. The editor is M. B. Trezevant. The paper is 7 in. wide by 10 in. high. The issue for May contains thirty-two pages and cover. The paper seeks to reflect the many activities of the employees. It has a circulation of 4000 copies.

Jitney Operation Ordered Stopped.—The Illinois Public Utilities Commission, following its recent order declaring jitney buses public utilities when they competed directly with street cars, has ordered Alphonso Snyder, Quincy, to cease operating a jitney line until he has secured a certificate of convenience and necessity. Mr. Snyder was running on a regular schedule and in competition with the cars of the Quincy Railway.

New Jersey Jitney Law Attacked.—The jitney operators of Asbury Park, N. J., have secured from Justice Kalisch of the Supreme Court a writ of certiorari to test the legality of the ordinance passed in that city. As the ordinance was based upon the so-called Kates State law, the attack is indirectly on that statute. Counsel for the jitney men contend that under the law the jitney men will find it impossible to operate their buses, and thus will be deprived of their property without due process of law.

Protest Against One-Man Cars.—A petition has been filed with H. W. Carroll, city clerk of Seattle, Wash., by property owners along the Greenwood Street line of the Puget Sound Traction, Light & Power Company, in the Ballard District, protesting against the proposed adoption of one-man cars on that line. Some time ago the company petitioned the City Council for the right to operate one-man cars on three separate lines, among which is the Greenwood line, and the matter is being investigated by that body.

Buffalo-Queenstown Fast Service.—The International Railway, Buffalo, N. Y., is now operating a fast through passenger service between the Buffalo terminal and Queenstown, Ont., via Niagara Falls, N. Y., and the upper bridge across the Niagara Gorge, returning via the Gorge Route. This service will continue throughout the summer, making direct connections with lake boats at the Queenstown dock for Toronto and other Canadian ports. No intermediate stops are made between Buffalo and Niagara Falls. The trip is made in two hours.

Through Freight Schedules Asked.—A petition has been filed by patrons of the Boise Valley Traction Company, Boise, Idaho, with the Public Utilities Commission of Idaho asking the commission to compel the company to file with the commission through-rate schedules which enable shippers on the company's lines to make interstate shipments without the necessity of reshipping, rebilling or transferring freight to the cars of the Oregon Short Line at points where the Oregon Short Line and the cars of the Boise Valley Traction Company connect.

New Rerouteing Plan in Toledo.—The special committee of the City Council of Toledo, Ohio, will shortly complete another rerouteing plan. The original plan was defeated through the influence of merchants on Summit Street, who objected to the removal of four lines from that thoroughfare. The new plan will call for the removal of three lines instead of four and the elimination of several stops on other lines. Members of the committee say their duty is to plan for the benefit of all the people instead of a few merchants or others who are not willing to be discommoded temporarily for the public good.

Derby Day Traffic Handled Expeditiously.—Eighteen thousand people were hauled each way from downtown sections to Churchill Downs, on Derby Day, the big spring racing event in Louisville, without an accident. In past years there has been serious delay in the downtown section on the Fourth Street line, which makes a loop on Main Street, next the river. This year traffic policemen coperated in favoring the north and south traffic on the big day. Wherever it was possible, special efforts were made to put the Fourth Street cars over the intersections ahead of east-bound and west-bound traffic.

Topeka Ordinance Keeps Jitneys Off Car Streets.—The City Commissioners of Topeka, Kan., adopted on May 22 an ordinance requiring license fees of $300 to $400 for jitneys operating on streets that bear street car tracks, except that jitneys may operate on the unpaved portions of such streets and may run on Kansas Avenue, the main street, an unusually wide thoroughfare. The law is not to go into effect until June 19. Meanwhile the jitney owners and drivers have formed an organization, are establishing routes and giving transfers in an effort to show the quality of service they can render and in the hope of securing a change in the ordinance. Three of the commissioners voted for the ordinance, two against it.

Jitney Bills in Massachusetts.—The bill of the Massachusetts Street Railway Association, which authorized street railways to use motor vehicles to supplement their service by street cars and for supervision by the Public Service Commission of common carriers by motor vehicles has been referred to the next legislative session. The bill authorizing the licensing by cities and towns of motor vehicles carrying passengers for hire was in a conference committee of the Senate and House recently for consideration of amendments. The bill caries a referendum for town voters and is dependent in cities for its acceptance by the City Council. It holds licensees strictly responsible, through the deposit of a bond or other security, for injuries or damages due to the negligence or unlawful acts of jitney drivers.

Hearing on Jitneys in Albany.—At the conclusion of the hearing before the Public Service Commission of the Second District of New York on the application of Chauncey L. Butler and George W. Gallien, Jr., for a certificate of public convenience and necessity for a motor bus route from the United Station to West Albany both of the interested parties were directed to file briefs. Commissioner James O. Carr, who presided at the hearing, suggested that the local business of the buses might be limited to a section to be specified. W. A. Glenn, for the petitioners, believed that there would be practical difficulties in the way of enforcing such an order. John A. McLean, attorney, and Charles F. Hewitt, general manager of the United Traction Company, insisted that without these limitations, the certificate should not be granted.

New Publication at Reading.—The Reading Transit & Light Company, Reading, Pa., is publishing *The Pretzel* for distribution among its patrons. The paper is 3¼ in. wide by 6 in. high. In the first issue the company said: "Do you enjoy a social chat as you ride? Of course you do. Then let us tell you a few of our joys and sorrows. Then you tell us some of yours. Sometimes we may be able to give you a little gossip, but if we do you mustn't tell. Of course we know you won't, 'cause nobody ever does. For a long time we have wanted to know you and have you know us. Once we get acquainted we are sure to enjoy a wonderful friendship and feel free to talk over many things of interest to both of us. You ride. Do you know what we are doing to make your ride comfortable, convenient and enjoyable? Do we know what you think we should do? Won't you tell us about things as you see them? We are open to suggestions."

Long Island Resumes Active Safety Campaign.—Diligent efforts are being made again this year by the Long Island Railroad to prevent motorists from committing suicide by running past signals at grade crossings. A pictorial campaign for the education of the public has been started, the first two posters of which have just been put up in cars and stations. This is an enlargement of the campaign started last year which resulted in a reduction of one-half in fatalities from the record of 1914, when twelve persons went to death on grade crossings. In addition to the posters, of which there will be four, prominently displayed wherever the public may see them, the railroad plans a newspaper campaign which will reach everyone who reads. The posters are done in five colors and are so graphic that anyone seeing them is immediately struck by the lesson they are meant to teach. There are two which are directly applicable to motorists and depict the most common causes of accidents. Many of the daily newspapers have aided in the campaign by reproducing the posters as illustrations in their news columns.

Personal Mention

Mr. W. E. **Boileau**, general manager of the Scranton (Pa.) Railway, has been elected president of the Rotarians at Scranton.

Mr. David S. **Ross** has resigned as assistant superintendent of the Cincinnati (Ohio) Traction Company to enter business for himself in Vancouver, B. C.

Mr. E. E. **Lillie** has been appointed superintendent of the Spokane & Inland Empire Railroad, with headquarters at Spokane, Wash., vice Mr. A. J. Davidson.

Mr. Walter M. **Brown**, superintendent of the Central Illinois Traction Company, Mattoon, Ill., has become identified with the Seattle, Renton & Southern Railway, Seattle, Wash.

Mr. F. W. **Whitridge**, president of the Third Avenue Railway, New York, N. Y., returned on May 21 on the American liner St. Louis after spending two months on his estate in Scotland.

Mr. H. L. **Mountney** has resigned as general manager of the Slate Belt Electric Street Railway, Pen Argyl, Pa. Mr. Joseph T. Hamilton, Wilmington, Del., will succeed Mr. Mountney on July 1.

Mr. Bion J. **Arnold**, Chicago, has been engaged by the Chamber of Commerce of Rochester, N. Y., to survey the needs of the city with respect to local transportation facilities and report to the Chamber.

Mr. N. **Wickersham**, superintendent of the Walnut Hills division of the Cincinnati (Ohio) Traction Company, has been appointed assistant superintendent of transportation, succeeding Mr. David S. Ross, resigned.

Mr. M. **White**, an inspector of the Cincinnati (Ohio) Traction Company, has been made assistant instructor in place of Mr. W. E. Weitzel, who has been promoted to the superintendency of the Walnut Hills division.

Mr. E. W. **Weitzel** has been appointed superintendent of the Walnut Hills division of the Cincinnati (Ohio) Traction Company, to succeed Mr. N. Wickersham, who becomes assistant superintendent of transportation. Mr. Weitzel was formerly assistant instructor.

Mr. E. W. **Ehrke** has been appointed a special car construction inspector of the Kansas City (Mo.) Railways by the Board of Control. Mr. Ehrke will supervise the construction of the fifty new cars recently purchased by this company from the St. Louis Car Company.

Mr. W. W. **Storey** has been appointed commercial agent of the Puget Sound Electric Railway at Puyallup, Wash., to succeed W. P. Ellingwood, who was killed recently in an automobile accident as noted in the ELECTRIC RAILWAY JOURNAL of May 27. Mr. Storey has been commercial agent of the company at Kent. He has been with the company about sixteen years.

Mr. A. N. **Dutton**, formerly vice-president and general manager of the West Virginia Traction & Electric Company, Wheeling, W. Va., who was compelled to resign from that position last fall on account of ill health at that time, has gone to Baltimore to undertake some transportation work for the Baltimore & Ohio Railroad, under Mr. J. R. Kearney, general superintendent of transportation.

Mr. C. O. **Jenks**, general manager of the United Railways, Oregon Electric Company and the North Bank Railroad, has been appointed general manager for the Great Northern Railway, with headquarters at St. Paul, Minn. He succeeds Mr. G. H. Emerson, who has been appointed a member of the railroad managers' committee to confer with trainmen on the eight-hour day controversy. Mr. Jenks' successor has not yet been selected.

Mr. Henry W. **Trumbower**, assistant professor of political economy at the University of Wisconsin, Madison, has been appointed a member of the Wisconsin Railroad Commission to succeed Mr. Halford Erickson, resigned. Mr. Trumbower was born in 1882 and is a graduate of Lehigh University. Later he took a special course in political economy at Princeton and at the University of Munich. His term of office began on June 1 and will end in February of next year.

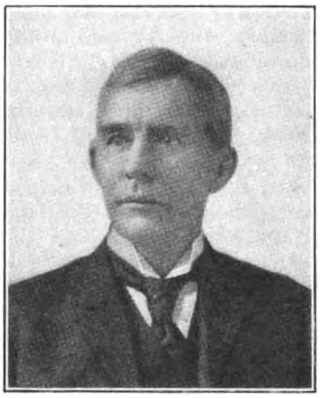
Mr. Frank R. **Fisher** has been appointed engineer in charge of subway construction under the City Hall by Mr. W. S. Twining, director of the department of transit of the city of Philadelphia. Mr. Fisher was in charge of the field work in the construction of the Market Street subway when Mr. Twining was chief engineer of that undertaking. Mr. Fisher is a graduate of Lehigh University, and has been engaged in engineering work in Philadelphia for many years.

Mr. F. W. **Brooks**, vice-president and general manager of the Detroit (Mich.) United Railway, was elected president of the company on May 31 to succeed Mr. J. C. Hutchins, who has become chairman of the board. Mr. Brooks will continue as general manager of the company. He has been connected with the Detroit United Railway system since 1895. A portrait and a biography of Mr. Brooks were published in the ELECTRIC RAILWAY JOURNAL for Jan. 22, 1916, in connection with his election as vice-president of the company.

Mr. Herbert H. **Vreeland**, director of welfare work and chairman of the welfare committee for the Interborough Rapid Transit Company, New York, N. Y., and the New York Railways, and formerly president of the Metropolitan Street Railway, New York, has been elected a director of the Vitagraph Company of America, one of the largest motion picture producers in the United States. Mr. Vreeland becomes an associate on the board of Mr. B. B. Hampton, vice-president of the American Tobacco Company, and Mr. G. J. Ryan, son of Mr. Thomas Fortune Ryan, who represent new capital in the enterprise.

Mr. R. A. **Moore**, who has been appointed general manager of the Aurora, Plainfield & Joliet Railway, Joliet, Ill., entered railway work with the Ledgerwood Electric Railway, Spokane, Wash., in 1902. He served two years as conductor and motorman, one year as lineman and electrician, and one year as superintendent, until the Ledgerwood Electric Railway was taken over by the Washington Water Power Company. Mr. Moore then entered the employ of the Northern Pacific Railroad, and worked in the train service for ten years. From the Northern Pacific, he went to work for the Peninsular Railway of California as conductor and motorman. After serving three and a half years in these capacities he was promoted to train dispatcher. He held that position for six months and was then advanced to equipment inspector and instructor of trainmen. A year later he was made first assistant to the superintendent of the Peninsular Railway and the San Jose Railroads. He continued in that capacity more than five years. Mr. Moore was recommended by Mr. F. E. Chapin, general manager of the Peninsular Railway and San Jose Railroads, and Mr. Paul Shoup, president of the Southern Pacific electric lines in California, for appointment to the Aurora, Plainfield & Joliet Railway.

Mr. John **Bauer** of the bureau of statistics and accounts of the Public Service Commission for the First District of New York, has been selected by Princeton University as the head of its new department in accounting, corporation finance and public utilities. Mr. Bauer is to enter upon his new duties in September, but will remain with the commission for most of the intervening time. Mr. Bauer joined the bureau on June 16, 1914, leaving Cornell University where he had charge of the department of accounting and elementary economics. He has acted in a consulting capacity in rate and capitalization cases, interpretation of the rapid transit contracts and general accounting. He was detailed by the commission to the bridge department to make a report upon the railway traffic on the Williamsburg Bridge, in a rental case in which that department was interested. He has in hand the preparation of a report to Commissioner Hervey on accounting methods under the dual contracts when in operation. While with the commission Mr. Bauer published a number of articles on accounting subjects in connection with matters pertaining to public utilities, one of which, "Relieving the Investor's Uncertainty," appeared in the ELECTRIC RAILWAY JOURNAL of March 11, 1916, page 491. Mr. Bauer received the degree of Doctor of Philosophy from Yale in 1908.



J. C. HUTCHINS

Mr. J. C. Hutchins resigned as president of the Detroit (Mich.) United Railway on May 31 and was elected chairman of the board of directors of the company. Mr. Hutchins has been connected with the Detroit United Railway and its subsidiaries since 1894. He was born in Carroll Parish, La., on Oct. 13, 1853. His boyhood was spent in Lexington, Mo., where he was educated in the public schools. After a course in civil engineering he commenced his railway career as construction engineer on the Missouri, Gulf & Lexington Railway, and for a number of years continued this work on various Missouri and Texas railroads. From 1876 to 1881 he was a reporter on the Waco *Examiner*. The following thirteen years he served on the engineering staff and in other capacities with the New Orleans & Pacific, Missouri, Kansas & Texas, Louisville, New Orleans & Texas, and the Illinois Central railroads. In 1894 he was elected secretary and treasurer of the Detroit Citizens' Street Railway, and when the Detroit United Railway was acquired he was elected to similar positions with that company. Later, upon the organization of the Detroit United Railway, he was made vice-president and general manager, and on Jan. 21, 1902, he was elected president of the company. Largely through his initiative and under his management the city lines and the interurban systems radiating from Detroit, comprising in all more than 800 miles of electric railway, were brought under one control. Mr. Hutchins is a past president of the American Electric Railway Association, having served as chief executive of that body in 1903 and 1904.

WILLIAM VON PHUL

Mr. William von Phul, who has been appointed to succeed Mr. Charles N. Black as vice-president and general manager of the United Railroads, San Francisco, Cal., was graduated from Tulane University in 1891 with the degree B. S., and two years later as mechanical engineer. He was subsequently employed as general superintendent of the Louisiana Electric Light Company and of the Edison Electric Company, New Orleans, until 1902, when he became associated with Sargent & Lundy, engineers of Chicago. He represented that firm as engineer in charge of construction for the Cincinnati Gas & Electric Company, later becoming general superintendent of that company until 1905, when he was employed by Ford, Bacon & Davis. Since 1907 Mr. von Phul assisted in the firm's engineering and operation of the street railway and lighting companies in a number of large Southern cities comprised in the American Cities Company, including the Birmingham Railway, Light & Power Company, Memphis Street Railway, Nashville Railway & Light Company, Little Rock Railway & Electric Company, Houston Lighting & Power Company, and later the New Orleans Railway & Light Company. In 1912 he became a member of the firm of Ford, Bacon & Davis. Mr. von Phul is a member of the American Society of Mechanical Engineers, the American Society of Civil Engineers and the Louisiana Engineering Society, and is responsible for a number of important inventions which have made possible the construction, at greatly reduced cost, of the large cotton warehouse terminal which Ford, Bacon & Davis designed and are now constructing at New Orleans for the Board of Port Commissioners of the State of Louisiana. A farewell dinner was tendered to Mr. Black a few days ago at which the heads of departments of the United Railroads were present. Mr. Black delivered a farewell address and Mr. von Phul was introduced as his successor. Mr. von Phul asked for the same co-operation that Mr. Black had received and promised in return the same consideration of common interests. President Jesse W. Lilienthal and all the other local officials of the company were present.

OBITUARY

Edward J. Davis, auditor of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., died suddenly in his room at the Claypool Hotel, Indianapolis, on May 24. At the time of his death he was in Indianapolis to testify in a rate hearing before the Public Service Commission. Mr. Davis was forty-eight years of age. He had been employed by the company for more than twenty years, and had served as auditor for the last sixteen years. He entered the service of the company as a conductor. He is survived by a widow and three children.

Maj. N. C. Pilcher, general manager of the Sherbrooke Railway & Power Company, Sherbrooke, Que., who went to the front in July, 1915, with the Fifth Mounted Rifles, as noted in the ELECTRIC RAILWAY JOURNAL of Aug. 7, 1915, is reported killed in action on May 19. Major Pilcher applied for service in the first contingent, but owing to his wife's ill-health he decided to await the leaving of the second contingent. Joining a unit of mounted rifles, with the rank of captain, he was promoted major at Valcartier, went to England and thence to France. Major Pilcher was born in England thirty-six years ago, but had been a Canadian citizen for twenty-four years. At the time of the Boer war he enlisted in the Canadian contingent from Toronto, being then employed with the Canadian General Electric Company. On returning to Canada he was for a time manager of the Port Arthur & Fort William Electric Railway, going thence to take the post in Sherbrooke, which he held until leaving for the front. Major Pilcher is survived by his widow and a young son.

MR. DOHERTY IN TOLEDO

Henry L. Doherty is in Toledo, Ohio, working with the sub-committee of Mayor Milroy's street railway commission on a plan of settlement that will allow local citizens or the municipality to take over the railway property of the Toledo Railways & Light Company, as outlined in the ELECTRIC RAILWAY JOURNAL some time ago. N. D. Cochran of the Toledo *News-Bee* and N. C. Wright of the Toledo *Blade*, both members of this committee, will be absent from the city, attending conventions, for the next three weeks, but President Johnson Thurston and Secretary E. P. Usher, together with Judge Ralph Emery, the commission's counsel, will meet with Mr. Doherty and proceed with the work in the hope that it will be in shape for a full report to the commission as a whole on the return of Messrs. Cochran and Wright. At a conference on May 29 Mr. Doherty said that he had taken up the matter of improvement of East Broadway and that the company had concluded to pay its share within five years, although the original arrangement had been for a ten-year period. He also explained that the fund now being accumulated in the hands of the Federal Court for improvements amounted to about $12,000 a month. During the next year, he explained, about $44,000 of this will be devoted to improvements and the other $100,000 will be retained to pay for the proposed paving. The expenditures for improvements between Nov. 1, 1915, and April 30, 1916, were shown to be $46,261.

At a recent meeting of the London County Council, the chairman of the finance committee said it was expected that there would be a loss of about £74,000 on the tramways undertaking in the last financial year. Some satisfaction might be derived, however, from the fact that the results of the year just closed were likely to show an improvement upon the original estimate. The strike in May, 1915, occasioned a loss of £100,000. If it had not been for the strike there would have been no loss during the last financial year.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Red Lake Northern Railway & Construction Company, Bemidji, Minn.**—Incorporated in Minnesota to build, maintain and operate railways with steam, electric or gasoline power from Alida, Minn., in a northerly direction past the west end of Red Lake to the Canadian boundary at or near Lake of the Woods and from Alida south past the Itasca State Park to the Twin Cities. Capital stock, $150,000. Incorporators: Jens J. Opsahl, Leo J. Opsahl, John Moberg, George H. French and A. M. Bagley, all of Bemidji, Minn.

FRANCHISES

Riverside, Cal.—The Riverside, Rialto & Pacific Railroad has filed an application with the Railroad Commission of California for authority to construct a switch or spur to connect its line with the Riverside-San Bernardino line of the Pacific Electric Railway, under a franchise granted by the Council of Riverside.

Santa Monica, Cal.—The Pacific Electric Railway has asked the Council for permission to remove its tracks from Ocean Avenue.

Eldora, Iowa.—The Iowa Railway & Light Company has asked the Council for a franchise in Eldora.

Nashville, Tenn.—The Nashville Railway & Light Company has asked the Board of Commissioners for an extension of its franchise to enable it to use certain tracks of the Nashville Traction Company. The board was asked to grant rights-of-way on Fourth Avenue from Broadway to the Sparkman Street bridge, across the bridge and on Shelby Avenue to Eleventh Street, on Fifth Avenue from Broadway to Mulberry Street, on Mulberry Street from Sixth to Third Avenue, through private property to Second Avenue, on Second Avenue to Lafayette Street or the Murfreesboro Road and on the Murfreesboro Road to the corporation line.

TRACK AND ROADWAY

Fort Smith Light & Traction Company, Fort Smith, Ark.—It is reported that plans are being considered by this company for the construction of an extension of its line in Van Buren to the Rea Addition, thence east along Alma Road to Arkebaur Lane.

Municipal Railway of San Francisco, San Francisco, Cal.—The passage of a bill calling for the preparation of plans and specifications for the construction of tracks of the Municipal Railway through the Twin Peaks Tunnel from Seventeenth and Market Streets to the junction of the Junipero Serra and Sloat Boulevards was practically assured when the Supervisors of San Francisco approved the printing of the measure on May 22. The bill authorizes the Board of Public Works to purchase material and enter into a contract for construction. The estimated cost is $275,000. An amendment was later added to the bill authorizing the preparation of plans for a continuation of the road from Sloat Boulevard to the beach via Taraval Street.

Columbus (Ga.) Railroad.—This company will reconstruct its double-track line on Broad Street from Twelfth to Fifteenth Streets.

***Blackfoot, Idaho.**—Plans are being considered for the construction of an electric railway from Pocatello to Idaho Falls, via Blackfoot, about 50 miles. Charles E. Harris, receiver of the United States Land Office, may give further information.

Metropolitan West Side Elevated Railway, Chicago, Ill.—It is reported that this company contemplates the extension of its Douglas Park branch to Berwyn.

People's Traction Company, Galesburg, Ill.—This company is leveling its tracks and making other improvements to its line on South Prairie Street, Galesburg, between Simmons and Tompkins Streets.

Gary & Interurban Railroad, Gary, Ind.—Plans are being considered by this company for the rehabilitation of its lines to Gary and the construction of a new line on Buchanan Street, Gary. It is expected that the cost will be about $300,000.

Des Moines (Iowa) City Railway.—This company will completely rehabilitate 3 miles of track in the business district of Des Moines this year. This reconstruction includes twenty special-work layouts varying in design from a simple turnout to a partial grand union. Solid manganese steel tongue switches and renewable manganese steel insert mates and frogs will be used throughout the special-work installations, and 7-in., 114-lb. girder-guard and 7-in., 93-lb. girder-grooved rail laid on 6-in. x 8-in. x 7-ft. white oak ties on a 6-in. concrete foundation will be used in the track structure. The work will be done by the North American Construction Company, Chicago, Ill. It is planned to rebuild between 5 and 6 miles of track in the outlying district, where 7-in., 80-lb. plain girder rail laid on 6-in. x 8-in. x 7-ft. white oak ties on 6-in. rolled crushed-stone ballast will be used. All track will be laid with continuous joints fitted with heat-treated bolts. The joints will be bonded with Electric Railway Improvement Company's bonds.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Operation has been begun on this company's extension from Bonner Springs to Lawrence.

Arkansas Valley Interurban Railway, Wichita, Kan.—This company contemplates the construction of a reinforced concrete bridge over Sand Creek.

Louisville (Ky.) Railway.—Operation has been begun on this company's Chestnut Street extension to Shawnee Park, via Twenty-seventh and Madison Streets, construction of which was begun last summer.

Newport & Alexandria Interurban Railroad, Newport, Ky.—Negotiations have been completed whereby the Newport & Alexandria Interurban Railroad will use the tracks of the Fort Thomas line of the Cincinnati, Newport & Covington Railroad as far as West Grand Avenue, where it will continue to Ross' Corner, through Fort Thomas over the Fort Thomas car line tracks to the Alexandria Pike at a point beyond St. Stephens Cemetery. Work of surveying and making the new roadbed will be begun at once. Capt. Gottleib Hartweg, Cincinnati, is interested. [May 6, '16.]

Orleans-Kenner Electric Railway, New Orleans, La.—Surveys have been begun by this company for a 6-mile extension from Hanson City to Rost. A movement is on foot to submit to the voters of the Third Ward in St. Charles parish a proposal to levy a 5-mill tax as a bonus to the Orleans-Kenner Electric Railway and provide also for the donation of all the needed rights-of-way. It is estimated that the cost of the proposed extension will be about $100,000.

Kansas City (Mo.) Railways.—This company, which is reconstructing its single track on Eighteenth Street from Main to Woodland Streets, Kansas City, Mo., is laying the track north of the center of the widened street and will lay another track next year, the roadbed being prepared previous to the paving of the street. The company has also been asked by the city of Kansas City, Kan., to lay double track on Eighteenth Street from Central to Kansas Streets, Kansas City, Kan., and this improvement will be completed by Sept. 1.

Southwest Missouri Railroad, Webb City, Mo.—Work will be begun at once by this company on the construction of new track and roadbed on Main Street, Chicago.

Great Falls (Mont.) Street Railway.—Work of establishing the grade for this company's extension down Fourth Avenue from Thirty-sixth Street to be made by the Montana Power Company, has been begun. It is reported practically all track material for the extension is on the ground, and the construction crews will be laying the track early in the summer.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—Extensive improvements are contemplated by the Omaha &

Council Bluffs Street Railway, involving an expenditure of about $250,000. Extensions to several of its lines are being planned.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—This company will begin work on June 16 rebuilding its double-track system for a distance of 3400 ft. on West State Street.

International Railway, Buffalo, N. Y.—Work is progressing rapidly on the new fast line being constructed by the International Railway between Buffalo and Niagara Falls, via North Tonawanda. Ground is being leveled and rails are being laid at the Buffalo end of the route and steel overhead towers to carry the wires are being erected near a point where the line enters Tonawanda from the south. These towers have concrete bases. Contractors are leveling the big hill in the north end of North Tonawanda which has been bought by the company to be used for making fills at several points along the right-of-way.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has approved the contract to be made between the Interborough Rapid Transit Company and Snare & Triest Company, New York, for the work of connecting up the Second Avenue elevated line in Manhattan with the new elevated lines in Queens to Astoria and Corona. The contract amounts to $55,760.

New York (N. Y.) Municipal Railway.—The Public Service Commission for the First District of New York has awarded the contract to MacArthur Brothers Company, New York, for the construction of Section 5 of Route No. 8, the Fourteenth Street-Eastern District subway.

Cleveland, Ohio.—Street Railway Commissioner Sanders of Cleveland is planning a number of rapid transit lines to relieve the congested condition of the local lines. One of these would start at Lindale, south of the city, and follow the Big Four Railroad right-of-way to Walworth run at West Sixty-fifth Street and follow this run to Fulton Road. The other would start at Lake Avenue and West 117th Street, skirt Edgwater Park, follow Bulkley Boulevard to West Twenty-fifth Street and cross the new high-level bridge to Superior Avenue. Mr. Sanders said the same or similar provisions should be made for the East Side, although the Cleveland & Youngstown line will provide rapid transit to a portion of the city and the hills to the southeast. The Cleveland Railway has the right to the use of its tracks between East Thirty-fourth Street and the Public Square.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—Plans are being considered for the relocation of this company's line to the center of North High Street from the north corporation line of Columbus to the Delaware County line.

Portsmouth Street Railroad & Light Company, Portsmouth, Ohio.—The Ohio Valley Traction Company, a subsidiary of the Portsmouth Street Railroad & Light Company, has placed in operation its extension between Portsmouth and Wheelersburg. It is proposed to extend the line to Ironton.

Lehigh Valley Transit Company, Allentown, Pa.—Harrison R. Fehr, president of the Lehigh Valley Transit Company, announced May 26 that his company plans to expend $1,000,000 a year during the next five years for the improvement of the system. The most expensive item will be the double-tracking of the Philadelphia division from Allentown to Sixty-ninth and Market Streets. It is also planned to build a line between Bethlehem, Pa., and Coopersburg or Quakertown, Pa., for a fast hourly express between Philadelphia and Easton.

Chester (Pa.) Street Railway.—The Public Service Commission of Pennsylvania has approved the application of the Chester Street Railway for an extension to its turnout on Edgemont Avenue and the construction of three carhouse branch-offs, also the construction of connections at Seventh and Potter Streets, Chester.

Monongahela Valley Traction Company, Fairmont, W. Va.—A contract has been awarded by the Monongahela Valley Traction Company to Keely Brothers, Clarksburg, for the construction of an extension of its line beginning at the west end addition near Clarksburg, extending down Limestone Creek for a distance of about 1800 ft. to the junction with the Fairmont and Clarksburg interurban line. The new line will cost about $18,000.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—Work will be begun at once by this company on the construction of a new carhouse at Watts.

Waterbury & Milldale Tramway Company, Waterbury, Conn.—This company will construct a new carhouse at the corner of Meriden and Frost Roads, Waterbury. The building will be 150 ft. x 35 ft., and will be of modern construction. A workshop will also be provided for repairs and maintenance of the company's rolling stock.

Iowa Railway & Light Company, Cedar Rapids, Iowa.—Plans have been made by this company for the construction of a 40-ft. extension of its general repair shop building and the rearrangement of the interior of the erection shop.

Alexandria (La.) Municipal Railway.—Work will soon be begun by the Alexandria Municipal Railway on the construction of a new carhouse at Tenth and Lee Streets. The building will be 53 ft. x 108 ft., and will be of brick construction.

Detroit (Mich.) United Railway.—Work has been begun by this company on the construction of a new office building at Dix and Livernois Avenue, to serve as the office for the Baker carhouse.

Interborough Rapid Transit Company, New York, N. Y.—Bids for the construction of station finish on Sections Nos. 7 to 11, inclusive, of Route No. 5, the Lexington Avenue subway in Manhattan, were opened by the Public Service Commission for the First District of New York during the past week. This part of the line extends from Forty-third to 106th Street, and stations are located at Fifty-first Street, Fifty-ninth Street, Sixty-eighth Street, Seventy-seventh Street, Eighty-sixth Street, Ninety-sixth Street and 103rd Street. The contractor must complete the work within six months from the delivery of the contract. The lowest bidder on this work was John B. Roberts, New York, at about $266,000.

Ardmore (Okla.) Railway.—It is reported that this company will construct a new carhouse in Ardmore.

Monongahela Valley Traction Company, Fairmont, W. Va.—Work will be begun by this company on June 15 on the construction of a new interurban station at Clarksburg. The building will be 80 ft. x 80 ft., three stories, and will be of reinforced concrete and brick with composition roof. The cost is estimated at $65,000.

POWER HOUSES AND SUBSTATIONS

Connecticut Company, New Haven, Conn.—The J. G. White Engineering Corporation states that work will begin at once on the first section of the addition to the Connecticut Company's power plant in New Haven. The plant, as stated in last week's issue of the ELECTRIC RAILWAY JOURNAL, will have an ultimate capacity of 100,000 kw. The present addition will have a capacity of from 10,000 to 20,000 kw.

Fishkill Electric Railway, Beacon, N. Y.—A report from this company states that it has placed an order with the Westinghouse Electric & Manufacturing Company for a new rotary to be erected in its power house at Beacon in July. The a.c. side of the new machine is two-phase, 2300 volts, 60 cycles; the d.c. side is 600 volts, 500 kw.

Northern Ohio Traction & Light Company, Akron, Ohio.—Work will soon be begun by this company on the construction of a new substation to be located in the vicinity of Brittain, just beyond East Akron. This will be both a power and light distributing station and will cost about $70,000.

Rhode Island Company, Providence, R. I.—The board of trustees of the Rhode Island Company recently voted to appropriate $45,000 to build and equip a substation in Burrillville on the Pascoag-Woonsocket line and also a similar sum to build a substation in the Harmony section of Smithfield for the Providence-Chepachet line.

Manufactures and Supplies

SPECIAL WORK GIRDER RAIL MARKET SLUGGISH

Except for a few special companies contemplating the rerouteing of cars, special work purchases, insofar as the electric railway industry is concerned, have been few in number, although in some instances large in quantity. On the other hand, the manufacturers, owing to the increased cost of all materials including steel and ferromanganese, have been forced to increase their prices. It is also understood that the prices for plain and grooved-girder rail sections, largely used for track in paved streets, will be advanced in the same proportion as were those for standard sections. The small quantity of special work being purchased at the present time is attributed, first, to the fact that the track is the first to feel the effect of a retrenchment policy and the last to receive the benefit of prosperity, and second, because prices have advanced and deliveries are slow. During the business depression which began in 1913, many railways resorted to the welders as a means of carrying special work over the regular period of renewals. This is also true of air and to some extent joints. Superimposed upon this situation was that of the lack of track extensions, a condition which in many localities is just beginning to become normal.

Steam railroad companies have purchased largely for their requirements throughout this year and during the first part of next year. Some electric railway companies also have placed orders for their present requirements and for the first four months of 1917. Under the prevailing rushed conditions at the mills, it will probably be difficult to secure prompt deliveries of girder rails in any quantity before the last quarter of this year, and then only in limited tonnages. Moreover, small orders for the plain and grooved-girder rail sections are being delayed more than in the past, because the tonnage for these sections is accumulating slowly, and it is necessary for the mills to withhold rolling until a sufficient tonnage has been ordered to warrant changing the rolls. Occasionally small orders for certain sections may be filled within a few days, and at other times an interval of several months may elapse before a sufficient number of orders for the particular section have been received at the mill. This delay, of course, could be materially decreased and the electric railways could secure more prompt shipments, if the number of sections was reduced and real steps were taken toward standardization.

ROLLING STOCK

Albany (Ga.) Transit Company has purchased a single truck pay-as-you-enter all-steel one-man car for delivery about Sept. 1.

Havana Central Railroad, Havana, Cuba, will purchase five motor coaches and one trolley car, in addition to steam equipment.

Cumberland County Power & Light Company, Portland, Me., is in the market for four 36-ft. semi-convertible single-truck pay-as-you-enter passenger cars equipped with Brill Radiax trucks.

Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, Cincinnati, Ohio, will lease or purchase five cars to replace those lost in a fire at the North Bend carhouses, as noted in the ELECTRIC RAILWAY JOURNAL of May 27.

Lakeside & Marblehead Railroad, Marblehead, Ohio, has purchased from the McKeen Motor Car Company a 200-hp., 55-ft., steel gasoline motor car with which it will replace its steam locomotive train passenger service between Lakeside and Marblehead.

Monongahela Valley Traction Company, Fairmont, W. Va., noted in the ELECTRIC RAILWAY JOURNAL of April 29 as having ordered eight cars from The J. G. Brill Company, which are to be of the closed prepayment type and delivered by Aug. 1, has specified the following details for this equipment:

Seating capacity	28
Length of body	20 ft. 0 in.
Length over vestibule	29 ft. 5 in.
Width over sills	7 ft. 6 in.
Width over all	7 ft. 9 in.
Height, rail to sills	2 ft. 7¼ in.
Height, sill to trolley base	8 ft. 9¼ in.
Body	Semi-steel
Interior trim	Cherry
Headlining	Birch veneer
Roof	Plain arch
Underframe	Metal
Bumpers	Brill
Cables	West.
Car trimmings,	Brill polished bronze
Control	West. K.
Couplers	Brill-Hovey draw bars
Curtain fixtures,	Curtain Supply No. 88
Curtain material	Pantasote
Destination signs	Keystone
Door-operating mechanism	Brill
Fare boxes	International
Gears and pinions	West.
Gongs	Brill
Hand brakes	Brill handle Peacock type A brake
Heaters	Peter Smith electric
Headlights	G. E. Incandescent
Journal boxes	Brill
Motors	West. 323 V, inside hung
Paint	Chas. Moser Co.
Registers	International
Sanders	Brill Dumpit
Sash fixtures	Brill
Seats	Longitudinal
Seating material	Cane
Springs	Brill
Step treads	Mason Safety Tread
Trolley base	U. S. No. 14
Trucks	Brill 21 E
Varnish	Murphy Varnish Co.
Ventilators	Brill
Window fixtures,	Brill—renitent post construction

TRADE NOTES

Valley Steel Company, East St. Louis, Ill., has been incorporated for $250,000 and will specialize in heat treated axles.

Westinghouse Lamp Company, New York, N. Y., announces the removal of its executive offices on June 1 to the City Investing Building, 165 Broadway.

J. Ed. Erickson has joined the sales organization of the Packard Electric Company, Warren, Ohio, and will cover the territory formerly in charge of Benjamin Smith, who has retired.

M. J. Fox, formerly assistant signal engineer Chicago, Burlington & Quincy Railroad, has become connected with the signal department of the Railroad Supply Company, Chicago, Ill.

C. T. Anderson, who has been in charge of the sale of rail bonds and third-rail insulators for the Ohio Brass Company, Mansfield, Ohio, has resigned to become vice-president and sales manager of the Hartman Electrical Manufacturing Company, Mansfield, Ohio, manufacturer of rail bonds and electrical specialties.

Oscar F. Ostby, general sales agent of the Commercial Acetylene Railway, Light & Signal Company, New York, has resigned from that position, effective June 1. Mr. Ostby is president of the Railway Supply Manufacturers' Association, and has been active in its affairs and those of the International Acetylene Association for many years.

Arthur D. Little, Inc., Boston, Mass., announces that a Dominion Charter has been granted to Arthur D. Little, Ltd., a corporation organized and equipped for the service of Canadian industry and the study and development of Canadian resources. The special facilities of the new corporation will be supplemented by the entire staff organization and equipment of the Boston firm.

Railway Improvement Company, New York, N. Y., has received an order for 153 Rico coasting recorders from the Stone & Webster Engineering Corporation. Of this number 143 were ordered to equip the lines of the Houston (Texas) Electric Company and ten for the Northern Texas Traction Company, Fort Worth, Texas, where the Rico coasting recorder has been used for several years past.

Stanley H. Rose, until recently in charge of the New York office of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, has been engaged by the Barber Asphalt Paving Company to direct its foreign trade department. The Barber Company's export trade in paving materials, roofing and other asphaltic products will hereafter be in Mr. Rose's charge, with headquarters in Philadelphia and New York.

Smith-Ward Brake Company, New York, N. Y., has received orders to equip with brake adjusters the following cars: People's Railway, Dayton, Ohio, ten cars; Altoona & Logan Valley Electric Railway, Altoona, Pa., five cars; Harrisburg (Pa.) Railways, three cars; Buffalo & Lake Erie Traction Company, Buffalo, N. Y., fifteen cars; Connecticut Company, New Haven, Conn., forty-eight cars; Puget Sound Traction, Light & Power Company, Seattle, Wash., ten cars; Worcester (Mass.) Consolidated Railway, ten cars, and ten additional cars for the Rhode Island Company, Providence, R. I. This company did not receive orders from the Mahoning & Shenango Railway & Light

Company, Youngstown, Ohio, and the Scranton (Pa.) Railway, as noted in the ELECTRIC RAILWAY JOURNAL of May 27.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has recently placed on the market a new grade of insulating transformer oil called "Lectroseal." This oil has its chief application as an insulating and cooling medium for use with all classes of oil-insulated distributing and power transformers. It is also used with such apparatus as induction-type feeder regulators and electrolytic lightning arresters. "Lectroseal" is a pure mineral oil obtained by the fractional distillation of petroleum and is free from moisture, acid, alkali and sulphur compounds. It has a high dielectric strength as an insulating medium. The average test is said to be 40,000 volts on a 0.15-in. gap between spheres ½ in. in diameter. It is claimed to be particularly well adapted as a cooling medium, the viscosity being approximately 36 and 40 deg. Saybolt method. If water should accidentally enter a transformer tank it should sink to the bottom of the tank as quickly as possible, as a small percentage of water thoroughly mixed with the air reduces its dielectric strength very rapidly. Various grades of oil differ greatly as to their ability to separate from water with which they have been mechanically mixed, but "Lectroseal" oil, it is claimed, possesses this quality in a marked degree. The other characteristics claimed for this oil are freedom from deposits, satisfactory flash and fire points, low rate of evaporation and light color.

ADVERTISING LITERATURE

Western Electric Company, New York, N. Y., has issued an illustrated catalog on its inter-phones and accessories.

William B. Scaife & Sons Company, Pittsburgh, Pa., has issued a booklet describing and illustrating its copper-brazed high-pressure tanks for air, gas and liquids.

Trussed Concrete Steel Company, Youngstown, Ohio, has issued a booklet on Kahn pressed-steel construction which describes and illustrates the use of Kahn pressed steel joists and studs with Hy-Rib, for floors, roofs, walls and partitions.

American Carbon & Battery Company, East St. Louis, Ill., has issued Catalog 20 on its carbon, graphite and metal graphite motor and generator brushes. A summary of the physical and electrical characteristics of these brushes and prices of all grades are given.

Protective Signal Manufacturing Company, Denver, Col., has issued Bulletin No. 4, which gives the details of its Model "C" oscillator and describes its construction and operation. This company has also issued Bulletin No. 5, which describes and illustrates its a.c. and d.c. relays.

E. I. du Pont de Nemours & Company, Wilmington, Del., has issued a book bound in du Pont Fabrikoid entitled "Du Pont Products." This book contains data on explosives, blasting supplies, Fabrikoids, chemicals and pyralin. A complete list of their products and the industries that use them is also given.

Sprague Electric Works of General Electric Company, New York, N. Y., have issued Bulletin No. 48,907 describing and illustrating their 500-lb. electric hoists, type I-5. Bulletin No. 49,600 has also been issued, describing and illustrating flexible steel armored conductors, flexible steel conduits and stamped steel boxes, fittings, and tools.

Electric Service Supplies Company, Philadelphia, Pa., has just issued a 400-page catalog on mining and industrial electrical supplies. This book lists and illustrates a complete line of equipment for electric haulage in power, mining and large industrial plants, as well as a very complete line of miscellaneous electrical supplies for such concerns.

Ohmer Fare Register Company, Dayton, Ohio, has issued an illustrated pamphlet entitled "Ohmer Register Equipments for One-Man Operation," which describes the adaptability of Ohmer fare registers and operating equipments for either one or two man operation. Ohmer registers are now in use on one-man cars of the Wausau (Wis.) Street Railway, Menominee & Marinette Light & Traction Company, Menominee, Mich., and the Southern Public Utilities Company, Charlotte, N. C.

Indianapolis Switch & Frog Company, Springfield, Ohio, has issued a pamphlet entitled "Conservation of Track and Roadway, or The Prevention and Cure of Track Disease." This booklet reprints the paper entitled "Track Joining and Bonding," presented by E. C. Price, vice-president and secretary of the Indianapolis Switch & Frog Company, at the 1915 summer outing meeting of the Central Electric Railway Association. It also contains instructions regarding the use of the Indianapolis electric arc welder, and the application and tests of this company's "Simplex" and "Apex" joints.

Tubular Woven Fabric Company, Pawtucket, R. I., has published a binder of wiring diagrams and conduit specifications showing the possibilities of "Duraduct" for car wiring. A particular feature is the comparison of the weight of Duraduct and ordinary conduit for each lay-out illustrated. The sheets of this binder are reproductions of advertisements originally published in the ELECTRIC RAILWAY JOURNAL. Taken together, they form the most extensive series of wiring lay-outs ever gotten together on different types of city, interurban and rapid transit cars. Several hundred electric railways are now using Duraduct both for car and miscellaneous wiring. One of its latest applications has been to the new one-man cars of the Stone & Webster Management Corporation.

Crane Company, Chicago, Ill., prints in the May issue of the "Valve World" a table showing the development in the process of rail manufacturing according to materials used. It is shown that wrought iron was the company's first material for rails, but, being very soft, it did not give long service. By the year 1880, Bessemer steel constituted the chief material for rails owing to the greater wearing qualities embodied in the more general uniformity, strength and hardness of steel. During recent years rails were made of greater and greater strength and hardness to keep pace with the rapidly increasing weight, speed and frequency of railroad trains, steel being susceptible to much modification of properties. In 1912 another important transition took place in rail materials, the chief material having become at that time open-hearth steel instead of Bessemer steel.

NEW PUBLICATION

Sound Investing. By Paul Clay. Moody's Magazine & Book Company, New York, N. Y. 371 pages. Limp leather, $2 postpaid.

Too many books that purport to give to the average man clear information on the subject of investment principles, fall short of their aim because they are not written by men with a knowledge of the field broad enough to cover all topics in which this and that reader may be interested; because the point of view of the bond seller is kept in mind instead of that of the bond buyer, or because in general the treatment is too technical. Mr. Clay's book, however, has avoided these faults, and as a result it is one which should be in the library of every man who desires to know for himself the fundamentals of investment. Primarily the book is intended for reference, the idea being in the main that a person considering an investment should first read the chapter on investments suitable for people like himself, and then the chapters on the classes of securities in which Mr. Clay advises him to invest. We would go further than this, however, and urge every reader to peruse the whole book carefully and then study the parts dealing with his own case. We suggest this method because we believe that the book contains a wealth of information with which every investor should be generally acquainted.

The plan of the book is first to give general but necessary information as to how to invest money; second, to present broad and comprehensive descriptions of each important class of securities; third, to name the types of securities best adapted to each particular class of persons, and fourth, to answer the practical, every-day questions of how and where to find the desired security, how to select an investment house and how to ascertain the yields of securities. One may well venture the opinion that a great deal of money could have been saved to investors in the last two years if such a book as Mr. Clay's had been studied. It will, of course, not make a wise investor out of a person incapable of good judgment, but it will do much toward developing thinking men and women along lines where in many cases instruction is sorely needed.

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PUTTING PERSONALITY INTO THE CORPORATION The old saying that corporations have no souls has been used many times to characterize their alleged heartlessness. It has not been as often understood to constitute a handicap to them, but there is no doubt that a corporation suffers a disadvantage, and a serious one, in business, even if it is only founded on sentiment, as compared with an individual, because it has no personality. This lack it is the duty of the management to supply as far as can be through utilizing the individuality of the officers. Of two electric railways which are giving good service, that one will enjoy the greatest public favor in which the personality of the management enters. Such a situation often occurs in the case of run-down properties which have been taken over by new managers and successfully rejuvenated. Here the public can give credit where credit is due, and it usually does so. But with the older and long-established company the task is a little more difficult though none the less important. So long as the patrons of a railway look upon it merely as a transportation-producing machine, with no personality behind it, a friendly attitude is impossible. One cannot be friendly with a machine. On the other hand, if the service appears to be the expression of a real desire to serve them, the case is radically different. It is perfectly natural, therefore, that the popular electric railways should, as a rule, be those which make an effort to develop this individuality or personality through their leading executive officers.

TRAFFIC INTERCHANGE WITH STEAM ROADS One source of freight revenue which certainly has not been developed to the limit of its possibilities is that of interchange traffic with steam roads. The equipment and methods of operation used on electric roads have largely been developed with the fundamental idea of handling a "gathering and distributing" type of traffic. On the other hand, steam road methods are well adapted to long-haul service. It would seem logical, therefore, that effective co-operation between steam and electric roads would work out for the benefit of all concerned. That some companies are doing this is shown by several articles on electric freight traffic in recent issues of this paper. In all of these cases the functions of the two classes of roads are markedly distinct, so that each benefits by the interchange traffic arrangement, which extends the zone of influence of each and tends to stimulate traffic on both. We believe that even paralleling steam and electric roads would find such arrangements profitable, because they necessarily do not reach exactly the same territory or have the same facilities for all kinds of freight. If such roads would forget their passenger traffic animosities long enough to work out a business-like scheme of co-operation in the handling of freight, we feel that the results would be much more satisfactory to both themselves and the public at large than those usually obtained.

OVERHEAD CRANES VERSUS DROP PITS In the present formative stage in electric locomotive design a decided advantage would be gained for the future if the repair-shop buildings constructed in the near future could be planned along lines that would prevent them from being made obsolete by changes in practice during the next few years. The main reason standing in the way of this possibility is that electric locomotive repair shops at present display no definite tendency either toward the "overhead" type, with traveling cranes to handle heavy parts, or toward the drop-pit type, where the heavy work is all done from below the engine. The latter type of shop is unquestionably the least expensive to construct, since the framework may be of the lightest construction or, at most, of sufficient strength to support a very light crane. Its high efficiency is exemplified by the Harmon shops of the New York Central Railroad, for years noted for the low cost and excellence of the work that they have turned out. With the drop-pit type of shop, however, there is a weak point in that it is not suitable for all types of locomotives in use even to-day, the Pennsylvania type of engine, for example, requiring a crane of considerable capacity for the removal of its main motors. On the other hand, with overhead cranes of sufficient size, any type of locomotive, apparently, can be successfully dismantled or assembled, and for this reason the overhead type of shop seems to have a decided advantage in view of the fact there is no telling what the morrow will bring forth in locomotive design.

THE PIONEER ELECTRIFICATION Until the titanic electric units of the past year or two revolutionized conceptions of electrification, the history of heavy electric traction might well be said to have been exemplified in its entirety by the pioneer installation at Baltimore. When this electrification began operation, twenty-one years ago, it was characterized by an overhead contact system in which the necessity for large contact area for low-voltage current was recognized. But this method of operation did not provide for a number of conditions, such as the exaggeration of sidewise movements of the collector that were inseparable from such a plan, and its subsequent abandonment and the substitution of a third-rail came as a forerunner to the several contact systems of the latter type that have been installed in this country. In the same way the earliest locomotives to be used were built in two four-wheel sections with gearless motors, and, although they are entitled to an important place in the development of the art, their costliness and hard-riding qualities prevented their perpetuation. The rigid wheelbase locomotives which followed them were typical of the influence that appeared so strongly in steam locomotive design some twelve or fourteen years ago, and these, in turn, were improved upon by engines with the articulated trucks that characterize all designs of the present day. Even from the standpoint of power supply, the installation has changed from the use of a small isolated power station —necessary in the days when electricity was a novelty—to the purchase of energy from the large, economical station of a local power company, so that in the parallelism of the B. & O. installation to the tendencies prominent in the general development of heavy electric traction, almost the only missing feature is a return to an overhead conductor with high voltage.

COUPLED DRIVERS FOR ELECTRIC LOCOMOTIVES There is food for thought in the article by F. H. Shepard on locomotive drives which appears elsewhere in this issue. Among the various comments which he advances in explanation of the complication that appears in some of the most recent locomotive designs, the most interesting one, perhaps, is that on the weight-shifting effect of drawbar pull. The phenomenon is simple, and it has been recognized for years on steam railroads, as it is well known that the old "American" type of steam locomotive, which has a four-wheeled leading truck and two pairs of drivers at the rear, is capable of pulling an appreciably greater load when running forward than when running backward. The reason is that, for forward motion, the drawbar pull, which is exerted at a height of nearly 3 ft. above the rail, establishes a couple that tends to tip the engine over backwards. In consequence, a not inconsiderable part of the total weight is transferred from the leading truck wheels to the drivers, giving the latter more adhesion and adding to the tractive effort of the engine. When the locomotive is running backward, the reverse of this action takes place, weight being shifted from the drivers to the truck, and the loss of effective adhesive weight makes the engine "slippery." With the electric locomotive, which may be constructed in a series of articulated trucks, the effect of the phenomenon may be magnified because of the relatively short wheelbase of each truck. A case might be cited, for example, in which each truck had only a 6-ft. wheelbase. Under such circumstances the couple set up by the drawbar pull would have an arm one-half as long as that opposing it, and if the drawbar pull was 30 per cent of the total weight, some 15 per cent of the weight on the front drivers would be shifted to the rear pair. Therefore, without independent control of each pair of drivers, or side rods coupling them together, the tractive effort of the whole engine would be measured by the most lightly loaded pair of drivers and would be reduced by 15 per cent. This is, of course, an extreme case, but it demonstrates that side rods, with all their objectionable features, have a very definite value.

A COINCIDENCE IN LOCOMOTIVE REPAIR COST

The cost of electric locomotive maintenance at Baltimore displays a somewhat remarkable agreement with the cost on the later tunnel electrifications at Detroit and Port Huron. In all three cases the charges approximate 5 cents per locomotive-mile, although the weight of the average Detroit engine is 25 per cent greater than the average at Baltimore, and that at Port Huron is 25 per cent less. From this it would seem that the Detroit engines should cost the most for repairs and the Port Huron engines least, with the Baltimore machines in between. There are, in addition, several circumstances surrounding operation at the three locations which tend further to produce a difference in the existing figures. For one thing the annual mileage per locomotive differs materially, being 35,000 at Port Huron, 21,000 at Baltimore and only 18,500 at Detroit.

Of still more importance as a factor in maintenance cost is the item of tire wear. Since the engine has to be practically dismantled when tire work is done, the procedure is materially expensive and may exert a marked influence on the cost per mile if the mileage between turnings is low. At Detroit, conditions seem to be exceptionally bad for tire wear because the mileage between turnings is reported to range between 12,000 and 15,000. At Baltimore the tires on the later engines approximate 70,000 miles and on the older ones 35,000, an average of, say, 50,000 miles for all classes, while the mileage for the Port Huron engines apparently exceeds 80,000.

Comparing operation at Baltimore with that at Detroit, since these two installations are of the low-voltage, direct-current type, it will be found, from the record published upon another page of this issue, that the Baltimore engines are worked very much harder than those at Detroit. This condition is reflected in the armature failures which are reported from Baltimore, while Detroit absolutely escapes this form of trouble. The effect is displayed also in the fact that at Baltimore the electrical repairs cost more than the mechanical repairs, although experience indicates that normally the electric apparatus should cost only about one-half as much as the maintenance of the mechanical equipment of an electric locomotive. Here, then, there appears on the one hand harder work for the locomotives as an offset to lighter engines and a higher mileage between tire turnings, and as it is conceivable that these conditions would balance each other, the cost of 5 cents per locomotive mile for these installations seems to be nothing more than a coincidence.

LOAD FACTOR IN ELECTRIC OPERATION

The influence of load factor on steam railroad operating costs may be said, in general, to be of subordinate importance, and for this reason the term does not appear in the railroad operator's terminology. The reason is that the investment in rolling stock and its appurtenances is but a small fraction, say one-fifth, of the total cost of the whole road. The major part of the investment is tied up in the roadway, and since this has no definite maximum capacity, there is no method of establishing its load factor, while the minor character of the investment in rolling equipment hardly warrants the expression of a relation between its possible capacity and the actual work that it does. As a matter of fact, load factors for railroad equipment are astonishingly low when judged by standards common in electric working, a steam locomotive, for example, doing something like 5 per cent of the work that it could do if operated to rated capacity all of the time and under best conditions.

Under electric operation, however, this lack of consideration of load-factor values in steam railroad statistics has worked and undoubtedly will work for some time to come a serious hardship, because electrification may introduce equipment costing fully half as much as the original roadway and requiring continuous operation to earn its fixed charges. Unfortunately, electrical engineers cannot expect a steam railroad to revolutionize its practice and turn its schedules topsy-turvy for the sake of electrifying, since the new form of power must show a saving under existing conditions before it can supplant the old. Eventually, no doubt, the economies that are measured by high load factors will be recognized, but in the meantime electrical equipment must be designed to move trains whenever and however the operating department sees fit to run them, regardless of the effect they may have upon the load curve.

Consideration of the steam locomotive brings out the fact that there are two very obvious causes for the distressingly low load factor under which it operates, and both of these are avoided to a large extent by the electric machine. One of them is the large amount of time spent at the engine house or its equivalent, during which intervals the steam locomotive has to have its fire cleaned and its tender resupplied with coal and water, and then has to be set in the roundhouse for the minor repairs and replacements inevitably required after every trip. It has been found that as much as fourteen hours out of the twenty-four are devoted to such operations, leaving only ten hours during which a road engine is actually available for service. On this hourly basis then, the steam engine starts with a daily load factor of only 42 per cent while the electric locomotive is ready for service practically all of the time, or, at worst, allowing an hour out of the twenty-four for inspection, has a daily load factor of 96 per cent on the basis of time ready for service.

The other one of the two most obvious characteristics that reduce the relation between the possible capacity of the steam locomotive and its actual performance lies in its practical inability to handle temporary overloads. The ruling grade on a division establishes its tonnage rating, and elsewhere during its run the engine is underloaded. In one respect this might be considered as an advantage, because the directly-opposite characteristic of the electric locomotive, due to its higher adhesion, leaves it open to abuse. However, the fact that the latter machine can exert a greatly increased drawbar pull for short intervals gives it a chance to get its train over a ruling grade without having to operate at less than capacity throughout the balance of the run, and this tends definitely to raise the load factor of the electric locomotive when its operations are considered in their entirety.

CARELESS FEDERAL LEGISLATION

The carelessness with which many congressional bills are drawn is illustrated in the "hours of service" bill (H. R. 9216) to which the committee on federal relations of the American Electric Railway Association has called attention, as mentioned in last week's issue. The circumstances indicate that this bill was intended merely to amend the present hours of service act by shortening from nine to eight hours the maximum hours of service of train dispatchers, but as the bill is worded it makes eight hours the maximum permissible working day for the motormen and conductors of electric interurban railways, while permitting the engineers and conductors of steam railroads to work sixteen hours.

It would seem necessary only to have attention called to this gross discrimination to secure a change, but there is serious danger that the law will get on the statute books unless individual electric railway companies awake to the importance of protest, as the bill has been favorably reported with its present amendments by the House committee on interstate and foreign commerce. As Mr. Brady says in his memorandum to the members of the House committee, a conductor or motorman is no more disqualified physically or otherwise at the end of eight hours from perceiving and understanding an order by telephone than is an engineer or conductor on a steam railroad train at the end of the same period disqualified from receiving and understanding a written order. This fact should be made clear to the members of the House.

The committee on federal relations of the American Electric Railway Association has also called the attention of association members to another bill (H. R. 9047, introduced on Jan. 14, 1916, by Mr. Decker), in which provisions intended evidently to apply purely to steam railroad trunk-line conditions are so worded as to include electric railways also. This is a common oversight in proposed legislation on interstate carriers, but the effect is nevertheless serious to the electric railways if the error should not be discovered until after the passage of the bill. Here also an expression by member companies to their Congressman of their views in relation to this legislation would be helpful in the circumstances.

Operation on the Baltimore & Ohio Electrification

Detailed Statistics Show That the Electric Locomotives in This Service Through the City of Baltimore Are Being Operated for Some 40 Cents per Locomotive-Mile, of Which Power Comprises More than Half Owing to the Heavy Grades—The Maintenance Cost Approximates 5 Cents

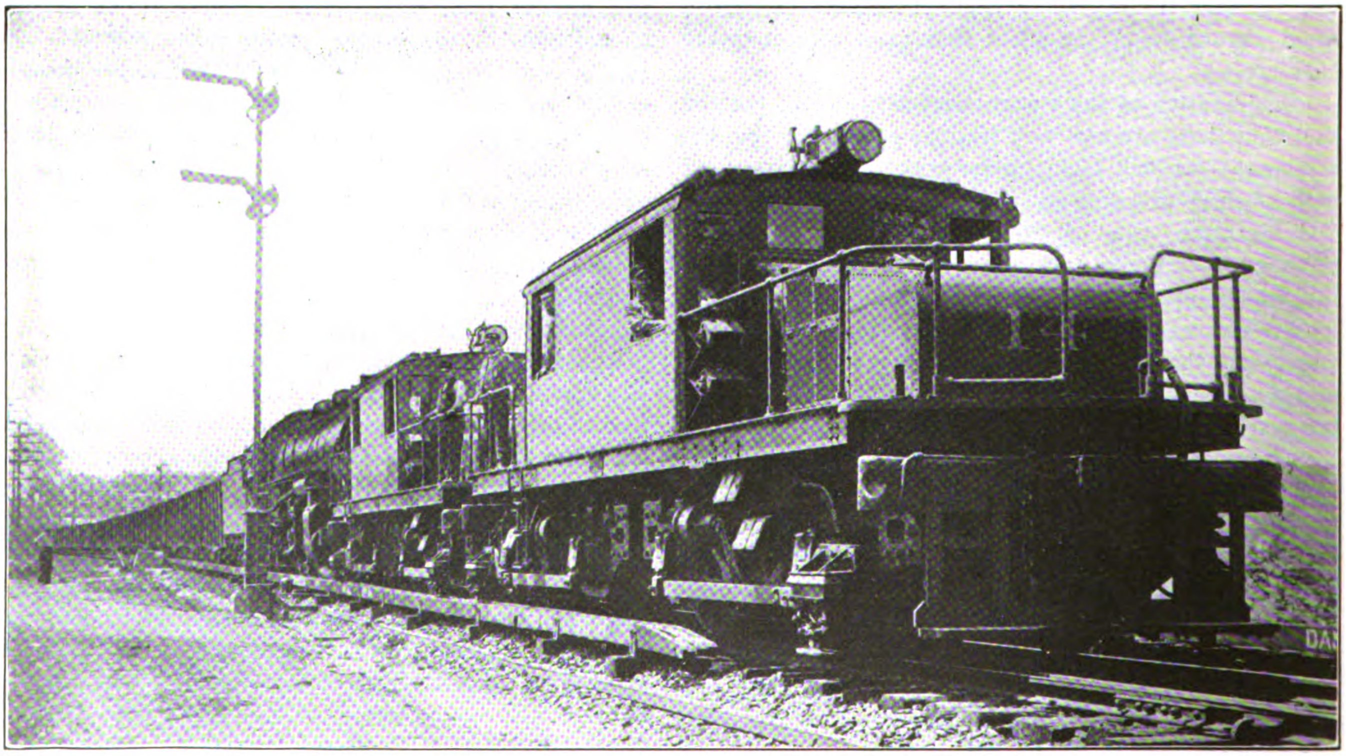
THE Baltimore & Ohio electrification has always been looked upon with interest as the pioneer installation of electric traction in steam railroad service in the United States. It is not generally known, however, that with the great increase in train weights due to the development during recent years of more powerful steam motive power equipment, it has been necessary to reconstruct or to replace practically all of the original installation. As this is probably the only instance where heavy electric traction has undergone such extensive changes, an account of the improvements made and the effect on operation and maintenance will no doubt be of interest.

PHYSICAL CHARACTERISTICS

The electrified section of the Baltimore & Ohio Railroad is its main line through the city of Baltimore, extending from Camden station on the west to Waverly interlocking tower on the east. The length of electrified section is 3.7 miles, the maximum grade, 1.52 per cent, the average through grade, 0.9 per cent, and the maximum curvature, 10 deg., 16 min. The line was constructed during the early nineties to furnish a direct rail connection between the main line west of Baltimore and that east, and one of the requirements of the ordinance governing the construction through the city was that trains be operated electrically. In addition, the number and lengths of the tunnels necessitated special means for reducing the amount of locomotive smoke and gases, for which electrification undoubtedly offered the most satisfactory solution. The first trip of an electric locomotive was made on June 27, 1894, but the line was not opened for traffic until May 1, 1895.

Regular service with a total of three electric locomotives was begun on Aug. 1, 1895. An overhead distribution system was originally installed, but as it never proved satisfactory it was replaced in 1902 by a third-rail system. Four electric freight locomotives were purchased in 1903 and another of the same type in 1906. With increasing traffic and weight of trains the capacity of the power plant and feeder capacity became inadequate, with the result that in 1909 a contract was entered into with the Consolidated Gas, Electric Light & Power Company of Baltimore for purchasing current, and a synchronous converter substation was built for supplying service. Between 1910 and 1912 a total of four locomotives of a more powerful type were placed in service, the original three being retired. Plans are now under consideration for remodeling the last four locomotives to increase their capacity, and for the provision of additional synchronous converter equipment in the substation.

The direct-current system is used, 675 volts being maintained at the d.c. bus. Originally all power was supplied directly from a power plant located at the west end of the electrified zone. In this were five 500 kw.,

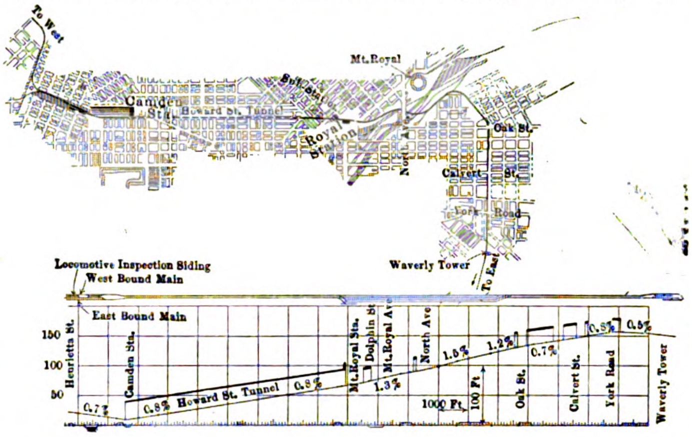


B. & O. ELECTRIFICATION—TWO ELECTRIC LOCOMOTIVES OF 1910 TYPE HAULING FREIGHT TRAIN AND ITS STEAM LOCOMOTIVE

700-volt, direct-current generators, direct-connected to tandem-compound, non-condensing, Corliss-type engines. A large proportion of the plant output, however, was used for the railroad shops and other purposes. But one train at a time was handled through the electrified zone, and the load was of an intermittent and high peak character. To obtain more economical operating conditions as well as to improve the voltage on the line a storage-battery substation was subsequently installed near the Mount Royal passenger station, 1¾ miles from the power house. A booster system of control was used which included a booster located in the power house, thus permitting a reduction of generating voltage to 550 in order that current could be used for industrial purposes. This limited the power house output to 900 kw. for traction purposes which, with the battery, was sufficient to handle simultaneously one freight train of 1600-ton weight, including electric locomotive, and one light passenger train.

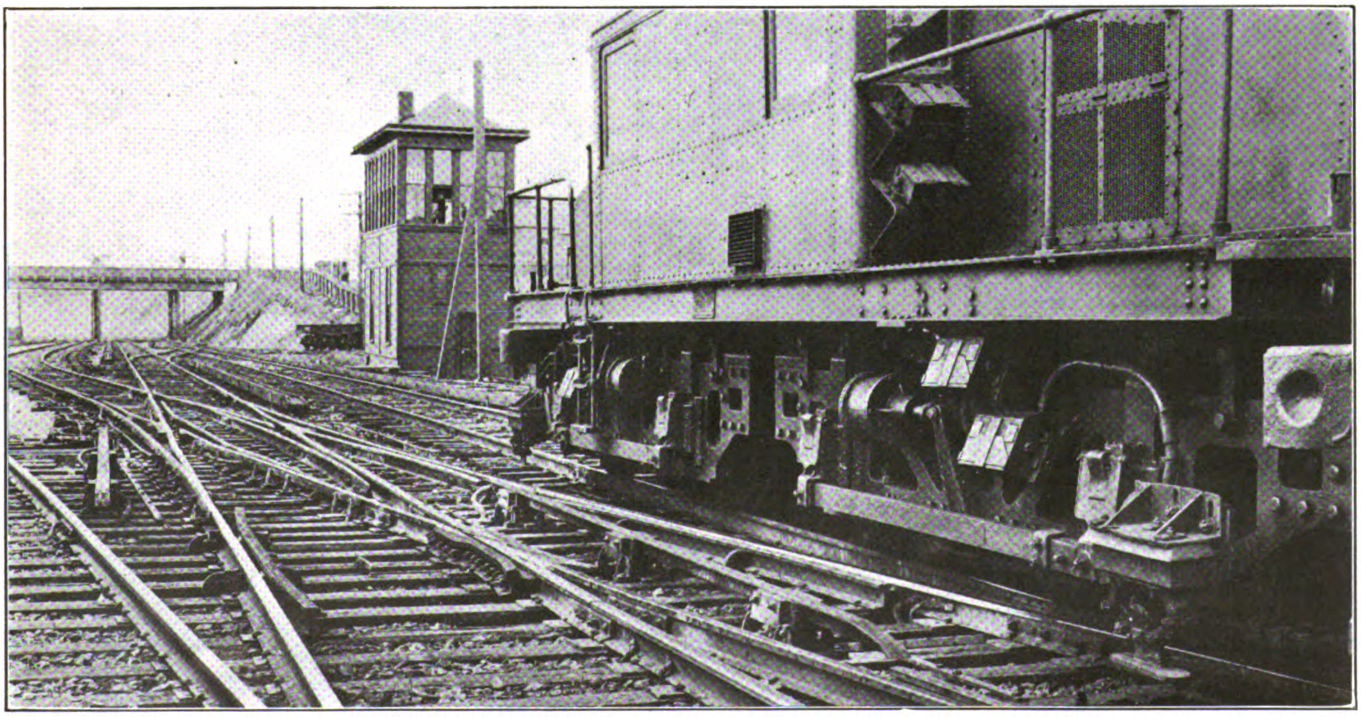
When the Consolidated Gas, Electric Light and Power Company began to furnish power in the form of 13,000-volt, three-phase, 25-cycle current, a synchronous converter substation was built by the railroad adjoining the Mount Royal battery station. Three 1000 kw., 650-volt, synchronous converters with the necessary auxiliaries were installed. The battery, which is of 3200 amp.-hr. capacity, at the eight-hour rate, was retained for peak work, being controlled by a special booster in conjunction with the Electric Storage Battery Company's carbon pile regulator system. The power plant was operated in parallel with the substation until it was shut down in November, 1914, when purchased electric service was extended to cover all the electrical requirements of the railroad for light and power in Baltimore. Plans are now under consideration for increasing the capacity of the substation by the installation of a 2000 kw. synchronous converter and for abandoning of the storage battery. The extension of use of electric service with consequent improvement in load factor and the purchasing of current under a new contract have rendered the operation of the battery unnecessary and uneconomical under the existing conditions. With the proposed increased capacity of the substation it will be possible to handle simultaneously through the electric zone two freight trains each of maximum weight of 2840 tons.

The original overhead system of power distribution provided a contact conductor of two "Z" bars so arranged as to form a box-like structure with a slot in the bottom. Outside of the tunnels this was supported from towers by a catenary construction and in the tunnels by direct hangers. In this overhead structure the collector shoe, attached to the locomotive by pantagraph, was allowed to slide. As would be expected, from the present knowledge of methods of collecting current, the system was unsatisfactory, while the presence of gases from steam locomotives resulted in high maintenance cost. In 1902 the overhead conductors were replaced by third-rail system, the larger part of which is still in service. A special form of protection has been provided on account of flush platform construction at passenger stations. As a further safety measure automatic sectionalizing switches were installed, but these proved unsatisfactory and were discontinued.



B. & O. ELECTRIFICATION—MAP AND PROFILE OF ELECTRIFIED LINE

To provide a continuous supply of current to the locomotives at double slip switches where the gaps are too great to be spanned by the third-rail shoe, a special ar-



B. & O. ELECTRIFICATION—MOVABLE SECTIONS OF THIRD-RAIL AT CROSS-OVERS rangement of movable third-rail is used to avoid the necessity for overhead conductors. These consist of structural T-irons located inside the crossing tracks and at such other points where the standard third-rail would be fouled by trains using the cross-over. In the operating position these rails are level with the top of third-rail but normally are lowered to the track rail level, in which position current is automatically cut off. The rails are controlled from the signal tower and are properly interlocked with the switch levers.

After ten years of service the third-rail in the Howard Street tunnel became so badly corroded, due to action of the locomotive gases and electrolysis, as to require its complete renewal, at which time the type of insulators and guard board support were redesigned to overcome certain faults in the original construction. This new design has been adopted as standard for future replacement.

In general there is a continual demand for greater drafts of power. The last lot of locomotives to be purchased are of the Michigan Central type and are used for both passenger and freight service. But to increase their hauling capacity it is now planned to increase their gear ratio from 3.25 to 4.27 and the weight to 120 tons. Shunt-field control will be provided to permit obtaining higher speeds with light-weight trains. This feature will be semi-automatic in operation in that with the controller in full running position the fields will be shunted only when the motor current is less than a fixed predetermined value. The principal data pertaining to the electrical and mechanical features of the various types of locomotives are given in Table I and the general features of their design are illustrated by the accompanying photographs.

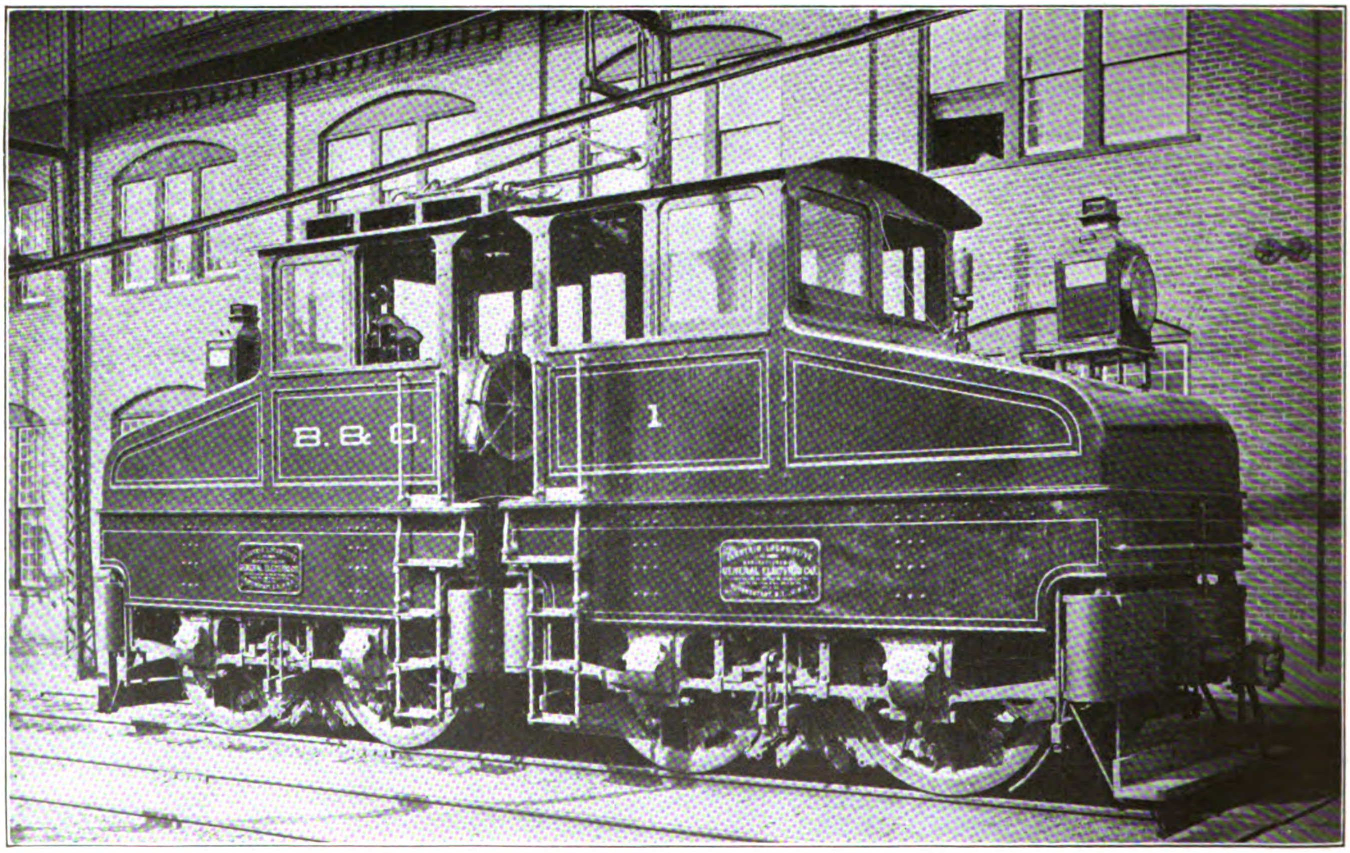
OPERATING FEATURES AND COSTS

Electric operation is used only in the up-grade (east-bound) direction, the electric locomotives returning light, because the grade west-bound traffic operates through the zone without requiring power from the steam locomotives except for starting. Trains, including steam locomotives are hauled intact as received from the adjoining division. The electrified service is very similar to helper locomotive service except that the road locomotives furnish no assistance. The ruling grade in the zone is 1.52 per cent while that of the remainder of the steam locomotive division is but 0.8 per cent. This requires the electric locomotive to be able to develop twice the tractive effort of the Mikado type of steam locomotives operated on this division, not only on account of the heavy grade but also because of the additional weight of the steam locomotive. Tests have shown that the resistance of steam locomotives when being moved by outside power is very large, amounting to 38 lb. per ton on a level tangent track. On the ruling grade the steam locomotive requires a drawbar pull that would handle nearly twice its weight in freight cars, or about 430 tons.

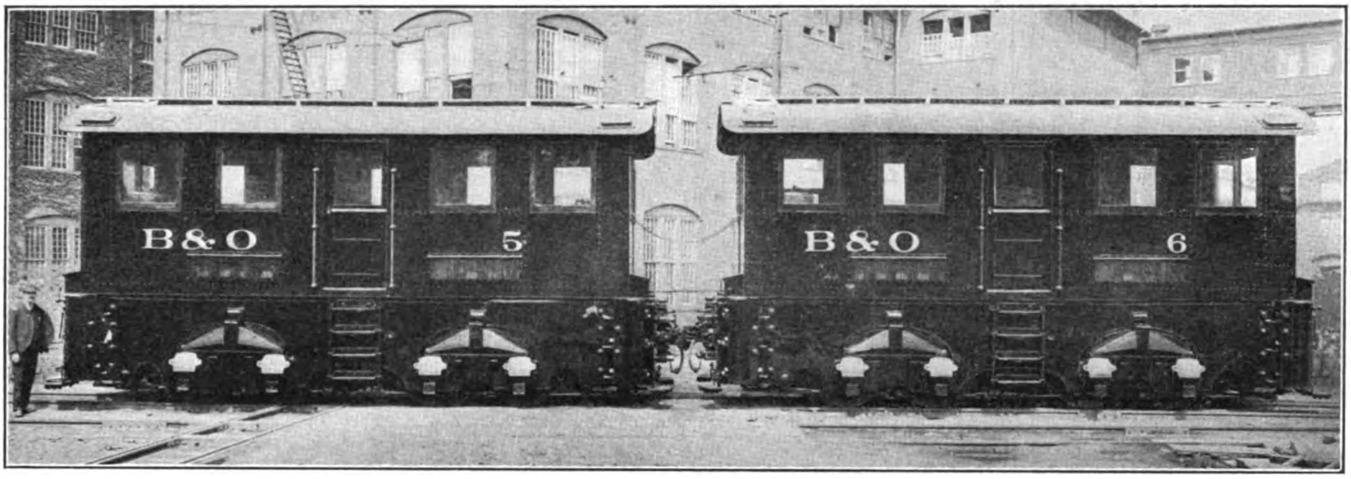
TABLE I—ELECTRIC LOCOMOTIVE DATA, BALTIMORE & OHIO RAILROAD

Year built	1894	1903 and 1906	1910	1912	
Type	Eight Wheel Two Section	Eight Wheel Rigid Base	Eight Wheel Articulated	Eight Wheel Articulated	Proposed Remodeled
Number	3	5	2	2	
Rigid wheelbase	6 ft. 10 in.	14 ft. 6¾ in.	9 ft. 6 in.	9 ft. 6 in.	9 ft. 6 in.
Total wheelbase	22 ft. ¾ in.	14 ft. 6¾ in.	27 ft. 6 in.	27 ft. 6 in.	27 ft. 6 in.
Length over all	33 ft. 10 in.	29 ft. 7 in.	39 ft. 6 in.	39 ft. 6 in.	39 ft. 6 in.
Total weight	190,000	160,000	185,000	200,000	240,000
Number of motors	4	4	4	4	4
Type	AXB 70	GE 65 B	GE 209	GE 209	GE 209
Output of motor, hp	270	200	275	275	275
Gear ratio	Gearless	81–19	78–24	78–24	83–19
Amperes input		292	400	400	400
Diameter drivers	62 in.	42 in.	50 in.	50 in.	50 in.
Tractive effort, pounds	23,000	35,000	26,000	26,000	33,800
Tractive effort, momentary	49,000	40,000	46,000	50,000	60,000
Speed, m.p.h	17.5	8.5	16.4	16.4	12.2
Number of locomotives normally operated together:					
Freight	Obsolete	3	2	2	2
Passenger	1	....	1	1	1

NOTE: Motor ratings on one hour basis.



B. & O. ELECTRIFICATION—FIRST LOCOMOTIVE OF 1894 TYPE, NOW OBSOLETE, EQUIPPED WITH OVERHEAD SHOE-COLLECTOR



B. & O. ELECTRIFICATION—TWO 80-TON LOCOMOTIVES OF 1903 TYPE

The annual traffic now handled electrically is approximately 20,000,000 tons, comprising both freight and passenger trains. Five 80-ton and four 92- and 100-ton General Electric locomotives in use. Three of the former type are always operated together and used in freight service exclusively, while the latter type are operated singly in passenger service with trains up to 800-ton weight and two together with heavy passenger trains and all freight trains. Whenever more than one locomotive is required the units are operated with but one crew, using multiple-unit control. Three operating crews are employed on both the day and night shifts. Under present traffic conditions the average annual mileage of the 80-ton locomotives is 20,000 miles and heavier locomotives 28,000 miles.

The maximum train weights now handled electrically are 2000 tons net, a total, including steam and electric locomotives, of 2450 tons. It is now contemplated to increase the train weights to a total of 2840 tons including steam and electric locomotives, which will require a maximum tractive effort on the ruling grade of 112,000 lb. to be developed by the electric locomotives with an input to the motors of approximately 3000 kw. A speed of 11 m.p.h. will be maintained on the maximum grade.

In Tables II and III are shown data on traffic handled and costs of operation and maintenance in dollars per 1000 ton-miles (including the weight of the electric locomotive) and in dollars per 100 locomotive-miles (including light mileage) for the past six fiscal years. As would be expected from the grade conditions and the fact that traffic is handled electrically in but one direction, the power consumption is very large with consequent very high cost for this item. The cost of current at the d.c. bus comprises the cost of purchased current and substation operation and maintenance.

MAINTENANCE PRACTICE

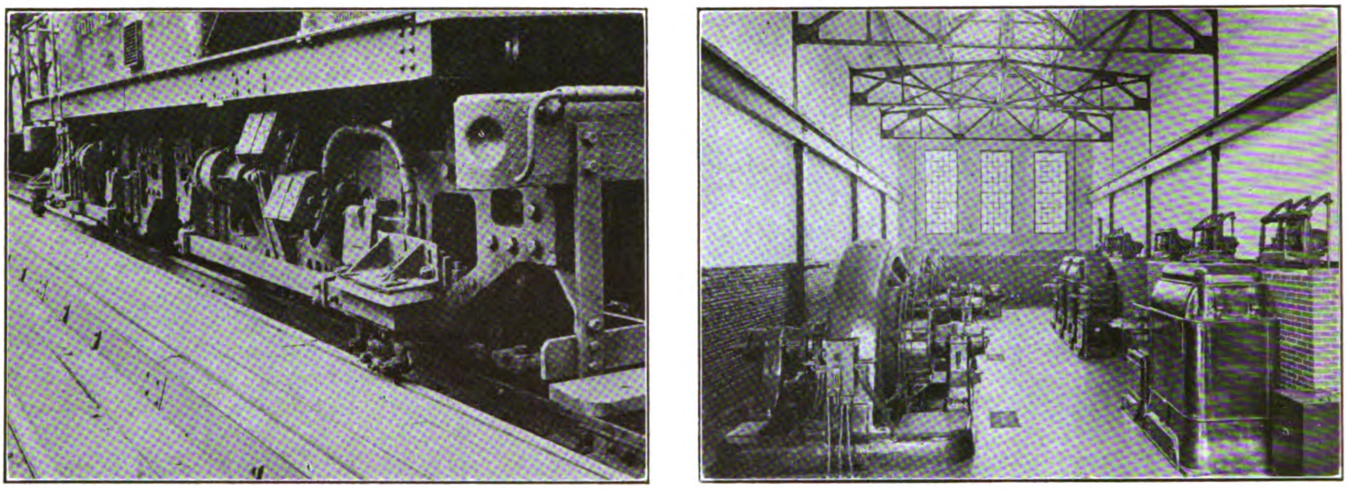
Except when actually handling trains or returning light the locomotives are kept on a siding at the west end of the zone. Inspection and running repairs are made at this point, the facilities consisting of only a track inspection pit. The general arrangement of tracks makes impracticable the construction of any inclosed shed into which the locomotives could be run for inspection purposes. Supplies and material for light repairs are kept in a near-by building which is also used by the operating crews and locomotive maintenance force. This force consists of a foreman, two repairmen and two cleaners, who handle all necessary inspection, running repairs and cleaning for the nine locomotives. Some of the locomotives have been kept in service a year without necessity for placing them under cover for repairs, and even the painting is done in the open. All shop repairs, with the exception of heavy accident repairs, are made in the general electrical repair shop located near the locomotive siding but not accessible to the locomotives under their own power. The shop is used primarily for repairs to motors and other electrical equipment for the entire system, a track into the building and a drop pit having been provided for the locomotives. Motors as well as the wheels are removed by means of the drop pit, as no crane is available. Tires are turned and renewed at the main steam locomotive repair shops which are located in Baltimore. Spare sets of wheels and axles have been provided so that the locomotives are not kept out of service while the tires are being turned.

TABLE II—TRAFFIC DATA BALTIMORE & OHIO ELECTRIFICATION

Fiscal Year Ending June 30	1910	1911	1912	1913	1914	1915	July-Dec.,1916
Number of passenger trains handled	7,471	6,963	5,784	6,049	6,211	6,274	3,534
Number of freight trains handled	10,456	10,001	7,164	7,535	7,236	7,028	6,887
Mileage electric locomotives	183,493	213,366	192,774	191,124	183,434	190,000	111,322
Ton-miles, including electric-locomotive	49,224,569	53,652,332	55,286,817	57,099,821	54,169,376	58,539,501	33,881,050
Gross watt-hours per ton-mile	109	92	93	118	103	101	92.5
Cost of current per kilowatt-hour at d.c. bus	$0.0185	$0.0182	$0.0143	$0.015	$0.0139	$0.0126	$0.0113

TABLE III—COST OF OPERATION AND MAINTENANCE OF ELECTRIC LOCOMOTIVE SERVICE, BALTIMORE & OHIO RAILROAD

	1910		1911		1912		1913		1914		1915		1916	
	Per 1000 Ton-Miles	Per 100 Locomotive-Miles	Per 1000 Ton-Miles	Per 100 Locomotive-Miles	Per 1000 Ton-Miles	Per 100 Locomotive-Miles	Per 1000 Ton-Miles	Per 100 Locomotive-Miles	Per 1000 Ton-Miles	Per 100 Locomotive-Miles	Per 1000 Ton-Miles	Per 100 Locomotive-Miles	Per 1000 Ton-Miles	Per 100 Locomotive-Miles
Trainmen's wages	$0.34	$9.15	$0.336	$8.43	$0.328	$9.40	$0.325	$9.68	$0.327	$9.67	$0.308	$9.50	$0.260	$7.88
Power	1.46	39.10	1.320	33.20	1.060	30.30	1.155	34.40	1.215	35.80	1.015	31.20	.785	23.80
Third-rail and feeder maintenance	.293	7.85	.109	2.74	.230	6.58	.205	6.12	.142	4.18	.137	4.20	.115	3.48
Oil and waste	.007	0.18	.007	.202	.006	.18	.007	.21	.007	.21	.007	.20	.005	.16
Miscellaneous supplies	.002	.05	.002	.048	.001	.02	.002	.06	.002	.06	.001	.03	.001	.03
Inspection, repairs and cleaning	.203	5.44	.201	5.05	.197	5.64	.213	6.35	.178	5.27	.170	5.24	.163	4.95
Totals	$2.305	$61.77	$1.975	$49.66	$1.822	$52.12	$1.907	$56.80	$1.871	$55.49	$1.638	$50.37	$1.329	$40.30



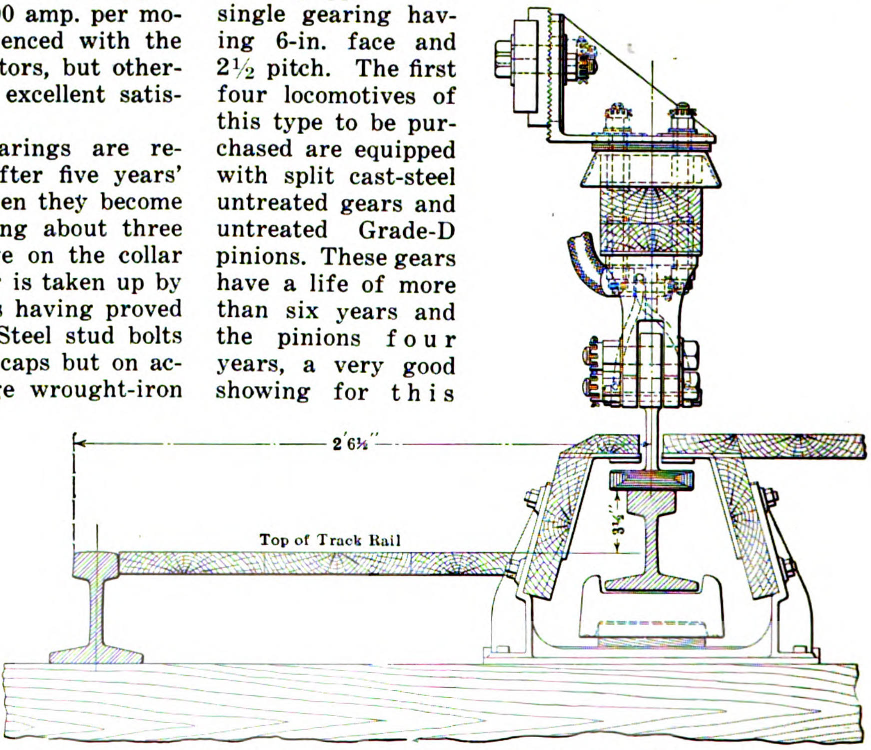
B. & O. ELECTRIFICATION—THIRD-RAIL PROTECTION AT PASSENGER STATION—INTERIOR OF MOUNT ROYAL SUBSTATION

The locomotives have been in very severe service. With the increase both in weight and number of trains handled it has been necessary to operate them considerably in excess of their rated capacity, as it is not always possible to proportion the motive power to the train weights. They have, however, withstood the severe demands remarkably well, the most serious trouble being a number of armature failures on the two latest types. Under heavy overloads, amounting to 700 amp. per motor, some trouble has also been experienced with the brush-holders and certain of the contactors, but otherwise this type of locomotive has given excellent satisfaction.

On the GE-209 motors, armature bearings are renewed when worn 3/64 in. large or after five years' service. Axle bearings are renewed when they become ⅛ in. large, which occurs after running about three years. Wear has been rather excessive on the collar end, and after reaching ¼ in. this wear is taken up by building out the ends with babbitt, this having proved more satisfactory than brass collars. Steel stud bolts were originally used to secure the axle caps but on account of the rather frequent breakage wrought-iron studs have been substituted and these have eliminated the trouble.

The mechanical features of the two latest types of locomotive, except for some minor details, have given entire satisfaction. When the locomotives were first placed in service the cast-iron hub liners, which were used to take up the side play at the driving wheels, showed excessive wear, some lasting less than a day. They were replaced with bronze liners which are now lasting more than two years. Some trouble was experienced by breaking of equalizer hangers which was overcome by redesigning them. Tire wear on the first locomotive of the 1910 type was 50,000 miles before receiving the first turning. Flange oilers were applied with the result that with the original tires on the other locomotives of this type from 70,000 miles to 75,000 miles were obtained up to the first turning. However, somewhat less mileage has been secured subsequently. The older locomotives have also been equipped with flange oilers, but the average tire mileage between turnings is but 35,000, this difference being attributed to the poor riding qualities of the rigid wheelbase type of construction on this class of engine.

The 1910 and 1912 types of locomotive are equipped with G. E. grade F twin gears and pinions. After six years of service under the severe operating conditions experienced, but very little wear has occurred on either gears or pinions and in no respect have they given any trouble. This has clearly demonstrated the advantage of the twin-gear type of drive for heavy, low-speed service. The locomotives of the 1903 type are equipped with single gearing having 6-in. face and 2½ pitch. The first four locomotives of this type to be purchased are equipped with split cast-steel untreated gears and untreated Grade-D pinions. These gears have a life of more than six years and the pinions four years, a very good showing for this type of gearing in such heavy service. The life of both armature bearings and axle bearings is but about one-third of that of the bearings on the twin-gear motors. More or less trouble has also been experienced with hot boxes on armature bearings at the pinion end.



B. & O. ELECTRIFICATION—THIRD-RAIL PROTECTION AT PASSENGER STATIONS

Table IV shows the mileage made by electric locomotives and cost of maintenance over a period of six years and also a statement showing the cost separated between electrical and mechanical repairs for the past calendar year. The maintenance of the 1910 and 1912 types is abnormal on account of the number of armature burnouts. These were caused by overloading the motors while handling trains beyond their capacity. In addition the railroad has no facilities for repairing arma-

TABLE IV—COST OF MAINTENANCE OF ELECTRIC LOCOMOTIVES, BALTIMORE & OHIO RAILROAD

Fiscal Year Ending June 30	Number in Service	1910	1911	1912	1913	1914	1915
Class 1903—1906 mileage....	5	125,678	135,148	59,962	52,780	72,803	79,844
Cost per 100 locomotive-miles	....	$3.26	$4.69	$6.36	$6.44	$4.22	$5.78
Class 1910 mileage	2	12,669	64,464	50,060	53,362	47,952	55,014
Cost per 100 locomotive-miles	....	$4.15	$3.90	$5.95	$4.66	$4.40	$4.59
Class 1912 mileage	2	....	....	11,716	57,273	45,967	55,247
Cost per 100 locomotive-miles	....	....	....	$4.58	$4.09	$4.70	$4.20

Detailed Statement of Cost of Repairs for Year Ending Dec. 31, 1915

	Cost per 100 Locomotive-Miles		Total
	Electrical	Mechanical	
Class 1903—1906			
Labor	$2.21	$1.18	
Material..................	.45	.77	
Total..................	$2.66	$1.95	$4.61
Class 1910—1912			
Labor.....................	$1.76	$0.80	
Material..................	1.43	1.02	
Total..................	$3.19	$1.82	$5.01

tures of this size and the expense has been heavy although the total charges, considering the service, have been low.

Reconstruction of the various features of the Baltimore & Ohio electrification to meet conditions of modern traffic has been carried out under the direction of J. H. Davis, electrical engineer of the railroad.

Making a Freight Agent of the Employee

A Personal Letter from E. H. Maggard to Employees Suggests Methods of Co-operation to Increase Freight Traffic

A CONSTRUCTIVE plan by which the railway employee becomes an agent for the development of reciprocal patronage between the local merchant and the local transportation company, has recently been evolved by E. H. Maggard, general manager Petaluma & Santa Rosa Railway, Petaluma, Cal., in the form of the following letter addressed to employees:

TO EMPLOYEES:

The Petaluma & Santa Rosa Railway is dependent entirely upon the business it transports for the money necessary to pay its employees.

Its success in all of its detail is coincidental with the quantity of freight and the number of passengers its facilities handle, and thus you can readily understand how much your individual success and the permanency of your efforts hangs upon the development of business.

What can you, and what will you, do to help? Are you interested in the matter? Does the situation suggest that you are in a position to assist in getting a greater volume of traffic for this line and thus make its operation more secure?

Some 200 persons are on the payrolls. Each is purchasing the articles necessary to a comfortable existence for himself and family. These articles are sold by merchants who must have the majority of them transported from field or factory. Why should they not be transported over the line in which you have an interest?

It would seem that the proprieties would not be violated if you in your patronage of the merchant or other business man, ascertained to your satisfaction that the merchant was in turn a patron of the institution you serve and which serves you.

Reciprocity is a legitimate element in commercial life—a business ethic. One gives return for what one receives, and to suggest within a reasonable degree that your regular and consistent patronage was entitled to a reciprocal return, would merely carry out this idea individually, and to suggest also that such reciprocal return be made to the company you serve, would indicate nothing more than a commendable desire to uphold the best interests of the employing concern.

The present depressed condition of trade has enforced many economies in all revenues of business, and this line, unfortunately, has not escaped the common lot. A united effort on the part of all of us may accomplish much good, and where we least expect it. As an experiment, the suggestion as above should prove interesting; as an adjunct to our soliciting force, we are satisfied that the result would be more than satisfactory.

Will you not consider these suggestions, and if they appeal to you as indicating a method whereby you can individually help the company that is enabling you to serve yourself and family, give the matter a trial, or, better still, adopt it as the permanent feature of your work?

Any information in regard to prospective movement of freight or passengers will be gladly received by any agent of the company or traffic department. A supply of cards to be used in this connection can be obtained from the general manager's office. Call or write for a few and let us get the good work started.

Sincerely yours,
E. H. MAGGARD, General Manager.

In order to give a more official character to the solicitation of patronage, agency cards like that reproduced in the accompanying illustration have been issued to the employees. Mr. Maggard reports that the employees have taken a deep interest in the matter. The day following the mailing of the letters more than twenty merchants called at his office for further information, stating that employees trading with them had requested that they patronize the companies, and were seeking information as to the best way to protect themselves against shippers disregarding their routeing instructions. It seems that in the past some Eastern dealers had been making a practice of ignoring routeing instructions furnished by consignees and that consignees were paying very little attention to this fact. The solicitation of the railway employees resulted in their giving the matter more careful consideration.

PETALUMA & SANTA ROSA RY. CO.
OVER NIGHT SERVICE
—BETWEEN—
San Francisco, Petaluma, Sebastopol, Santa Rosa
LIVE TOWNS connected by LIVE WIRES
We respectfully solicit your patronage.
INSTRUCT SHIPMENT BY
PETALUMA & SANTA ROSA RY.

Presented by.. Employe

EMPLOYEE'S AGENCY CARD FOR SOLICITING PATRONAGE

Iron Ore Production in 1915

The iron ore mined in the United States in 1915 reached the great total of 55,526,490 gross tons, the greatest output made in any year except 1910 and 1913. The shipments in 1915, namely 55,493,100 gross tons, valued at $101,288,984, were a little less than the quantity mined. The quantity mined in 1915 was an increase of 14,000,000 tons over the output in 1914. The increases in quantity and in value of iron ore shipped amounted to about 40 and 41 per cent, respectively. The average value per ton in 1915 was $1.83, compared with $1.81 in 1914. These figures, which are just made public by the United States Geological Survey, were prepared by E. F. Burchard, who states that the production of iron ore from the Lake Superior district alone in 1916 will possibly be 60,000,000 tons, and that there will probably be an increase in price of 70 cents to 75 cents a ton for this ore. Five states—Minnesota, Michigan, Alabama, Wisconsin and New York—which have in recent years produced the largest quantities of iron ore, occupy in 1915 their accustomed places. Only one of these states—New York, produced less than 1,000,000 tons in 1915.

Heating Boilers for Electric Locomotives

The Type of Oil-Fired Boiler for Supplying Steam to Heat Passenger Trains Which Has Been Developed on the New York Central Railroad Evaporates 2200 Lb. of Water per Hour and Occupies a Floor Space 4 Ft. in Diameter

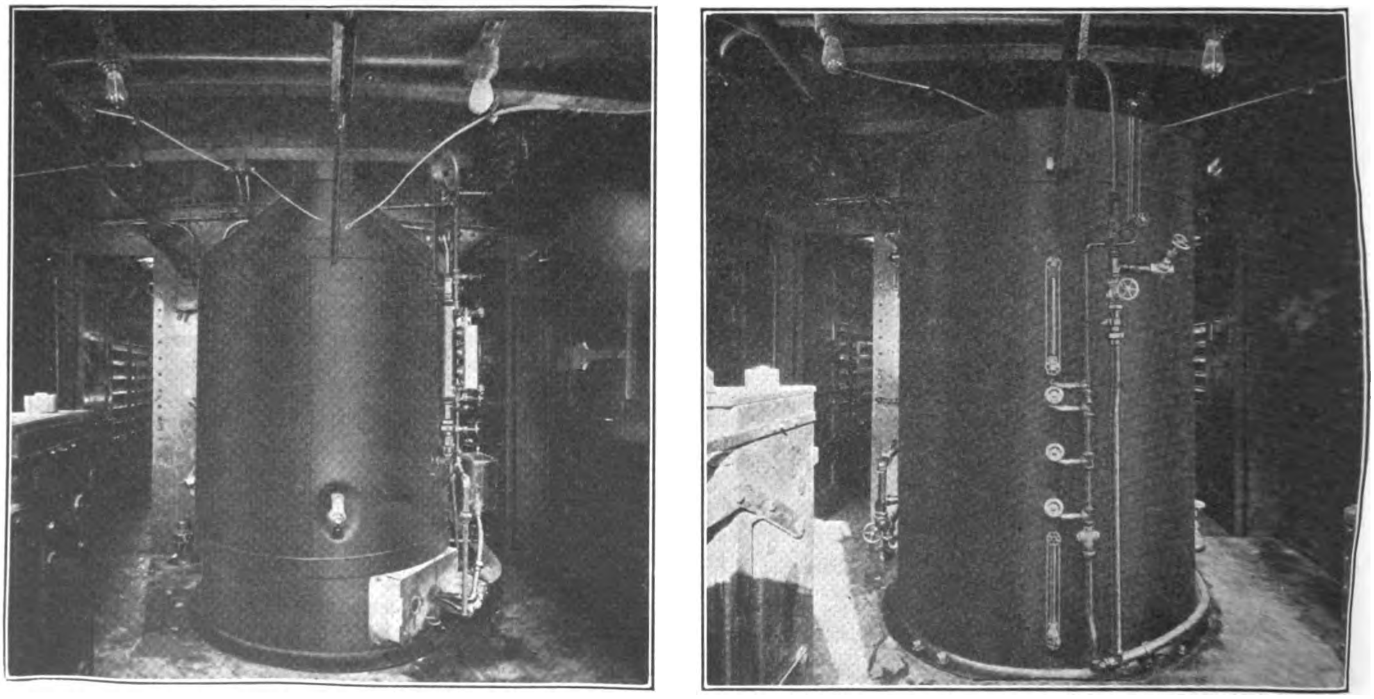
ALTHOUGH the problem of supplying steam heat for passenger trains on an electrified trunk-line railroad may seem to be a secondary feature in electric locomotive design, as a matter of fact it has frequently caused quite as much trouble, through lack of a satisfactory solution, as any of the primary considerations of electric operation. There has been practically nothing in the way of past experience to serve as an aid in arriving at a suitable equipment, because the question of steam supply for heating cars has never been raised in connection with the operation of railroad trains that are drawn by steam locomotives. Consequently, the improvements in steam heating boilers for electric locomotives have been made by slow and costly methods. On the New York Central Railroad's electric zone, however, these efforts have resulted in the development of an oil-fired boiler the performance of which is satisfactory, notwithstanding the restrictions of space and weight imposed upon its designers, and through the courtesy of E. B. Katté, chief engineer of electric traction New York Central Railroad, an outline of the various stages of the development has been made available for publication in the following paragraphs.

Early Designs

The type of boiler originally installed on the New York Central electric locomotives was approximately 22 in. in diameter and 16 in. high. It carried a pressure of 80 lb., had 130 sq. ft. of heating surface, and was rated at 400 lb. of steam per hour. This capacity was found to be quite inadequate, and as the necessity for providing heat for the train was a pressing one, an elaborate series of experiments was inaugurated by the railroad, with the idea of providing a remedy for the difficulty. Prominent among the complications involved in the problem was the necessity for smokeless operation of the boiler, so that the first undertaking was to devise a burner by which the boiler capacity could be increased without making smoke. This was done by enlarging the steam-supply pipe to the burner so that ample high-velocity steam would be available at the burner nozzle and making other improvements mentioned in later paragraphs.

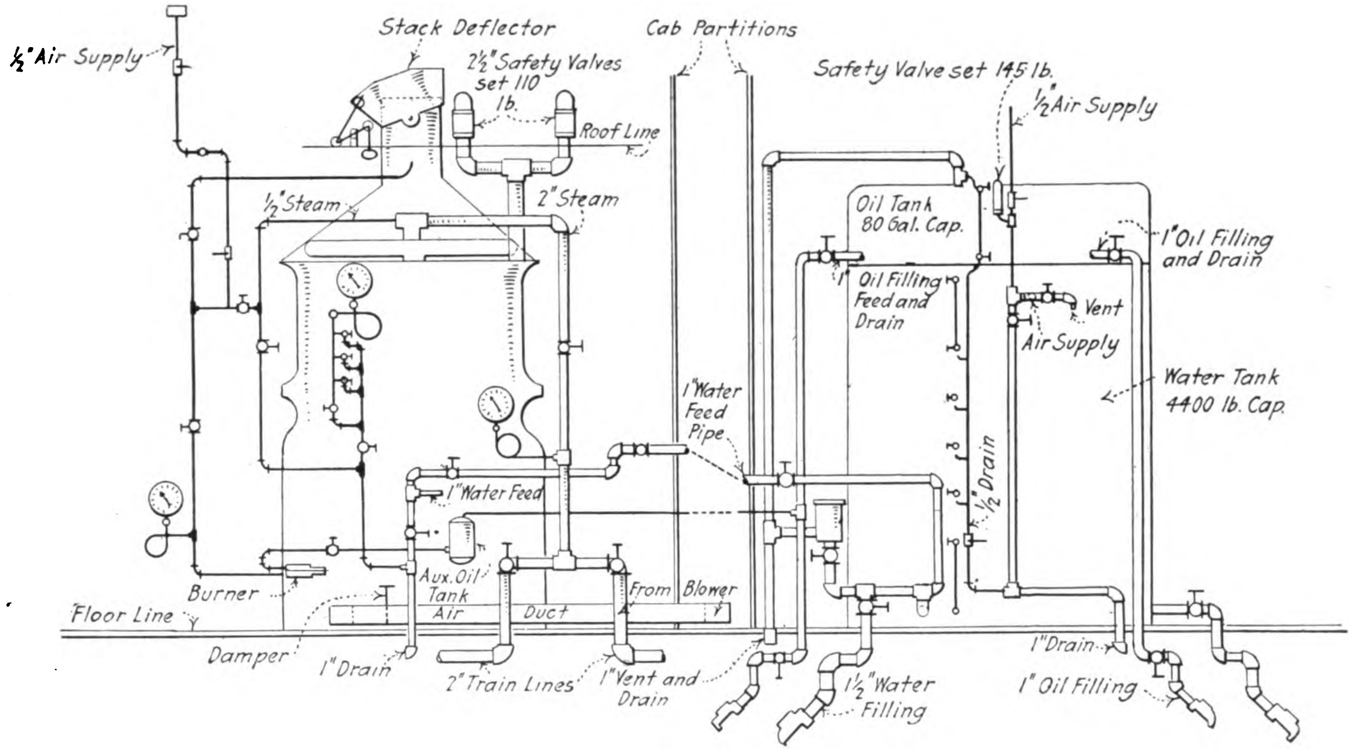
In this way the capacity was raised to 800 lb. of steam per hour, so that seven suburban coaches could be heated in average winter weather. To heat the through trains of steel cars, however, it was necessary to crowd the boiler to such an extent that the flame actually was carried up the stack. Owing to the fact that the boiler had a width of bridge between the tube of only 3/16 in., this forced evaporation caused the tubes to get very hot at both top and bottom, the upper part of the tube being surrounded only by steam and the bottom suffering from the exaggerated effect of the radiant heat upon the crown sheet or bottom flue sheet. Naturally, this resulted in leaking tubes, in addition to the lack of capacity in severe weather or with very long trains. Further mechanical troubles occurred because the absence of water legs at the bottom of the boiler permitted scale to accumulate around the lower portions of the tubes and because the seams in the boiler shell displayed a distinct tendency to leak on account of the strains which were set up by the sudden changes in temperature when the boilers were started up or shut down.

In consequence, a new design was developed. This had 266 sq. ft. of heating surface and produced an evaporation of 1600 lb. of water per hour, the design being purely experimental and appearing in only one boiler actually placed in service. With the new type, how-



STEAM HEAT BOILERS—INTERIOR VIEWS OF ELECTRIC LOCOMOTIVE CABS SHOWING HEATER AND STORAGE TANK ever, there was obtained an idea as to the size of boiler needed to supply the demand for steam to heat the largest steel passenger coaches used on the railroad, this figure running as high as 250 lb. per car when the outside temperature approximated 10 deg. Fahr., and 200 lb. at 16 deg., so that a ten-car train might easily require 2000 lb. of steam per hour.

The experimental boiler suffered from several of the limitations of the original design in that the absence of water legs and the existence of very small bridges caused leaking tubes, while the straight sides of the boiler shell made trouble on account of expansion at the seams. These difficulties were, in fact, magnified over those that existed with the smaller boiler which had preceded the experimental design, and as a result the boiler used on main-line engines was designed. This has 436 sq. ft. of heating surface and it can actually evaporate 2200 lb. of steam per hour from feed water at about 55 deg. Fahr., the steam pressure being 110 lb. It has ample capacity to keep a train warm, but of course it cannot be economically used to heat up a cold train. The evaporation works out to about 5 lb. of water per square foot of heating surface, with a ratio of 8½ lb. of water per pound of oil burned. The improvements in design in general, are the result of co-operative action on the part of the electrical department of the railroad company, J. F. Otis of the Oswego Steam Carriage Boiler Company, who designed all three of the above-mentioned types of boilers, and B. C. Dakin, special inspector, who is in direct charge of the maintenance and operation of the steam-heat boilers on the electric locomotives.



STEAM HEAT BOILERS—DIAGRAMMATIC ARRANGEMENT OF HEATER AND STORAGE TANK

FINAL DEVELOPMENT

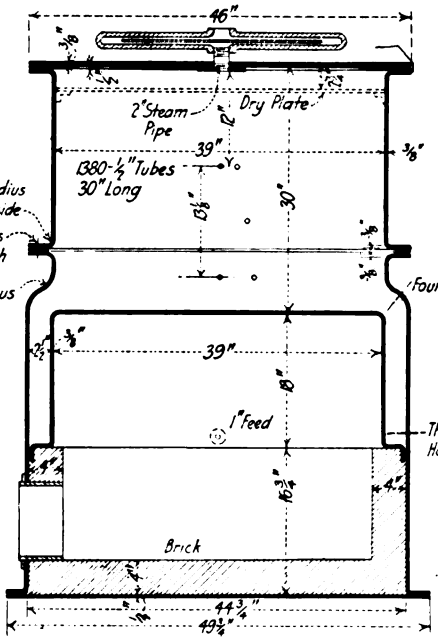
The present standard design is most prominently characterized by a water leg 18 in. deep and 2½ in. wide, as well as by two expansion joints in the length of the shell, the latter being formed in two parts, of which the ends are flanged outward and riveted to form a joint of the well-known bellows type. Inside of the shell are 1380 vertical copper tubes 30 in. long, these being of ½ in. outside diameter and 7/16 in. inside diameter. They are placed upon ⅞-in. centers, thus increasing the width of bridge to ⅜ in. Copper, it may be said, was used for the tube material in preference to steel because it had been found that the steel tubes pitted badly. The shell is lagged 4 in. thick around the main drum and 1 in. around the water leg, a Russia iron jacket covering the boiler up to the smokebox, which fits snugly over the whole. The lagging conceals the large joints in the shell and imparts a tank-like appearance to the boiler.

From this it will be seen that the boiler is really of the standard fire-engine type. The water level is such that approximately 1 ft. of the top of the tubes is exposed to steam and not to water, so that it acts as superheating surface. In addition, there is a dry plate fitting loosely on the tubes, and located 2¾ in. below the top head of the boiler, to prevent sudden drafts of steam from carrying the water out of the boiler. Superheated steam is needed for two blowers in connection with the equipment, one of them being used as an atomizing jet for the fuel-oil burner, and the other being located at the base of the stack above the tubes so as to create a strong induced draft. They consume about 6 per cent of the steam made by the boiler. Most of the superheat for the steam discharge is effected by the exposure of the top portion of the tubes to steam, and a small additional amount is provided by a flattened casting provided with diaphragms in the middle and arranged in the form of a cross above the tubes to give a total length of 8 ft. Normally, about 15 deg. of superheat is obtained, but it may be said here that no burning has been in evidence at the top of the tubes notwithstanding the fact that they are not surrounded with water. A higher degree of superheat would obviously be undesirable because of the effect on the steam hose and couplers.

Since all of the boilers are washed out once each week, there have been provided three nipples so located in the shell that they direct the wash water onto the crown sheet. In addition, there are three handholes in the water leg. On the latest type of boiler, of which twenty-eight have been in operation for about three years, only one copper tube has been replaced to date. There were, however, several sets of steel tubes which pitted and had to be removed. On the original boilers, tube replacements are quite common and these are effected by cutting off the top of the tube flush with the top tube sheet, then screwing a ½-in. tap into the lower end of the tube so that it holds firmly, and then driving the tube out through the bottom sheet by blows upon a steel rod run through the tube and resting against the tap that is screwed into the bottom, a light air hammer being used for this purpose. The whole operation takes about three minutes per tube, including installation of a new tube.

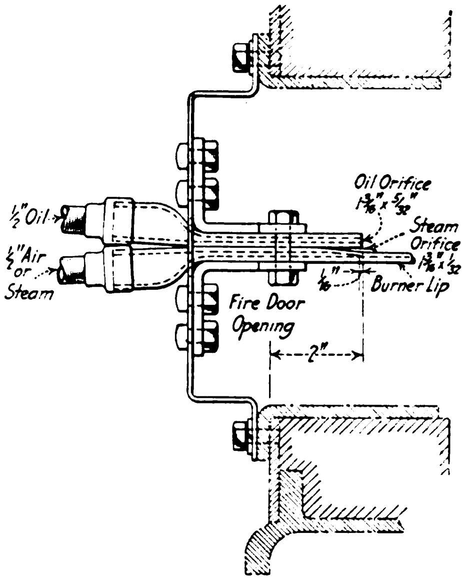
When tubes are inserted they are expanded only by driving a slightly tapered pin into the tube end and turning this by hand, the surface of the expander being oiled. Experience with the original boilers showed that, when the tubes began to get thin from being repeatedly expanded after leaking, an effective remedy could be applied in the form of steel thimbles inserted into the tube ends. These thimbles were ½ in. long and of a scant ½ in. outside diameter, being tapered at the end so that they could be inserted into the tubes. They were used only as a last resort before retubing, but were found to be sufficient to spring the copper outward enough to form a shoulder just inside of the tube sheet, thus holding the tube tightly in place and preventing leaking for some time. No thimbles have been installed in the new boilers up to the present time because of the practical elimination of difficulty with leaking tubes.

On top of the boiler, as installed in the locomotive, is a sheet-iron smokebox, or hood, which connects the boiler and the stack, and the design of this exerts a marked influence upon the steaming capacity of the boiler. On the existing equipment the slope of the hood is approximately 45 deg., the slope beginning about 4 in. above the top flue sheet, since the tubes have to be blown out with compressed air after each round trip and it is advantageous to have ample room for the escape of the soot. The hood is lined on the inside with 1 in. of asbestos board, and no indications of burning have been in evidence.



STEAM HEAT BOILERS—CROSS SECTION OF LATEST TYPE OF BOILER

Another feature of very material importance is the use of a deflector or bonnet on the top of the stack. This bonnet swings with the wind caused by the movement of the locomotive, and its presence makes at least 15 per cent difference in the evaporating capacity of the boiler by aiding the products of combustion to get out of the stack. The principle upon which it has been used is that, at very high speeds, the great disturbance of the air makes a blanketing effect across the top of the stack, choking off the outlet and tending to hold the gas in the boiler. The construction of this bonnet is shown in two of the accompanying line cuts, of which one shows the original form, in which the sides were left open, and the other shows the present form with the sides inclosed to protect against the action of side winds. The bonnet has an open top, and from the cut it will be seen that it protects the front edge of the stack orifice from wind pressure and tends to produce a vacuum at the opening to the rear when the train is moving fast. The movement of the bonnet to correspond with the direction of the engine may be effected by hand from the cab, but it swings automatically in accordance with the direction of the train whenever the wind pressure becomes high enough to move it.



STEAM HEAT BOILERS—FUEL-OIL BURNER

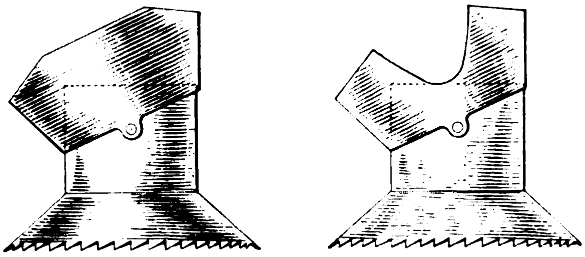
Complete with storage tank and piping, but without water and oil the heater equipment weighs 5850 lb. To remove the boiler by lifting it through a hatchway that is provided in the cab roof involves about three hours work on the part of three men. Four men can reinstall it in about seven hours, this including testing and firing up. The boilers are left in place on the locomotives the year round, being removed only when heavy repairs are necessary. Two extra boilers are kept in stock to replace any of the twenty-eight large boilers in service if they need repairs.

OIL BURNING FACILITIES

The burner for the oil fuel that is used with the boiler has been practically standard for several years, consisting of a pair of flattened pipes of which the upper one contains oil and the lower one steam. The openings in both cases are 1 3/16 in. wide, the oil opening being 5/32 in. high and the steam opening 1/32 in. high. Below the steam opening there is a lip about 2 in. long upon which surplus oil may flow and still be subject to the atomizing action of the steam jet, this lip being permitted because the burner is designed solely for use with Eastern oils having a paraffin base and a thin consistency. Of course, with thick Western oils, which have an asphalt base, the use of this lip obviously would not be possible because of the chance of the oil piling up and interfering with the steam jet. In fact, it may be said in general that Western oil is so thick that it has to be heated in cold weather, whereas the paraffin-base oil for which the equipment in question is designed may be used in the coldest weather without any special arrangements to keep it in a fluid condition.

Originally, the burner was so designed as to extend into the firebox for several inches, the firebox door being left open. It was found, however, that there was need of a greater supply of air than that drawn in at the door, and in consequence provision was made to close the firebox door during operation and to apply forced draft through a 5-in. square duct from the casing of the fan which supplies air to ventilate the main propulsion motors of the locomotive. Also, since it was found that a long flame was preferable to a short one, the nozzle of the burner was moved back until the orifice was only 2 in. inside of the outside sheet. The limiting feature in the position of the orifice is the drip of oil upon the hearth.

The firebox is formed from a cast-iron base upon which the boiler rests. Height of combustion chamber is an important consideration, and the standard used with the type of boiler in question is 27 in. measured between the burner and the bottom flue sheet of the boiler. The burner itself is about 4 in. above the firebox floor which is insulated from the floor of the locomotive by a 4-in. lining of fire clay. The firebox sides are lined with 4 in. of fire-clay cement molded in a form and having an expanded-metal reinforcement of ¾-in. mesh that is located ¾ in. from the inside surface. A single fire brick, which is, as a matter of fact, an arch brick from a steam locomotive, is set directly opposite the burner so that the flame will impinge upon it, this being 18 in. high and 10 in. wide. The distance from the burner to the back wall of the firebox is 38 in. and it is aimed to have all of the combustion take place within this space.



STEAM HEAT BOILERS—PRESENT TYPE AND ORIGINAL TYPE OF STACK DEFLECTOR OR BONNET

The fire door, as mentioned above, is normally kept closed during operation, the air for combustion being supplied by a forced draft opening 5 in. square which is connected to the main blower for the propulsion motors. In the duct is a gate which may be adjusted in any desired position to suit the air requirements, the arrangement consisting of a simple latch such as is commonly used upon passenger-car windows. The fire door is 9 in. by 18 in. in dimensions, so that if desired a man can get his shoulders into the firebox to repair any slight leaks which may occur in the flues, although in general most of the leaking appears at the top flue sheet. The door itself is lined with asbestos cloth ⅛ in. thick, together with a heavy cast-iron plate ½ in. thick, the whole being hung upon a door plate of sheet iron. A peep hole is provided at one side so that the condition of the flame may be seen without opening the door. The firebox lining, it may be said, lasts for approximately two years before renewal is necessary, although severe bumps between engines sometimes knock down the lining before that period has elapsed.

ARRANGEMENTS ON LOCOMOTIVE

On the locomotive the general arrangement is that the heater proper is located in the cab at one end of the locomotive, while a storage tank for oil and water, approximately the same size, is located in the cab at the opposite end. The storage tank is made up with welded joints, having a bumped bottom head and a crowned top, together with a crowned partition between the oil and the water. It contains 80 gal. of oil and 4400 lb. of water, the latter being kept under 135-lb. pressure from the air-brake system. This pressure acts in lieu of an injector or feed pump, these auxiliaries having been eliminated with the idea of attaining the utmost possible simplicity. The oil is not under pressure, but is located in the upper part of the storage tank so that it can drain by gravity to the burner at the other end of the locomotive. This gravity flow was adopted because pressure on the oil might cause it to be sprayed out at any small leak in the piping and thus offer a very material fire hazard. With the gravity feed nothing more than a slow drip can take place even at a large leak.

The oil tank is replenished with oil at locomotive terminals by means of an air-hose connection extending through the locomotive floor, this being connected to outside storage tanks which are under air pressure. For filling the water tank the same plan is followed, and in addition there is a connection in the cab which is made in a receptacle, this being provided with a drip to ground so that the cab may be kept dry at all times. The storage tank is held in position by turnbuckle guy rods to the cab frame. Other features of its equipment include a safety valve in the air line that supplies pressure to prevent dangerous results in case the pressure on the air-brake system should get away from the control of the air-pump governor, and there is also a check valve to keep water from backing into the air-brake system in case the tank should be overfilled. Two pop valves are connected to the boiler, one being set to blow at 110 lb. pressure, and the other at 115 lb. Both valves are located on the roof of the cab.

The water pipe from the storage tank at one end of the locomotive is extended to the boiler at the other and in a small air duct that has an electric heater at each end. When the locomotive is in motion, air travels through the duct from the rear to the front cab. For this reason the duct heaters are so connected with the cab heater circuits that the duct heater at the rear of the duct is in circuit with the cab heaters in the front cab. The latter rig was required because the space between the two cabs on the New York Central locomotives is normally at atmospheric temperature, and without a heated duct the water pipe between the two cabs might freeze. The duct is made slightly high in the center and a small ventilator is provided at that point so that circulation of the warmed air is always bound to take place even when the engine is stationary.

The oil supply is carried from the oil storage tank in a pipe located inside of a hand rail which guards the passageway between the two cabs at one side of the locomotive. As before mentioned, the paraffine-base oil that is used for fuel for the heaters on the New York Central Railroad does not become unduly thick during cold weather, and therefore no provisions for heating it are necessary. There is a small supplementary oil tank located alongside of the boiler, the object of this being to keep the burner from temporarily losing its oil supply when surges in the liquid that is contained in the supply pipe are caused by sudden stops which may be made by the locomotive. These surges in the oil supply, it may be said, initially caused quite a little trouble because the flame would go out when the flow of oil was interrupted, and when it started again, a series of explosions would follow in rapid succession.

OPERATION

When the heater is being started up the first operation is to turn compressed air into the jet, or blower, that is located at the base of the stack to produce induced draft, compressed air from the main air reservoir being used for this purpose only during the starting period. Oil is then turned on at the burner, and immediately afterward compressed air is turned into the nozzle, which normally supplies the atomizing steam jet for the burner. The oil lights at once in the firebox, only a piece of burning paper being necessary to ignite it. These preliminary operations are made with the fire doors open, but as soon as the burner is operating in good shape, air from the motor-ventilating fan is turned into the firebox and the fire doors are closed. This cuts down the roaring noise that is a prominent feature of operation with the door open.

The extraordinary rapidity of action is indicated by the fact that it is possible to have 10-lb. steam pressure from cold water in four minutes, and 110 lb. of steam in ten minutes from the time of starting. When the steam pressure reaches approximately 80 lb., a change-over is made from air to steam for the burner and stack blower. The procedure is to drain the steam line and then to turn on a small amount of steam, subsequently turning off all of the air and then turning on all of the steam. It is customary to use a pressure ranging between 30 lb. and 50 lb. of steam at the burner, and it is also customary to turn on more oil after steam is substituted for air in the atomizing nozzle, apparently because the steam improves the jet capacity. The steam-jet blower at the base of the stack, which has a 3/16-in. opening with a flaring taper and which is also changed over from air when the boiler has become reasonably hot, has the pressure at the nozzle so adjusted by hand as to keep a moderate draft in the firebox at all times.

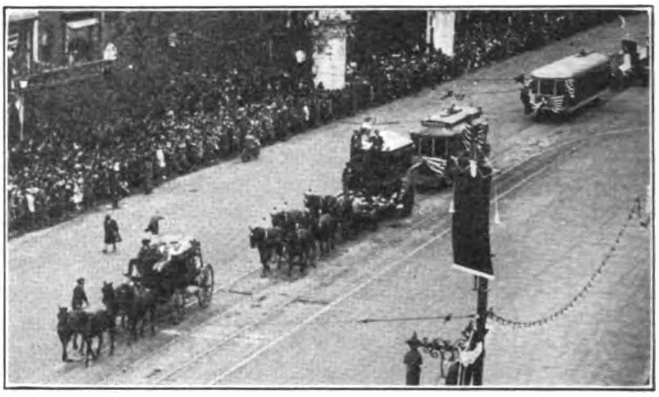
The appearance of the firebox, it may be said, affords a definite indication of the action of the burner. A dirty yellow flame in the firebox is invariably a sign of smoke at the stack, the desirable condition being an orange color with a tendency toward white. Too little oil involves a loss of capacity and is indicated by a white flame in the firebox and a series of explosions instead of a low roar. Too much oil always produces a dirty yellow flame in the firebox and causes smoke at the stack. Consequently, it is not necessary for the fireman to watch the stack to see whether or not it is smoking.

To shut the heater down the procedure is first to stop the supply of oil to the burner and then the supply of steam. The supply of low-pressure air to the firebox is then cut off, but the blower in the stack is kept on lightly for some minutes to keep out of the cab any smoke due to unburned oil in the firebox.

In the first eighteen months of the compensation law's operation in the State of New York there were 337,500 industrial accidents reported to the commission, resulting in 56,374 cases in which claimants were entitled to awards. The temporary total disability cases comprised 88½ per cent of all cases filed. The average medical cost for each injury reported was $10.95. There were 1214 death cases, in 81 per cent of which there were dependents. In 9 per cent of the death cases there were alien dependents.

Railway History Illustrated in Newark Celebration

There is at present in progress in Newark, N. J., an elaborate celebration of the 250th anniversary of the founding of the city. Pageants, parades and other forms of entertainment follow each other in rapid succession and will continue to do so all summer. Naturally the Public Service Railway is an important factor in the celebration, and by a fortunate coincidence the new $6,000,000 terminal was opened on the eve of the opening day.



TRANSPORTATION IN 1766, 1866, 1896 AND 1916, AS ILLUSTRATED IN NEWARK'S 250TH ANNIVERSARY CELEBRATION

On Founders' Day, the 250th anniversary day, a great parade was a central feature. In this the railway demonstrated the history of the industry by means of a series of vehicles representing transportation in 1666, 1766, 1866, 1896 and 1916 respectively. All but the first, an Indian vehicle, consisting of a pair of poles, each with one end carried by a horse and the other trailing on the ground, are shown in the accompanying illustration. The railway company spared no trouble in obtaining the "real thing" for this instructive exhibit.

Ventilation Problem on New York Subway

Upon an opinion of Commissioner Henry W. Hodge, the Public Service Commission for the First District of New York, has decided the subway grating question in relation to the Broadway subway in Manhattan. The gratings were to be used for ventilating the subway, but business men and civic organizations objected to their use along the principal shopping and theatrical section of Broadway, and many suggestions for their elimination were made to the commission. As a result of the adoption of the opinion of Commissioner Hodge, all the sidewalk gratings will be eliminated between Twenty-ninth and Thirty-fifth Streets and between Thirty-ninth and Forty-sixth Streets. It was found impossible to eliminate the gratings from the sidewalks between Thirty-fifth and Thirty-ninth Streets, because of the long distance to the nearest ventilating chambers and the inability to pump air over these long stretches effectually. The gratings are now to be placed in park and other open spaces along the roadway in the stretches named. This solution of the grating problem relates to points where the subway work is not yet completed. Commissioner Hodge stated that he did not believe that completed work should be ripped up for the purpose of removing gratings. The commission has given a great deal of study to the grating problem, and it is hoped that the plan just adopted will work out successfully.

Electric Locomotive Drives

The Author Discusses in Detail the Reasons for Using Quills on Driving Axles and Frame-Mounted Motors with Armatures of Increased Length, as Well as the Advantages Obtained from the Use of Gear Reductions and Side Rods

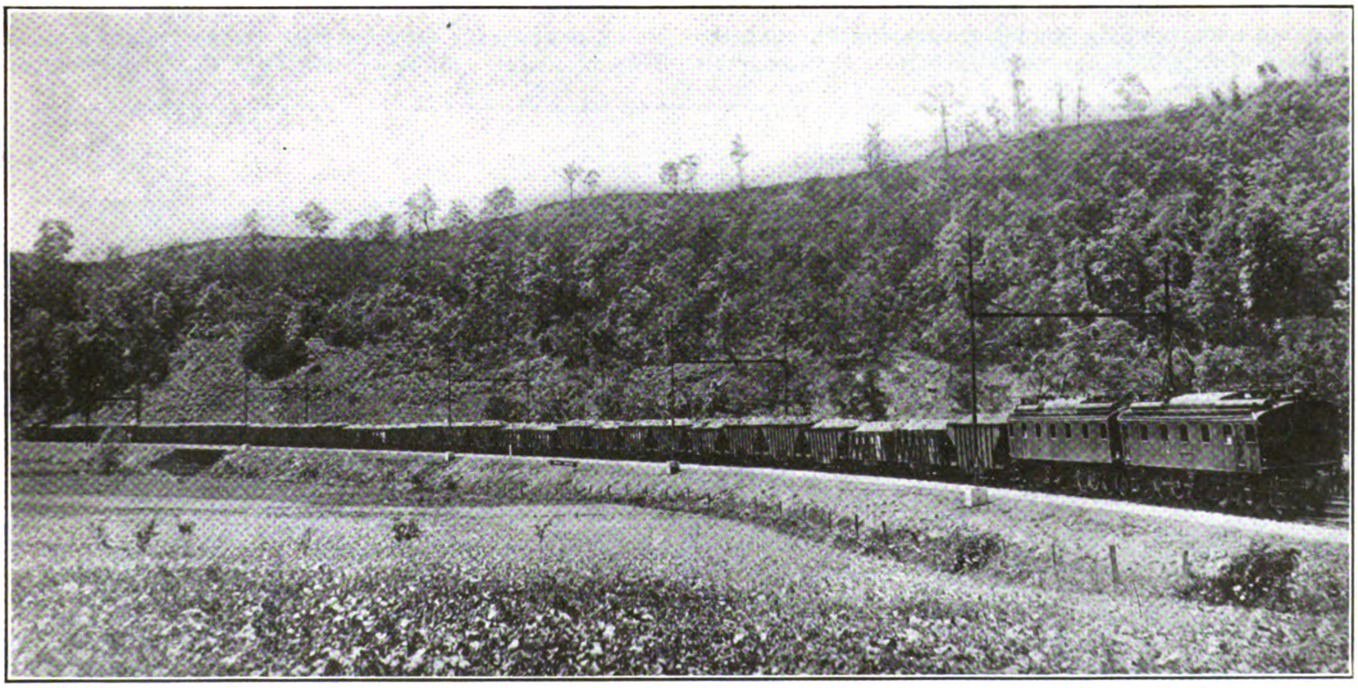
By F. H. SHEPARD
Manager Heavy Electric Traction Division, Westinghouse Electric & Manufacturing Company

THE drive for an electric locomotive, or that means whereby the torque of the motor is transmitted to the driving wheels, constitutes one of the most involved problems in electric locomotive design, although at first thought nothing appears to be simpler than the transfer of rotary motion between motors and driving wheels, which cannot be separated, because of the very nature of the locomotive construction, by more than a few feet. Nevertheless, the question is one that has been agitated for more than a decade, and even to-day radical innovations in design are in process of development.

The reasons for this condition are many. Indeed, they may even be traced back to the earliest history of steam railroading, wherein the practical standardization of rolling stock provided little latitude for broad features of general design. Since the clearances of trunk line railroads have been designed for steam locomotive use, and since these clearances have become established as a permanent standard, electric locomotives have to be constructed to suit them, even though the latter may be called upon to exceed any figures for capacity and speed that are possible of attainment with steam. This question of space limitation by standard clearance lines constitutes the first of the complications involved in the electric locomotive drive.

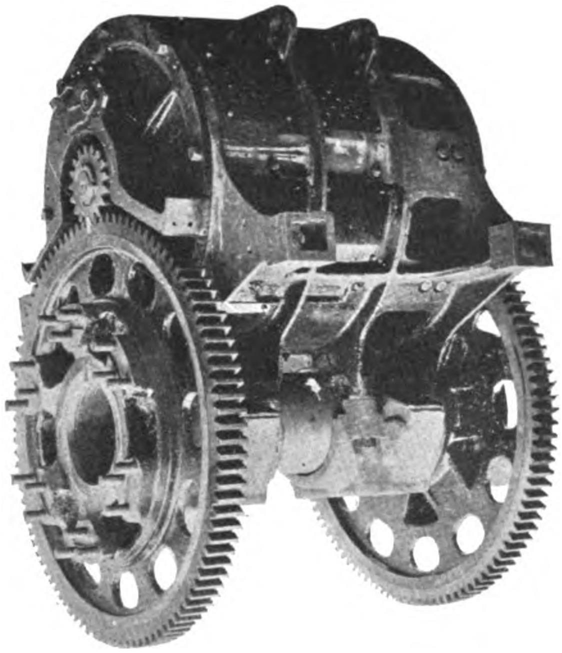
Another complication, of fully equal importance, is found in the fact that steam railroad track does not present to the passage of a train of cars the smooth, plane surface that it appears to have. Instead, it is a highly cushioned, yielding structure, capable of relatively great vertical movements under the enormous strains imposed by modern rolling stock. It is really a marvel of security developed by years of experience, and the fact that it is able to carry trains safely across country under widely varying physical conditions and subject to violent temperature changes, although for whole seasons it cannot be touched because of a solidly-frozen sub-grade, is an extraordinary accomplishment. Primarily, the ability of steam railroad track to withstand modern traffic is due to its flexibility, and its development has been along lines wholly different from those followed in the development of a roadbed suitable for electric traction in its most commonly-known form.

Electricity for traction purposes has been used until comparatively recent years only in city streets, and the primary requisite of the track on which most electric cars run is to conform absolutely to the pavement surface. In the early days, when motors actually were mounted on the platforms of small horse car bodies, this was an easy matter, yet when the demand for increased seating capacity necessitated the use of motors under the floors, together with large and heavy car bodies, there were presented enormous difficulties in maintaining the track so perfectly rigid that its motion would not destroy the adjacent pavement. This principle of maintaining the track in an unyielding plane is entirely foreign to steam railroad practice. It permits relatively large non-spring-borne weights, but it involves prohibitive first cost and maintenance charges especially when viewed in the light of steam railroad conditions where hundreds of miles of track may have to be put down to serve a traffic of possibly less than a half-dozen trains daily. On interurban lines, where



ELECTRIC LOCOMOTIVE DRIVES—COAL TRAIN HAULED BY GEARED JACKSHAFT TYPE OF LOCOMOTIVE ON NORFOLK & WESTERN RAILWAY electrical equipment is used for cars operating at higher speeds and having greater weights, the maintenance of the track, according to steam railroad experience, requires a surprising amount of attention.

In all electric car service, the weight of the car body is the predominating feature. The weight of the electrical equipment is really secondary, and this makes the electric car by no means a satisfactory basis for designing electric locomotives, where the weight of the electrical equipment exceeds that of any other part of the machine. If it were not for this fact the problem of the electric locomotive drive might not exist, because for electric cars a perfectly permissible means of connection between motor and driving wheel has been established through years of experience. This consists of a motor located between the wheels and provided with a single pinion which meshes with a gear directly mounted upon the axle, the latter carrying, through the medium of axle bearings, somewhat more than one-half of the weight of the motor, the remainder being borne by springs on the truck frame.



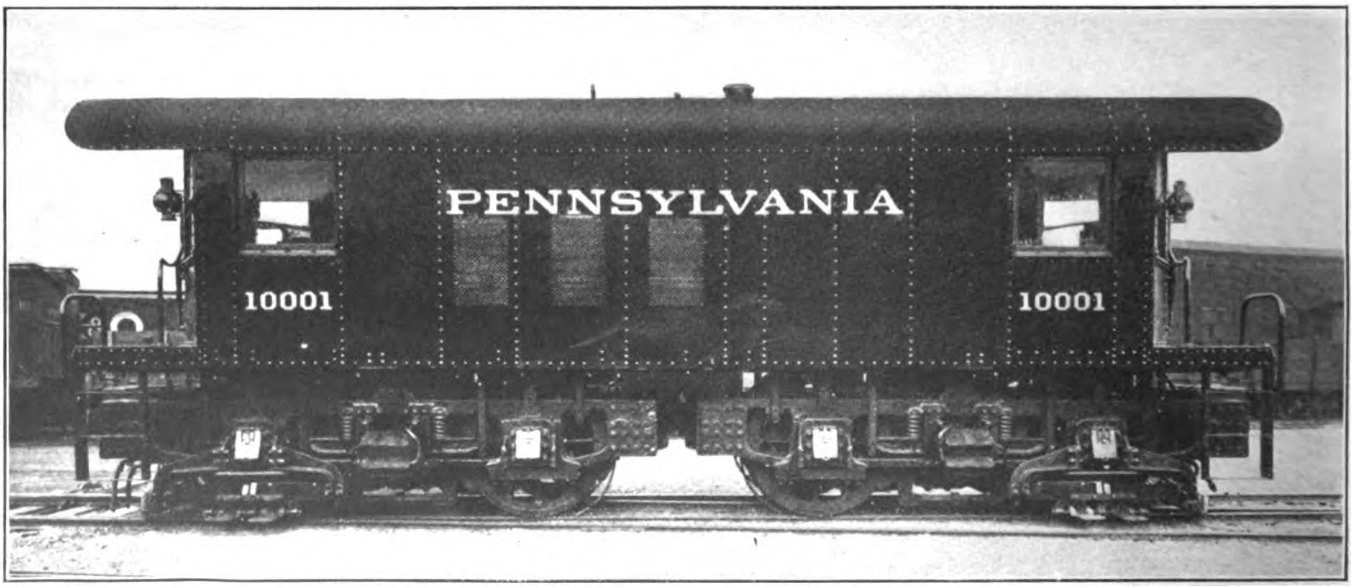
ELECTRIC LOCOMOTIVE DRIVES—SINGLE MOTOR MOUNTED ON QUILL WITH GEAR, SWITCH ENGINE TYPE

This arrangement has the great advantage of directness, and to the popular mind, the idea of the direct drive has a strong appeal. In comparison, the electric locomotive of to-day frequently appears to be a structure quite as complicated as the steam locomotive, which requires the transformation of reciprocating motion at the cylinders to rotary motion at the driving wheels. Why such an apparent reversion in design should have taken place constitutes a very natural question.

FREE VERTICAL MOTION OF WHEELS A NECESSITY

The first consideration responsible for this complication is that it is necessary to tie the mass of the locomotive together and yet to leave the wheels and axles as free as possible from restraint due to the connection of the motors to them. In other words, the wheels should be free to follow any inequalities in surface without shock and injury to the track, while the locomotive as a whole follows steadily along the general alignment of the roadway. In addition, a great effort has been made to introduce cushions between the driving motors and the wheels and axles which must be in actual contact with the rail. These devices are necessary to reduce the impact effect of inequalities in the track, and their effectiveness depends largely upon the extent of the variations in surface and alignment of the track. For perfect track almost any device is suitable, but otherwise great amplitude of movement must be taken up by the cushion.

It is to provide this cushioning effect that the various forms of "quill" drive have been developed. The first quill was brought out for the earliest locomotives on the Baltimore & Ohio Railroad, rubber pads being used to act as cushions between the quill and the wheels. A later type appeared in the original New Haven passenger locomotives, in which the drive was effected by quill arms acting through a nest of springs that were carried in pockets built within the wheels. In this design the amplitude of movement between the axle and the quill was small—only about ¾ in. A later design on the same principle had the springs exposed between the wheel spokes, and this enabled more spring material to be used, thus increasing the amplitude to 1½ in. The drive for the later New Haven freight locomotives constitutes another example of this general form,



ELECTRIC LOCOMOTIVE DRIVES—EXPERIMENTAL LOCOMOTIVE WITH MOTORS DIRECT-GEARED TO AXLES DESIGNED FOR PENNSYLVANIA RAILROAD BUT NOT USED as the gear is mounted on the quill while the twin motors whose pinions mesh with the gear are supported wholly upon the engine frame and all of the motor weight is spring-borne.

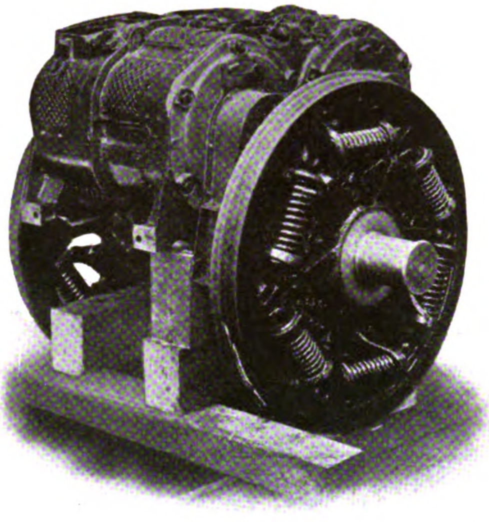
For track with greater irregularity in surface it is desirable to have still greater amplitude of movement than is provided in the above examples, and since the extent of the movement is limited only by the amount of spring material that may be introduced, there is indicated the desirability of large driving wheels for locomotives equipped with this type of drive, even when they are to be used in slow freight service. Obviously, as the driving wheel becomes larger, more space is provided for the introduction of spring material, and a greater amplitude of movement for the quill is permitted.

Flexibility between the mass of the engine and the wheels and axles may be obtained in another way by mounting the motors on the locomotive frame, so that they are wholly spring-supported, and by driving the wheels directly through horizontal main and side rods. This arrangement, however, lengthens the wheelbase unduly and imposes limiting dimensions and other difficulties in connection with the support of the motors. In practice, such a design is provided in modified form through the introduction of a jackshaft, so that the motor can be mounted directly over the driving axles. The 160-ton locomotives on the New York electric zone of the Pennsylvania Railroad constitute an excellent example of this type of drive. The arrangement is eminently desirable for service where very high speeds are the rule. The cost of maintenance is low and the limited number, accessibility and ruggedness of the moving parts, as well as the general simplicity of the design constitute extremely strong points in its favor.

NEED FOR GEAR REDUCTION

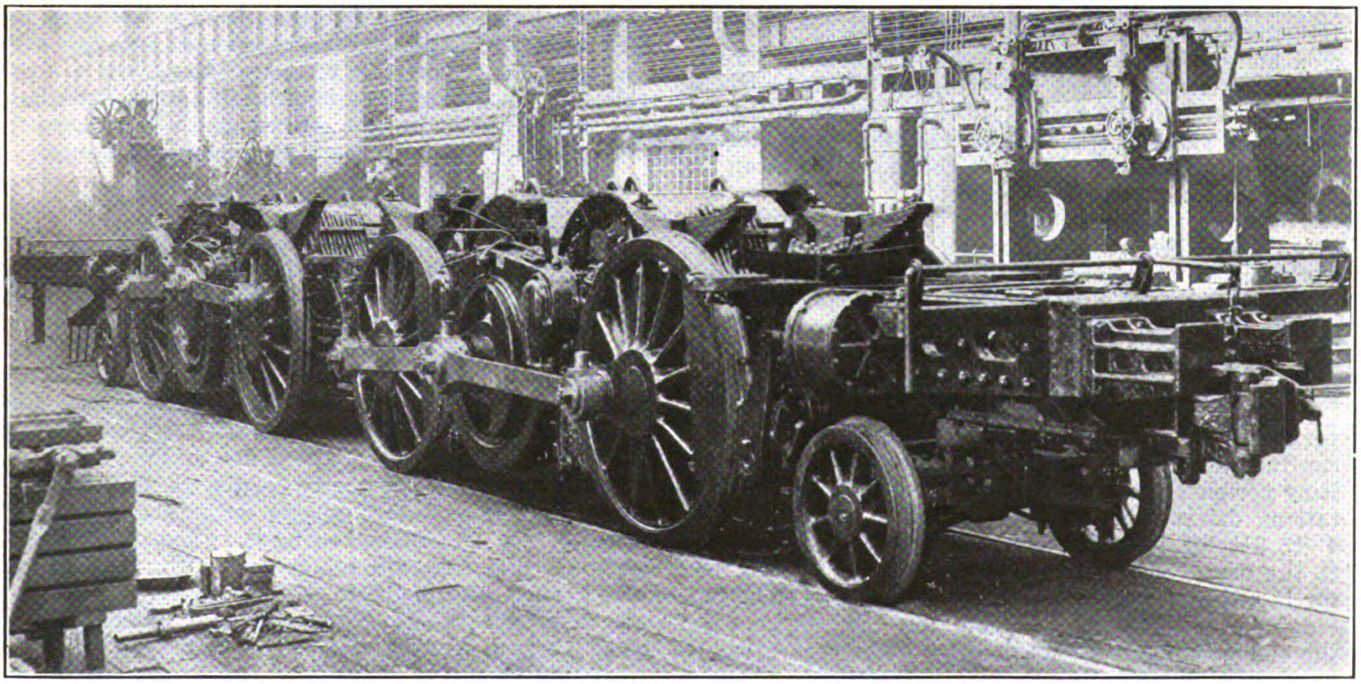
With this type of direct drive, however, it is necessary for low-speed motors to be used, because they can revolve only at the same speed as the drivers, and this involves excessive first cost. Economy in electric locomotive construction is secured for any given service by having the limiting speed of the engine coincide with the limiting peripheral velocity of the driving-motor armature or rotor, and this latter figure is, in general, about a mile per minute. As an alternative to the direct drive, the motors may be geared to the jackshaft through a considerable gear reduction, and in this way the peripheral velocity of the motor may be raised to a point where the greatest economy is effected in the motor construction.

Generally speaking, if an engine is to be gear driven, the primary consideration is the speed limit for the locomotive. Frequently, however, a condition arises in slow freight and switching service where the normal speed of the locomotive may be low but the speed limit relatively high. In this case, since no practicable speed-changing device is available, the motors cannot be designed economically for the low speed on account of the high speed-limitation, and here it is perhaps advisable to call attention to the fact that, for this reason, electric locomotive operation should be carried out at the highest practicable speed.



ELECTRIC LOCOMOTIVE DRIVES—TWIN MOTORS AND QUILL-SUPPORTED GEAR, NEW HAVEN RAILROAD TYPE

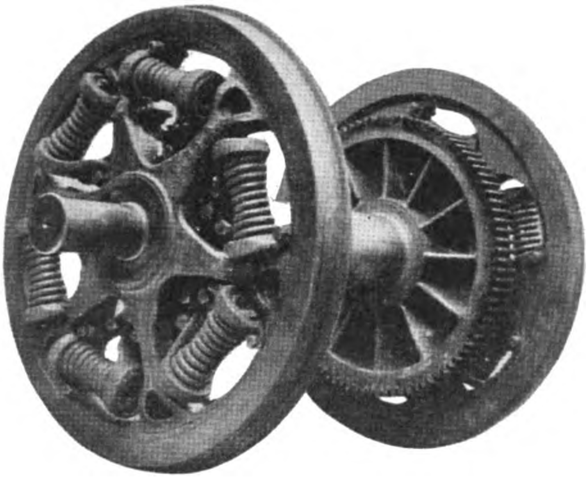
If the speed limit for a locomotive was set, for example, at 30 m.p.h., it might easily work out that a design which provided for normal operation at 10



ELECTRIC LOCOMOTIVE DRIVES—RUNNING GEAR FOR GEARED JACKSHAFT TYPE OF LOCOMOTIVE FOR NORFOLK & WESTERN RAILWAY m.p.h. would cost practically as much as one that delivered the same tractive effort at 20 m.p.h. The latter engine, therefore, would deliver twice the horsepower of the former and would do about twice as much work. Of course, the cost of the machine having double the horsepower would be somewhat larger than that having the lower working speed, on account of the necessity for larger cables, conductors, switches, etc., but on the other hand, the cost would not vary anywhere near in proportion to the horsepower that was delivered, and the use of the higher speed locomotive would be a very great economy.

LENGTH OF ARMATURE IMPORTANT

In general, the permissible peripheral velocity for railway motor armatures is of the order of 7000 ft. per minute, the limit depending somewhat upon the construction of the motor. It should be recognized that any motor is a composite structure, and that the action of the centrifugal force, which varies as the square of the speed, is bound to cause a certain amount of relative motion between the different component parts. If the centrifugal speed is excessive, these centrifugal forces will be productive of much greater relative movement than would normally exist, thus making certain the ultimate destruction of the insulation by abrasion and perhaps by mechanical disruption. There is, of course, no such thing as permanence in a composite machine, and in the case of railway motors especially, where the variable speeds cause variable forces, the influence of peripheral velocity on the motor life is an important one and cannot be neglected.



ELECTRIC LOCOMOTIVE DRIVES—QUILL-SUPPORTED GEAR USED WITH NEW HAVEN RAILROAD LOCOMOTIVES

Therefore, for a locomotive operating within any given speed limit and delivering a given horsepower, the limit of peripheral velocity, approximately speaking, establishes an absolute limit to the rotative speed of the armature, and this, in turn, roughly establishes the physical size of the motor, which, of course, can be made to deliver the most power when the rotative speed is highest. Thus the most desirable condition is that permitting a long armature of small diameter which can turn at a high speed without going beyond the limiting peripheral velocity. Unfortunately, the space limitations determined by the standard railroad gage of 4 ft., 8½ in., impose a surprising number of obstacles to the use of such elongated armatures. When a motor is mounted between the wheels, space must be provided for the gear, the commutator, the bearings and the end windings, so that the core (that portion which is effective in producing torque) is frequently less than 12 in. and seldom as much as 15 in. in length.

The influence of this restriction may be exemplified by citing the fact that rated horsepower can be increased directly by lengthening the core and thereby exposing a greater length of conductor to the magnetic flux from the field pole. Horsepower can also be increased by an increase in diameter, but this adds to the cubical contents (as well as to the horsepower of the motor) as the square of the increase, and generally speaking, the cost and weight of a motor is somewhat on the order of the cubical contents. In other words, adding 5 in. to the length of a 15-in. core increases the horsepower of the motor 33 per cent, but increases the cubical contents of the motor only about 16 per cent, because the core length is only some 50 per cent of the total length of the motor between bearings. If on the other hand, the diameter should be increased 33 per cent, the cubical contents and the horsepower would be increased 77 per cent, and the cost and weight approximately in the same order, but at the same time the rotative speed would have to be reduced so that the final result would be an increase in power of only 33 per cent as opposed to the 77 per cent increase in cost and weight.

Thus the advantage gained by using an elongated armature is important, and it exerts a marked influence upon the design of the drive. In many cases, for example, gears are used at each end of the motor to limit the stresses upon the gear teeth. This may involve a handicap which may be greater than the use of two small motors with single pinions, because of the shortness of the core that is required when the valuable space between the wheels is taken up by the extra gear. It is apparent, therefore, that there is distinct advantage in mounting the motors upon the frames if by so doing the space limitations established by a location between the wheels are eliminated. In such cases, the motor might even be constructed so as to extend out to the clearance line on either side of the engine, thus making the armature shaft of the order of 10 ft. 6 in. long.

Such avoidance of space limitation, secured by moving the motors away from between the wheels, enables motors of very great capacity and less first cost per unit of power to be installed and also permits the use of the frame of the motor as a cross-tie for the locomotive frame, as has been done on the Norfolk & Western locomotives. Also, the use of a few large motors mounted in this way and connected so as to drive several pairs of driving wheels, rather than a single pair, reduces the number of driving details and allows also ample dimensions for the gears so as to keep the unit pressure upon the teeth at a moderate figure.

COUPLED DRIVERS PERMIT LARGE MOTORS

The foregoing paragraph leads up to the reasons for using side rods with coupled drivers. Briefly speaking, motors mounted on the frame may be made of large capacity and less first cost per unit of power, and to take full advantage of this, it may become necessary to provide more adhesion than can be exerted at a single pair of wheels. However, the addition of the intervening rods, pins and bearings exaggerates the characteristic called "chattering slip." The cause of this, which has been recognized only recently, is that the driving gear, which may extend through the armature shaft, rods and pins to the driving wheels, when under heavy stress, is distorted without exceeding the elastic limit, like a spring. Should the wheels slip they are shot ahead through the discharge of the stored energy, then come to rest momentarily, and again grip the rails, when the condition of distortion is again set up and again discharged by slippage. This may result in chattering at a high frequency, producing stresses upon the rods and pins of the order of 80 per cent of the adhesive weight on the wheels. In other words, this characteristic may produce a force as much as twice as great as the maximum that is ordinarily deemed possible to place upon a driving wheel owing to the ultimate adhesive limit that exists. It follows, therefore that rods, pins and bearings must be made correspondingly heavier than they would be made on a steam locomotive. With a side-rod drive, also, there is a loss in efficiency through the friction of the rods, and possibly because of excess rolling friction caused by slight differences in diameter of the various driving wheels that may be coupled together. In general, however, the side-rod loss seems to be not more than of the order of 4 per cent at full load.

To offset this loss there are several advantages that are peculiar to the use of coupled drivers. For example, the tractive effort of a locomotive is obtained at the rails and yet is exerted at the drawbar which is 34½ in. above the rails, thus setting up a couple which tends always to relieve the weight upon the front axle of the locomotive, or in other words, to tilt the engine backward. If the propulsion current is divided evenly between the various motors, the tractive effort of the locomotive as a whole is thus limited by the weight on the lightest pair of drivers. This difference may be as much as 15 per cent, and therefore a side-rod drive may be 15 per cent more effective than a drive providing a separate motor for each pair of wheels, because there is no loss in adhesion for the locomotive as a whole, each set of coupled drivers acting as a single unit. Then, too, in case slippage takes place with side rods, all wheels rotate at one speed. With direct current, therefore, there is no difference in the voltage across the commutators, a condition which exists when a separate motor is coupled to each pair of drivers and which may cause serious damage if the trolley voltage is high.

In conclusion it might be well to emphasize the fact that to be thoroughly successful, electric operation in all its phases must be subordinated to the requirements of the railroad as a whole. It is almost futile to construct a locomotive that will be satisfactory only when the railroad is seriously limited in operation by a set of rules laid down by the electrical specialist, or when the machine has to be handled by expert electricians. If the electric locomotive can be operated only upon track of extraordinary rigidity, a handicap is placed upon its use, and this may be of far greater influence than the handicap imposed by the minor complication of providing a cushion between the wheels and the motor. Again, if the locomotive is so expensive that it can be used only under exceptional traffic conditions, it defeats the major reason for its existence, and for this reason the electric locomotive must be economical in design, even though this may mean the use of elaborate gearing as well as a more or less complex construction to permit motors of ultra-large capacity. Primarily, an electrified division is operated for the benefit of the railroad, and should the opposing view be taken and the operation restricted solely to make a record for the electrical equipment, the result may be only an apologetic success.

Some time ago a concession was granted for electrifying the Swedish East Central Railway, but nothing was done in the matter. The proposal was to erect a hydroelectric plant at Nijölarp, using the Svarten. The work is now, however, to be taken up, and it is hoped to finish it by 1920. The electrification of the Sund-Bjärred Railway has been delayed by troubles with the telephones, caused by induction, which difficulties have now been overcome.

Copper-Zone System Sustained

Connecticut Commission in Groton & Stonington Street Railway Case Says New System Is Improvement Over Old Nickel-Zone System

IN a recent decision, mentioned briefly in the news department of the issue of this paper for June 3, the Connecticut Public Utilities Commission held that the new or copper-zone system put into effect by the Groton & Stonington Street Railway was in general an improvement over the old nickel-zone system in that former inequalities of rates were eliminated. In only four places, where the new arrangement caused some injustice to patrons, was an adjustment necessary. As the decision contains a number of interesting features, an abstract is presented.

DEVELOPMENT OF CASE

The Groton & Stonington Street Railway, from the time of its incorporation in 1903 until July 1, 1912, was independently operated, but after the latter date it was operated under lease by the Norwich & Westerly Traction Company, which company also owned and continues to own the entire outstanding common stock of the former line. The company operates cars between Groton and Westerly, R. I., a point 0.29 mile east of the Connecticut State line, thus placing itself under the jurisdiction of the Interstate Commerce Commission. On Sept. 30, 1915, the company filed a new tariff with this commission which, after being amended, was made effective on Nov. 22, 1915.

Prior to the filing of this new tariff the system of fares was based on zones of varying lengths, a 5-cent fare being charged for a ride in each zone. Lap-overs were established at the terminals of the several zones. The main line between Groton and Westerly was divided into six 5-cent zones, and a branch line to Old Mystic into two such zones. Tickets were issued in books of forty at a reduced rate of 3.75 cents for regular 5-cent zone ride, good for travel in the last two zones toward Westerly, and similar tickets were sold in books of thirty at 3.5 cents, good on the two zones of the Old Mystic extension. "Public school scholars' fifty-trip ticket books" were also sold for $1.50, good until used on any zone on the line. These school tickets were available to any persons between the ages of five and twenty-one, and according to the former tariff sheet could be used between 7 a. m. and 6 p. m. Testimony showed that these tickets had been sold not only to school children, but also to school teachers.

The new tariff was based on an entirely different arrangement. The main line between Groton and Westerly was divided into eighteen zones of varying length, but averaging approximately 1.11 miles each, and the Old Mystic branch was divided into four zones of an average length of 0.815 mile. In general, the fare charged under the new schedule was 5 cents for the ride in any part of two zones, 2 cents a zone for a ride in more than two zones, this being an average rate of approximately 1.8 cents per mile for through riders on the main line. On account of the 2-cent unit of fare, the new form was called the copper-zone system to distinguish it from the nickel-zone system, although the 5-cent unit as a minimum charge for each passenger was still retained.

COMPLAINT ABOUT TEACHERS' RATES

On Nov. 24, 1915, teachers in Groton and Stonington petitioned the commission for relief from alleged unreasonable intrastate rates. Later the two towns mentioned petitioned to intervene in the case, and as a result the commission made a double investigation as to the reasonableness of the new Groton & Stonington Street Railway rates for teachers and their reasonableness for the entire riding public in the territory served. The complaint of the school teachers was directed against the withdrawal of the privilege formerly enjoyed by them of riding on scholars' tickets at a reduced rate irrespective of whether they were twenty-one years of age or more. The commission held, however, that there was no statutory obligation to carry teachers as such at rates different from those offered to the general public. The fact that some teachers of more than twenty-one years had been permitted to enjoy lower rates than other passengers (whether with or without the official sanction of the company) vested no rights in the teachers for a continuation of such lower rates. In other words, the main question became one of reasonableness of the rates as they affected the general public.

THE RATES IN GENERAL

In judging the rates in general, the commission endeavored to ascertain whether the net return earned under the schedule as a whole was excessive and, if not, whether any of the individual rates were unreasonable. As a basis for judging the fair return the commission had before it various valuation figures. Engineers employed by the company calculated the total estimated cost of reproduction at $928,610, including $50,000 for organization expenses, while the investigation of the commission's accountants in the actual cash expenditures showed an original investment of $811,167, including $50,000 for organization and construction expense. The plant and equipment account of the company totaled $1,083,932, while the capital stock and bonds at par value amounted to $1,075,000, and at taxable value to $935,000. On the basis of these figures, the commission came to the conclusion that the company should be permitted to earn a return upon a valuation amounting to $900,000.

The company expected from its new schedule an increase in gross passenger revenue of approximately 20 per cent, and from the figures before the commission it was held to be reasonably apparent that the actual increase attributable to the new tariff would not exceed this figure. Using this percentage, the commission determined that the net income would be less than 5 per cent upon the allowed valuation, which would not constitute an excessive return.

REASONABLENESS OF INDIVIDUAL RATES

Turning to the subject of individual rates, the commission stated that it would be impossible to secure the permissible increase of 20 per cent in revenue without increasing some of the individual rates, and it would naturally follow that certain rates which were disproportionately and unreasonably low should be increased at a greater percentage than rates which were formerly fair or high. The petitioners showed instances where the increase in percentages were great, but many of these larger increases appeared to arise at points where the former zone lengths were excessive and bore no fair relation to the cost of service. In general, therefore, the commission found that with certain exceptions the new schedule secured a more equitable distribution of the rates among the several localities, and that the alleged discriminations between localities were in a large part the result of the leveling-off of former inequalities. The withdrawal of the special rate ticket book between Stonington and Westerly and on the Old Mystic branch was considered to be an increase of rates as reasonable as the other increases. In regard to the interstate service, the commission held the traffic to be so small as to be immaterial in the effect upon the conclusions reached.

The commission made a careful study to ascertain whether a system of mileage or equal-length zones might be established with either a 1-cent, 2-cent or possibly a 3-cent rate per zone. In its opinion inequality would exist to a certain extent in any system having varying lengths of zones with arbitrary terminal points. In the majority of cases in steam railroad passenger transportation, rates are fixed on a mileage basis, but the commission believed that the establishment of arbitrary mile-zones of exactly equal length in connection with street railway transportation might work an injustice to the most popular centers along the line, since it was a recognized economic principle pertaining to street railway rates that the denser the population the longer should be the possible ride for a single fare unit. While an equal-length zone system might equitably and successfully be established on long lines through sparsely settled territory, such a system in cities and lesser centers of population would have a tendency to impose unnecessary burdens upon the traffic.

At the four places where the new system worked some injustices in the opinion of the commission, it ordered neutral zones to be established, the effect being to permit riders where traffic was densest to secure transportation more nearly commensurate with the cost of service. The immediate result would be a slight reduction of gross revenue, but the commission thought that the establishment of the neutral zones would in the course of the year stimulate the riding habit and thus offset the concession in rate. The company is required to alter its system of rates to be effective on and after July 1, 1916, accordingly.

Warning Signs at City Crossings

The Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, has reduced the accident hazard at its crossings in the city of Waterloo by the installation of distance warning signs of the type shown in the accompanying illustration. This road, which does a heavy freight business, has a belt line around the city, serving the industrial districts with many branch tracks to manufacturing plants. These tracks, in addition to the high-speed passenger lines, have a proportionately high number of highway crossings. As the tracks are on private rights-of-way, the speeds are comparatively high for city service.

WARNING
ELECTRIC RAIL ROAD CROSSING
300 FT

WATERLOO, IOWA—HIGHWAY WARNING SIGN

Warning signs of the type shown are placed near the curb line on the highway at a distance of 300 ft. away from the track. These signs serve to call the attention of travelers to the fact that they are approaching a crossing. The result is a reduced hazard of operation.

Bridge Construction and Reconstruction in Kansas City, Mo.

Ordinance Provisions Impose Heavy Burden on Railway Company for Bridge Construction and Maintenance

ONE of the unusual conditions that exist on the Kansas City (Mo.) Railways, as compared with conditions on most other systems, is the large percentage of its track that is carried upon bridges or viaducts. This is partly on account of the contour of the ground and partly because so many of the lines cross the Kaw River and various railway properties. The total length of these structures is almost 26,000 ft., and they carry a total of 9.8 miles of single track. Their total cost was more than $2,000,000. The cost of maintaining and renewing them is naturally very much heavier than the cost of maintaining a similar amount of track upon the surface. Many of the structures are subject to corrosion on account of the smoke from locomotives passing beneath them, in addition to the ordinary wear and tear and decay incident to such structures.

Some of these structures belong to the railway company exclusively, but by far the greater number were erected under some of the ancient ordinances and contracts with the city and the railway company, which obligated the company to build the structures and maintain them for all time. Many which were built some years ago have had to be reconstructed in order to bear the loads of the present day imposed by the cars of increased size, and especially by the very heavy trucks which are now operated over the highways.

For example, the old structure across Jersey Creek at Third and Freeman Streets formerly consisted of three very light trusses weighing in all only about 7½ tons, whereas under modern loads and specifications not less than 15 tons of steel were required to carry the load. The deck of this structure became badly decayed and was unsafe for vehicles. The trusses were so light that they were overstrained by cars passing over the structure. The masonry abutments, however, at either side were very heavy, and with some repairs and painting were put in first-class condition. Four riveted trusses taken from the old Twelfth Street incline were substituted for the old trusses, and a substantial floor of new timber was laid. The total cost of renewing this structure was about $3,000, all of which was borne by the railway company.

Another steel structure 1664 ft. in length, which crosses the Rock Island and Union Pacific tracks at Seventh Street, became so badly corroded by locomotive gas that all traffic had to be temporarily discontinued until it was reconstructed by the company at an expense of $30,000.

In order to prevent other structures from deteriorating a great deal of maintenance work has been required. The Fifth Street viaduct in Kansas City needed extensive repairs to its floor system in the past year, costing $10,000, in order to preserve the metal from corrosion. In making these repairs every bit of the steel work was cleaned by means of a sand blast provided by a portable electrically driven compressor having a capacity of 100 cu. ft. of free air per minute.

The railway company has also contributed $300,000 for the reconstruction of a three-span, 734-ft. bridge across the Kaw River at James Street, and $300,000 for a new concrete viaduct at Twelfth Street. Both of these viaducts carry a roadway separate from the space occupied by the street railway tracks. The railway company will also contribute to the construction of a new high-line bridge which will be built across the Kaw River at Central Avenue. The cost of all the changes in this bridge, not including much of the work that must be done by the street railway, such as rerouteing of its lines, will be in the neighborhood of $600,000, half of which will have to be paid by the railway.

"Transmission Losses" in the Purchasing Department

The Author Analyzes the Causes of Losses and Suggests Methods by Which They May Be Reduced

BY H. B. TWYFORD
Formerly Purchasing Agent Underground Electric Railway Company, Ltd., of London

WHEN a purchasing agent buys any manufactured article he is purchasing in a composite form all the materials which go to make up the finished product. The manufacturer of a motor or a looseleaf ledger had to buy various materials to produce these articles, and these materials were again the finished product of some antecedent manufacturing process.

Tracing back this succession of buying and selling, it is found widening and spreading until the original raw material is reached. If, in the exercise of the buying function through all these movements, the execution of it can be more economically administered, it has a very appreciable effect on the ultimate cost of the finished product.

In the great fabric of business there are losses incurred with every operation. These are the "transmission losses" and any lessening of them by the use and adoption of more efficient and scientific methods draws more closely the lines of our economic system. The purchasing function holds an important strategic position in this complex business structure, and by its proper conduct the transmission losses of its own department can be reduced to a minimum.

The influence of a good buying policy and the use of proper methods is not confined, however, to the operation of its own particular function but has a broader and wider significance for it distincly affects a variety of commercial transactions in many aspects, and the benefits derived are direct and positive and can be set forth beyond any doubt or miscalculations.

THE CAUSE OF LOSSES

In the purchasing department, as in every other division of a business, there are innumerable small efficiencies and economies which can be put into force and be of considerable assistance in the operation of the department, but these are almost entirely local in the benefits derived, and they are in effect in all well-administered purchasing departments.

There are, however, some phases of purchasing which do not always receive sufficient consideration, and it is these which have a large influence on business generally. Personal experience has demonstrated that the connection between many buyers and the best available sources from which to make their purchases is loose and uncertain, resulting in losses which show up in the increased selling and general expenses of every commercial establishment and consequently adversely affect prices.

If the selling department of an organization worked at an efficiency of 100 per cent and closed every negotiation it entered into, it would mean a tremendous lowering of the percentage that selling expenses bear to the final cost of an article, but this is an impossible condition. It is, however, possible for more efficient buying to make a considerable advance in this direction. It is not an exaggeration to say that at some time every purchasing department is the cause of transmission losses between buyer and seller.

How Losses Are Incurred

The following incident will illustrate this point and is related because it is an actual occurrence which came under the writer's notice. A requisition was received to purchase a large quantity of steel stampings, and requests for quotations were sent to a number of manufacturers. Owing to the incomplete information on file in the buyer's office 60 per cent of the manufacturers could not quote because they were not fitted to make that particular style of stamping.

This is a clear loss of a very large percentage of the purchaser's efforts, but if that were the only loss it would not have far-reaching effects. As a consequence of the promiscuous manner in which the manufacturers were approached for prices, 60 per cent of them were put to the trouble, inconvenience and expense of investigating and replying to the invitation to bid without the slightest prospect of securing the business.

Such instances very appreciably increase the selling expenses of practically every business house. This expense must be loaded on to the selling price and is ultimately paid for in this way by some buyer. This is a feature of unscientific purchasing which is too prevalent but can be remedied by better records. In the illustration cited, the buyer should have had accurate information regarding the manufacturers who were able to make exactly the class of stampings required, and his inquiries would then have gone only to such concerns.

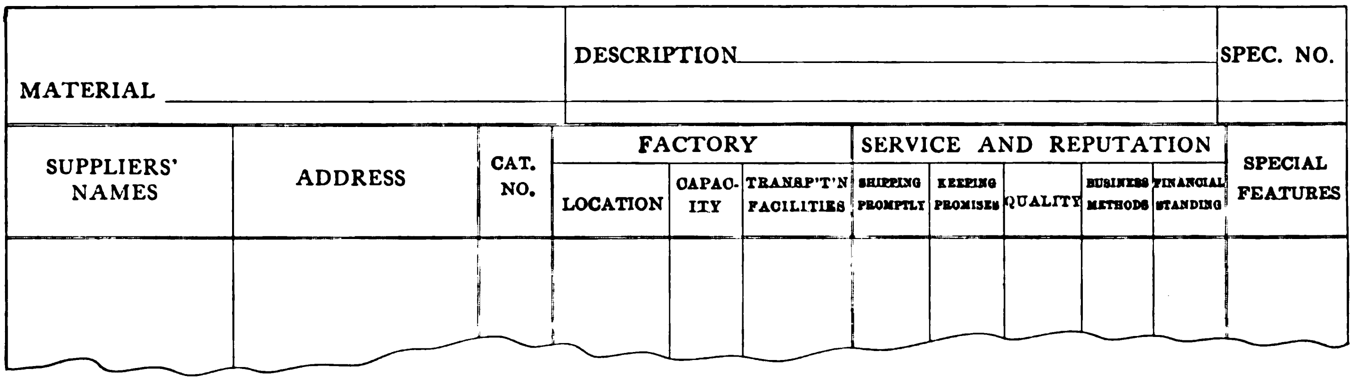
Where a buyer is purchasing a very limited assortment of materials, it is entirely feasible for him to work at an efficiency of 100 per cent, but this efficiency cannot be maintained by those departments which handle a very large variety of goods. Even in such cases indiscriminate shopping or marketing is inexcusable. The writer has known cases where vague and loosely worded inquiries have brought salesmen from long distances only to find that the material required was not in their line, or that other houses were better fitted to supply the purchaser's needs.

Among manufacturers of nuts there are some who confine themselves to the milled description only, while others make only punched nuts. Some also make nuts of certain small sizes, while others limit their product to larger sizes. Yet inquiries are frequently sent out to all of them on a hit-or-miss principle. The manufacturers and vendors of almost any product or commodity can be segregated into those who are in a position to supply a purchaser's exact requirements and those who are not.

Losses are also incurred through the ambiguous wording or incomplete description given on many orders which necessitate references back for additional and correct information. The remedy for this is proper specifications, and these should be on record in every purchasing office. In some cases they may consist of only two or three words, figures or dimensions, but they should be accurate and impossible of misconception.

How Losses Can Be Reduced

Improvement of the conditions outlined involves a continual educational process for the man in charge of the buying. Constant research work is necessary for his department. Negotiations for a purchase should be entered into only with those concerns which are best fitted to undertake the business. This can be accomplished by accumulating and properly tabulating reliable information. In keeping a record of manufacturers and suppliers, there are other considerations besides the knowledge of the actual product they are able to supply. Can they make shipments promptly and in accordance with the buyer's requirements? Are they located geographically to give good service? We have all had experience recently of what freight delays and embargoes mean. Are they financially in a position which insures the buyer protection in that respect? Do they keep their promises? These and any other special features necessary in individual cases should be systematically recorded and tabulated.



MATERIAL ____________

DESCRIPTION ____________

SPEC. NO.

SUPPLIERS' NAMES	ADDRESS	CAT. NO.	FACTORY			SERVICE AND REPUTATION					SPECIAL FEATURES
			LOCATION	CAPACITY	TRANSP'T'N FACILITIES	SHIPPING PROMPTLY	KEEPING PROMISES	QUALITY	BUSINESS METHODS	FINANCIAL STANDING	

FORM ON WHICH PURCHASING AGENT CAN RECORD SOURCES OF SUPPLY

The accompanying form will be found convenient for recording sources of supply. Either a card or the looseleaf system can be used. If it is not possible to give complete specifications in the space allowed for description, they can be kept in separate folders and numbered. If necessary these specifications can be printed, or a number of carbon copies can be kept ready to send out with inquiries and orders. Many articles are purchased through supply houses, and it is important to know where the factory is located.

If a record similar to this is kept, a purchasing agent can be positive that he is negotiating and ordering only with concerns which are best fitted to supply his requirements, and he knows he is keeping to channels where neither he nor others will incur any losses through promiscuous shopping and ordering.

As pointed out in the earlier part of this article, many economies can be put into effect in a purchasing department, which are beneficial only perhaps to the department itself or to the establishment with which it is connected. If a loss is incurred by anyone it is more than offset by the gain. Suppose, also, that a buyer beats down a seller on his price or obtains more favorable terms. This is a loss on one side and a gain on the other, therefore the general economic system of business has suffered no loss. But in "transmission losses" there is no gain to anyone, and by the wasted effort and expense our whole commercial economic system is so much poorer.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

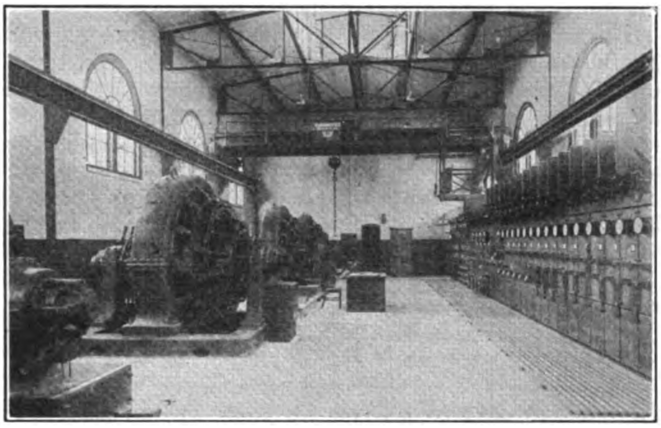
A Recent Railway Substation—I—General Features

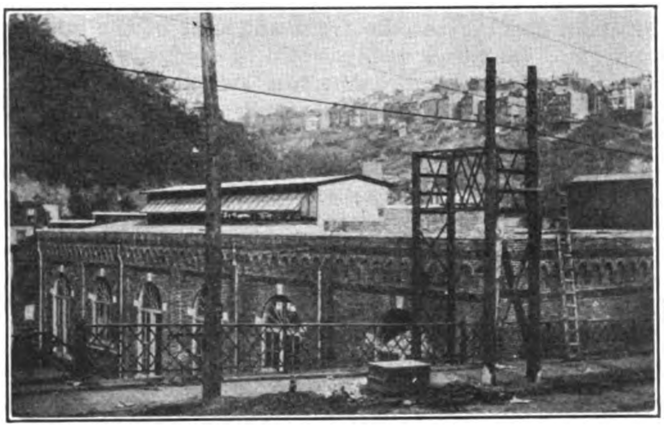
BY G. C. HECKER

Chief Electrician Pittsburgh Railways

For a number of years the power supply for the lines of the Pittsburgh (Pa.) Railways, in the north-side district of Pittsburgh (formerly the city of Allegheny), was furnished by the Manchester power station containing five engine-type, 600-volt railway generators, and by several similar units in the Brunot's Island power station. The latter is a large a.c. turbo-generator station of which the railway units constitute but a small portion of the total generating capacity.

A recent analysis of the power costs and future power requirements for railway purposes in this district led to the conclusion that a large substation, centrally located and designed to care for the natural growth of traffic, could most economically furnish this power. A series of feeder tests were therefore conducted, the results of which, together with power-station load and traffic data, were used to determine where the substation should be located, the number and size of units necessary, and other general requirements.





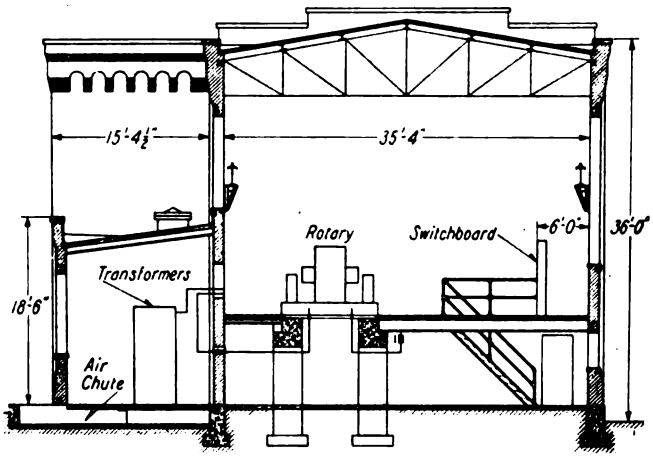
GENERAL VIEW OF TAGGART STREET SUBSTATION, SHOWING ROTARIES, SWITCHBOARD AND CRANE—VIEW FROM BRIGHTON ROAD LEVEL

The resulting new substation now in operation is located between Brighton Road and Taggart Street, a short distance north of Columbus Avenue. Some of the general features of this substation are given in the present article. In a later one the switchboard and auxiliaries will be taken up more in detail. The present equipment, which was furnished by the Westinghouse Electric & Manufacturing Company, consists of four 1800-kw., 600-volt, six-phase, 514-r.p.m., commutating pole, rotary converters; twelve 625-kva., 11,000/424-volt, oil-insulated, self-cooled, single-phase transformers, and the necessary switchboards and auxiliary apparatus. The station is planned for and can be readily extended to an ultimate capacity of six machines, although the present building will accommodate but four. The high-tension switch structure, switchboard panels and conduits are installed for the ultimate capacity of the station. The building is constructed almost entirely of fire-resisting materials, and the completed station is an excellent example of modern practice in railway substation design.

The operating room, containing the converters and switchboard, is located on the second floor of the building. Each converter is supported on two foundation walls built on a reinforced-concrete footing course, 12 ft. square. These foundation walls serve to support one end of the floor beams. On the first floor elevation a car track from Taggart Street extends 16 ft. into the building. Removable floor plates are provided in the second floor, directly over the track, so that equipment may be unloaded conveniently from cars by means of an overhead, electrically operated crane, traversing the operating room.

The transformers are arranged in a single row, in a one-story room on the first floor elevation, parallel to the operating room, and are supported on I-beams, over a ventilating passage extending the length of the room. Air ducts from outside of the building connect with the passage, one duct being provided for each transformer bank, and ventilators are installed in the roof over the transformers so that an excellent circulation of air is maintained. A system of piping connecting with all transformers permits draining the oil from any transformer in case of fire. When transformer repairs are being made the oil may be drained into drums or barrels.

The high-tension switch structure occupies three floors across the Brighton Road end of the building and is entirely isolated from the remainder of the station by a brick wall. The construction of the switch structure is somewhat of a departure from the previous practice of the company, in that it is a combination of reinforced-concrete slabs and brick. The incoming, 11,000-volt, three-conductor cables enter the high-tension switch structure on the first floor and terminate a short distance inside of the building wall. The 11,000-volt transformer cables leave the switch structure on this floor, passing underneath the floor in 4-in. iron pipes to the transformer room, where they terminate near the tops of the transformers. The electrolytic lightning



CROSS-SECTION OF SUBSTATION

arresters, series and potential transformers and fuses are located in the switch structure on the first floor. The second floor of the switch structure contains the oil circuit breakers and disconnecting switches. The circuit breakers are of the remote-control type, electrically operated, and are supported in channel irons built in the compartment walls. The four circuit breakers in the center of the switch structure control the incoming cables and the remaining six, three on each end of the structure, are for the transformer banks.

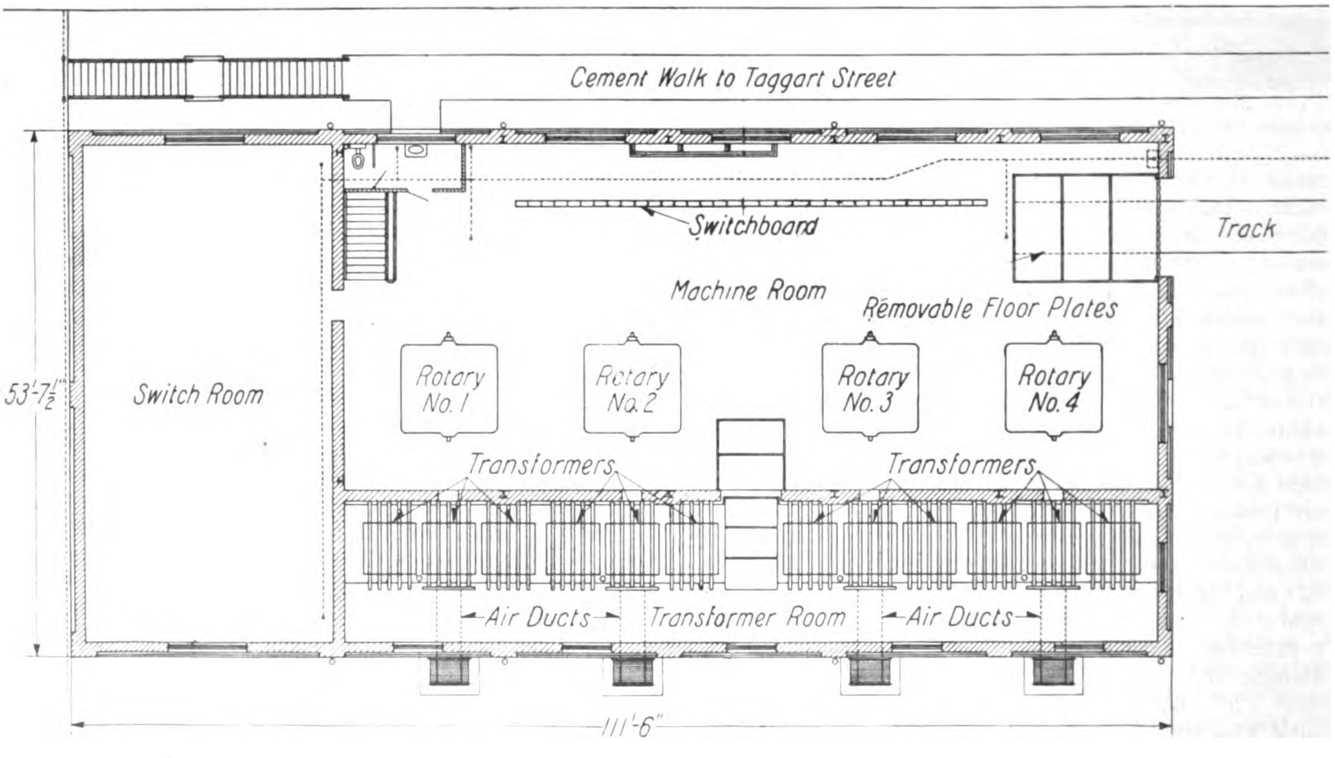
The third floor of the switch structure consists of the busbar compartments which are entirely inclosed, except for small openings at the front and rear of the busbar supports. The buses are installed in duplicate, each set being provided with disconnecting switches for sectionalizing. All openings in the switch structure, not isolated by elevation, are covered with transite wood doors. Hardwood insulating mats are placed on the floor in front of all disconnecting switches, fuses and lightning arresters. Provision is made for short-circuiting and grounding any high-tension circuits upon which men may be working. To avoid errors and possible accidents, the names and phase letters of each circuit are painted on the floors, walls and doors of the switch structure.

On the first floor, under the operating room, is a motor-generator set, consisting of a 5-hp., 600-volt, shunt-wound, d.c. motor, direct-connected to a 4-kw., 125-volt, compound-wound, d.c. generator. During approximately twenty hours of the day the control circuits are energized from this set. A 60-amp.-hr., 125-volt, lead-plate storage battery, located in a small fireproof and vaporproof room on the first floor, is used for the operation of the control circuit during the remaining four hours of the day and in emergencies. The battery is charged once a week from the 600-volt station bus through a suitable rheostat.

The rotary converters are of the self-starting type, and the starting panels are mounted in the wall between the transformer room and the operating room so that all switch terminals extend into the former room just above the low-tension transformer terminals. Connection from the starting panels to the transformers is made with copper strap, supported on bus-type insulators, this form of construction being very rigid and presenting a neat appearance. The negative converter panels, each containing a negative switch, an equalizer switch, and a series field short-circuiting switch, are mounted on the bearing pedestals at the commutator end of the machines. The negative and equalizer buses are supported from the floor beams, directly under these panels, and connections are made with copper strap passing through openings in the floor. These connections are entirely inclosed by transite wood at the sides and tops of the panels.

The station lighting is supplied from the 600-volt d.c. bus and is supplemented by emergency gas lighting. In the operating room, twelve 250-watt tungsten units with enameled steel reflectors supported 21 ft. from the floor furnish the illumination, no lights on the switchboard being required. A standard motor-driven, railway-type air compressor, located on the first floor and connected with a system of piping in the floor, furnishes compressed air for cleaning apparatus.

In the design of the station simplicity of operation, reliability of service and the safety of the operators



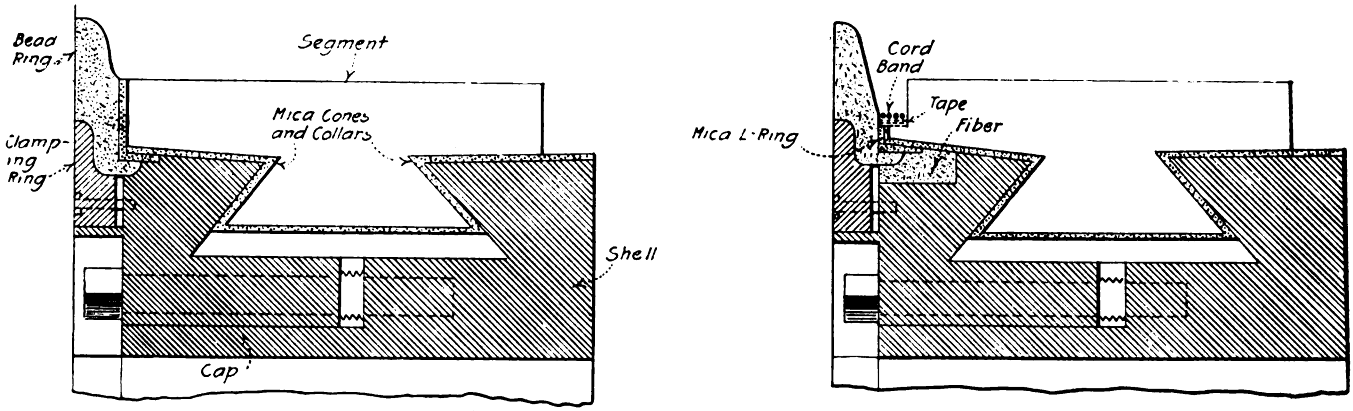
PLAN SHOWING LOCATION OF ROTARIES, SWITCHBOARD, AND TRANSFORMER AND SWITCH ROOMS have received the utmost consideration. The requirements of the National Board of Fire Underwriters have been fully complied with and every effort has been made to minimize fire hazards. This substation was erected and the equipment installed under the supervision of F. L. Aime, engineer Pittsburgh Railways.

Maintenance of GE-800 Motors

BY J. R. SMITH
Superintendent Lancaster Traction & Power Company, Lancaster, Ohio

Our GE-800 motor equipments were a constant source of annoyance, due to commutator failures, until a few years ago when we attempted in various ways to eliminate the causes of this trouble. After much experimenting we found a way to prevent entirely the short-circuits and grounds so common on the commutators of motors of this type.

As these motors were designed for grease lubrication, they had no adequate oil guards, hence the use of oil as a lubricant resulted in oil reaching the commutator segments even though the greatest of care was taken to use minimum lubrication. The commutator contains an L-shaped mica ring clamped by a bead ring of composition material against the outer ends of the segments. This bead ring in turn is held by an iron clamping ring. Oil from the bearing crept over these rings, reached the segments, and penetrated between the ring and the ends of the segments. This oil carried with it particles of carbon dust and developed short-circuits between the segments.



SECTIONS OF GE-800 MOTOR COMMUTATOR BEFORE AND AFTER REMODELING

We solved the problem of keeping the oil and other foreign substances from penetrating between the ring and the segments by making the following change on the commutator: The iron clamping ring, bead ring and mica ring were removed from the commutator, and the armature was placed in a lathe. A cut ¼ in. wide and to a depth of within 3/16 in. of the bottoms of the segments was turned off the inner ends of the segments, ample brush surface being still left.

After insuring that the armature was free from all defects, the L-shaped mica ring, trimmed down to exactly the diameter of that part of commutator from which the cut was taken, was placed in its original position, butted against the ends of the segments, and held in place by the bead ring and the iron clamping ring. The ends of the segments were sealed to the mica ring with a high-grade commutator cement or plaster of Paris before it was finally clamped on the rings. After the rings were in place and all cement or plaster of Paris was wiped away from the joint, thick shellac was applied, and two thicknesses of friction or linen tape, trimmed to the exact width, were wrapped over the joint. Over this a band of small cord was wound. The cord was then painted thoroughly with heavy shellac and baked well.

We inspect these motors once every 800 car-miles, and at each inspection wipe out the groove with a piece of felt dipped in gasoline.

The change described above practically eliminated the trouble from short-circuits, but occasionally a ground would occur through the outer mica cone due to the short creepage path to ground. We eliminated this by taking a lathe cut off the inner edge of the commutator cap that supports the outer mica cone and locks the commutator, and substituting a collar turned out of wood fiber. The cut taken from the cap is 1 in. wide and approximately ½ in. deep, and the fiber collar substitute has, of course, the original surface taper. Commutator troubles are now unknown with this type of motor, although we operate on as high as 625 volts.

Those familiar with this motor are aware that, compared with modern motors, its armature journals are small for its weight. This fact led us to use a high-grade phosphor-bronze bearing instead of babbitt, which gave very low mileage. We realize that the hard bearing shortens the life of the journal, but we plan to sleeve the journal or to build it up by the welding process when necessary. Our bronze bearings are perfectly satisfactory, having already given four times the mileage of babbitt bearings without appreciable wear.

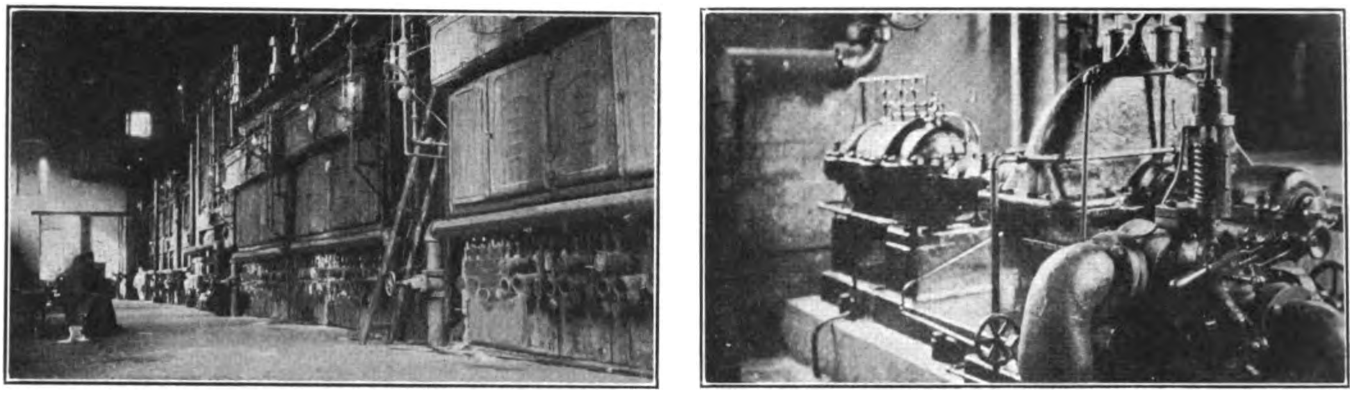
By the above procedure, we have materially reduced maintenance costs of this equipment and, in addition, we no longer face the bugaboo of the disabling of equipment at a time when it is most needed.

Firing with Gas at Elyria Power Station

BY A. P. LEWIS
Superintendent Power and Shops Cleveland, Southwestern & Columbus Railway

Previous to the installation of gas for fuel in the Elyria power station of this company the boilers were hand fired. All coal was unloaded by hand and, while this plan was expensive, the company never got to the point of installing coal and ash-handling machinery and stokers. This was mainly because most of the boilers were set too low to admit of stoker installation without raising the boilers, a very difficult and expensive operation under these conditions.

The discovery of natural gas in large quantities near by seemed to offer a solution of our problem, so a long-term contract was made with the Berea Pipe Line Company, which owns extensive fields east of Elyria and south of Cleveland. From the fields gas is piped through an 8-in. high-pressure line, 16 miles long, which has a capacity of 4,000,000 cu. ft. per day. The wells average



BANK OF BOILERS IN ELYRIA POWER STATION EQUIPPED TO BURN GAS FOR FUEL; INTERIOR OF GAS REGULATOR AND METER HOUSE

about 2800 ft. in depth and the rock pressure is about 1000 lb. per square inch. This pressure is reduced to 100 lb. for transmission.

One of the best regulator houses in this country is located on this property, a diagram of which is shown in an accompanying drawing. The gas which reaches the plant at 85 to 90 lb. pressure, is reduced to 20 lb. pressure for metering. The two meters are of the proportional type, each of capacity sufficient for the plant, so that there is always one meter in reserve. After going through the meter, the gas is reduced to 8 oz. pressure and delivered into a 24-in. pipe line, which distributes it to the different boilers.

The boiler grates are brick-covered with a layer of cinders on top, and as most of them are of the dumping type the whole covering can be dropped into the ash pit, the burners taken out and the boilers fired with coal if necessary without taking a boiler out of service. Considerable difficulty was experienced at first due to vibration caused by the burning of the gas and communicated to the boiler setting. This was treated as a matter of resonance, and by changing the area within the boiler setting, adjusting the baffling, and varying the draft the vibration has been entirely eliminated. The next problem was to get rid of tube trouble, produced by blow-pipe action of the gas flames. This was accomplished by using checkered walls in the furnace to break up the flames and distribute the heat more uniformly.

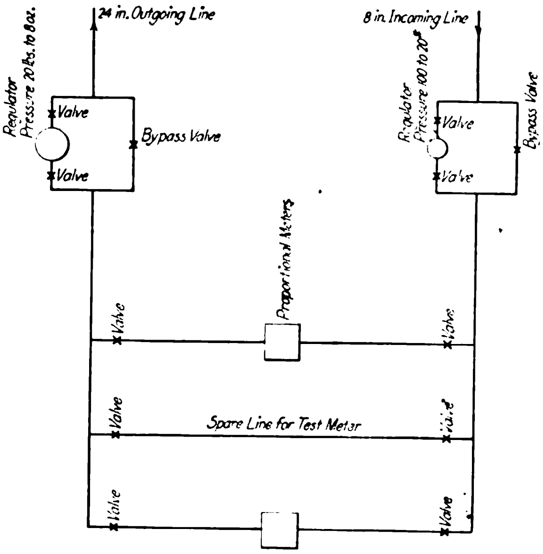


DIAGRAM OF PIPING IN GAS REGULATOR AND METER HOUSE ON THE C. S. & C. RY.

The plant burns about 2,500,000 cu. ft. of gas per day. As the gas cost is about the same as the former coal cost, we are saving either the entire labor cost of unloading, wheeling and firing coal for hand firing, or the fixed charges that would have occurred had coal and ash-handling equipment and stokers been installed. As our burners are designed for 8-oz. pressure we feel that it is more economical to regulate the steam pressure by turning burners on or off than by using a steam and gas regulator which controls the steam pressure by varying the gas pressure at the burners.

The neatness of the boiler room would be an incentive to change even if it were not for the saving that is being effected.

Application of Ball Bearings to Railway Car Journals*

BY O. BRUENAUER
General Sales Manager Gurney Ball Bearing Company

The application of anti-friction bearings to railway car journals is rapidly coming into the focus of interest of the men who are operating railway properties. The development and mechanical refinement of the most prominent friction-reducing element known to technical science, namely, the ball bearing, and its application to almost every variety of machinery during the past fifteen years, has produced such truly remarkable results in the way of power saving that its installation in car journals was but a logical step.

The ball bearing itself as an anti-friction device many years ago passed from the experimental stage into that of an approved and accepted element of machinery. It is, however, only about three years since the electric railway industry has experimented in the way of its application to car journals. Experimental installations have grown rapidly in number for the reason that many of them showed very promising results, so much so that in the city of New York there are being operated to-day 209 cars equipped with ball-bearing journals. In the opinion of the engineers conducting exhaustive tests of this kind the experience gained therefrom is encouraging to a high degree, yet it does not at this time permit of drawing definite conclusions to cover general conditions all over the country.

Quite frequently in the recent past data have been published regarding current consumption, coasting periods, etc., of cars equipped with ball bearings. We find, however, that the conservative railway engineer is inclined to consider these results as more or less isolated.

Pending the publication of data obtained from the very exhaustive tests being conducted at present in New York and elsewhere, I agree with this opinion. Too many conditions must be met, and the problem at hand is too complex to permit of its definite solution in such a short time as has been devoted to it.

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*Abstract of a paper read in Chicago, Ill., before the Illinois Electric Railways Association on June 9, 1916.

I shall, therefore, direct attention to two problems which seem to stand in the foreground of interest and toward a satisfactory solution of which the ball-bearing industry has directed its greatest efforts. A satisfactory yet economical means of taking care of the side thrust when a car takes a curve is a matter of utmost importance. Stress is to be laid upon the economical feature of the problem, as will be realized when the magnitude of the thrust loads imposed is considered.

For example, take a single-truck car weighing, fully equipped, 26,550 lb., and having a seating capacity of forty-five passengers and a standing capacity of forty-five. The schedule speed is 8 m.p.h., the high speed 16 m.p.h., and the highest speed ever obtained 20 m.p.h. In this case the radial load on the two ball bearings in one journal is 8750 lb. when the fully-loaded car is standing still. When it is making 8 m.p.h. straight ahead the radial load is 9430 lb. When the car takes a curve of 35-ft. radius there is being imposed upon the bearings a thrust load of 2150 lb., or 11½ per cent of the radial load obtaining at this moment. The radial load on the inner journal at this time is 44 per cent, whereas the radial load on the outside journal is 56 per cent of the total radial load on the axle. Hence it obviously would be better if the inner journal bearing could be made to take the thrust.

Among the most important problems in the mechanics of bearing mounting are those connected with the stresses at the shoulder against which the inner bearing is locked, that is, at point *A* in Fig. 1. The moment of inertia of that part of the axle which is outside of the wheel, and on which are mounted the bearings, does not by any means increase in proportion with the bending moment. On the contrary, the moment of inertia increases abruptly at point *A*. The section at this point is consequently the weakest one in the axle under working conditions, and provision should be made to strengthen it to the required extent. A simple and effective way of doing this, aside from proper heat treatment, is by turning the axle with a fillet of comparatively large radius.

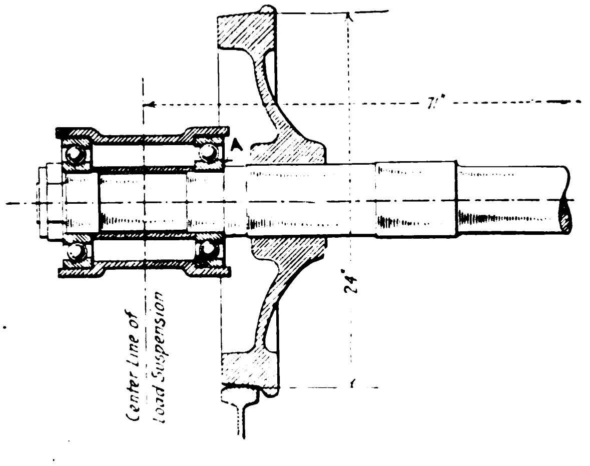


FIG. 1—DIAGRAM TO SHOW WEAK POINT ON CAR AXLE

In order to provide for a corresponding seat of the bearing against such a shoulder a special bearing has been designed, which is called the "Railway" type. Its inner ring, on the side facing the shoulder, is provided with a chamfer of a very much larger radius than is customary on standard bearings. The radius of chamfer of a "Railway" type bearing is slightly larger than that of the fillet on the axle. The shoulder on the axle, on the other hand, is high enough to afford a sufficient contact surface between its straight face and the straight face of the inner ring of the bearing. It is through these two flat contact surfaces that side thrust from the axle is transmitted to the bearing and not through the curved surface of the respective chamfers.

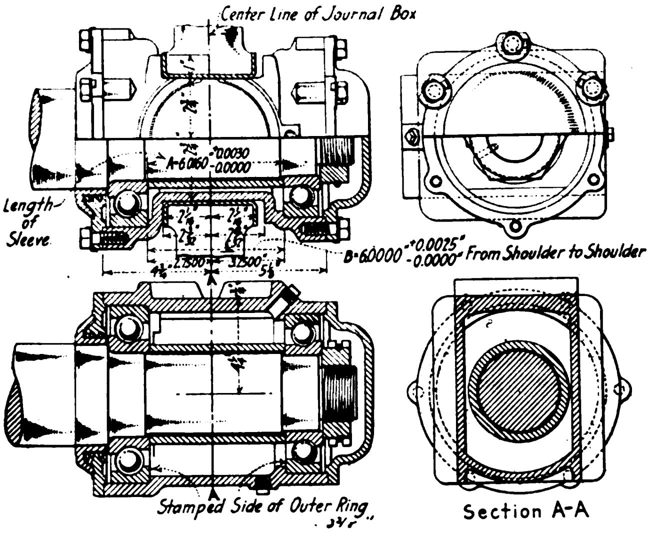

Center Line of Journal Box
Length of Sleeve
B-6.0000 +0.0025 -0.0000 From Shoulder to Shoulder
Stamped Side of Outer Ring
Section A-A

FIG. 2—BALL BEARING AND HOUSING FOR USE ON ELECTRIC RAILWAY CARS

An exceptional method of taking advantage of the radial and thrust load conditions is the application of a combined radial and thrust type of bearing, which we call the "Radio-Thrust" bearing. The mounting of these bearings in the boxes, as shown in Fig. 2, illustrates a solution of a second problem, namely, that of the installation of ball bearings on railway cars without changing the standard truck in the least. The installation as shown applies to a 3-ton standard truck.

There are two features peculiar to this method of mounting "Radio-Thrust" bearings. First, the bearings themselves have radial end play, due to the angular contact between balls and races, affording a thrust capacity in one direction of 100 per cent of the radial capacity. This end play is taken up by locking the bearings against each other with the thrust sides in opposed position. This is done by tightening the nut on the end of the axle. In order to make it absolutely impossible to lock the bearings too tight, thereby imposing a load on them in addition to the weight which they are to carry, a sleeve is provided between the inner rings of the bearings. This sleeve is cut to a length slightly in excess of the distance between the shoulders in the box which bear against the outer rings of the bearings. This simple method insures the required amount of freedom of the bearings regardless of the tightness with which the nut may be turned down, and consequently does away entirely with any kind of adjustment approaching delicate handling.

By reference to Fig. 2 it will be noted that the standard pedestal of the truck fits into the vertical slides of the box with a clearance of about 1/16 in. between the inner surfaces, and a very liberal clearance between the outer surfaces. Consequently, when the car takes a curve to the right, for instance, the right-hand, or inside, box will come in contact with the right-hand pedestal, thereby transmitting the thrust to the inner bearing of this box only. The greatest part of the radial load obtaining at this moment is being carried by both bearings on the other end of the axle, there being no thrust whatever on the outside bearings. This follows on account of the above-mentioned large clearance between the outside shoulder of the box and pedestal, as the latter two are not in contact with each other laterally. The inner bearing of the inside wheel is being made to take radial load also, but very much less than that imposed on the inner bearing of the outside wheel. The result is that considerably smaller bearing sizes are required with this method than when one of the bearings in the outside wheel is required to carry the thrust.

Satisfactory service of ball bearings presupposes, of course, adequate lubrication and a means of excluding dirt and grit. A highly effective dirt seal is the one shown in Fig. 2. Its working principle is based on the action of the grist mill. There are no contacting or wearing surfaces, and no felt is used either for excluding dirt or retaining grease.

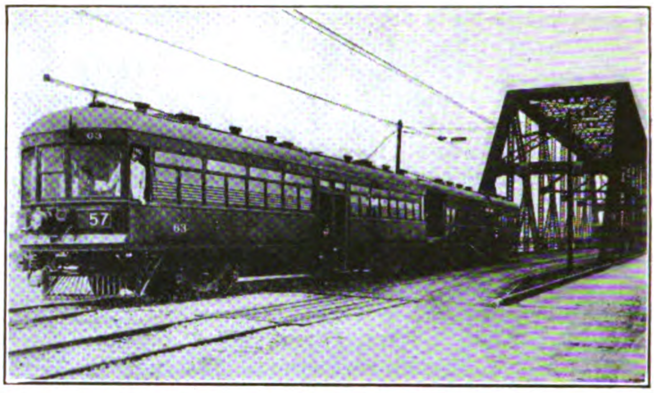
A great number of cars with these trucks have been equipped in this way with the "Radio-Thrust" bearings, among others by the largest electric railway companies in the East. These have been in operation for a period in excess of a year.

Before long I hope to be able to present definite data regarding the working conditions on the cars so equipped.

New Interurban and Work Cars for the K. C., C. C. & St. J. Ry.

J. N. SPELLMAN
Master Mechanic Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

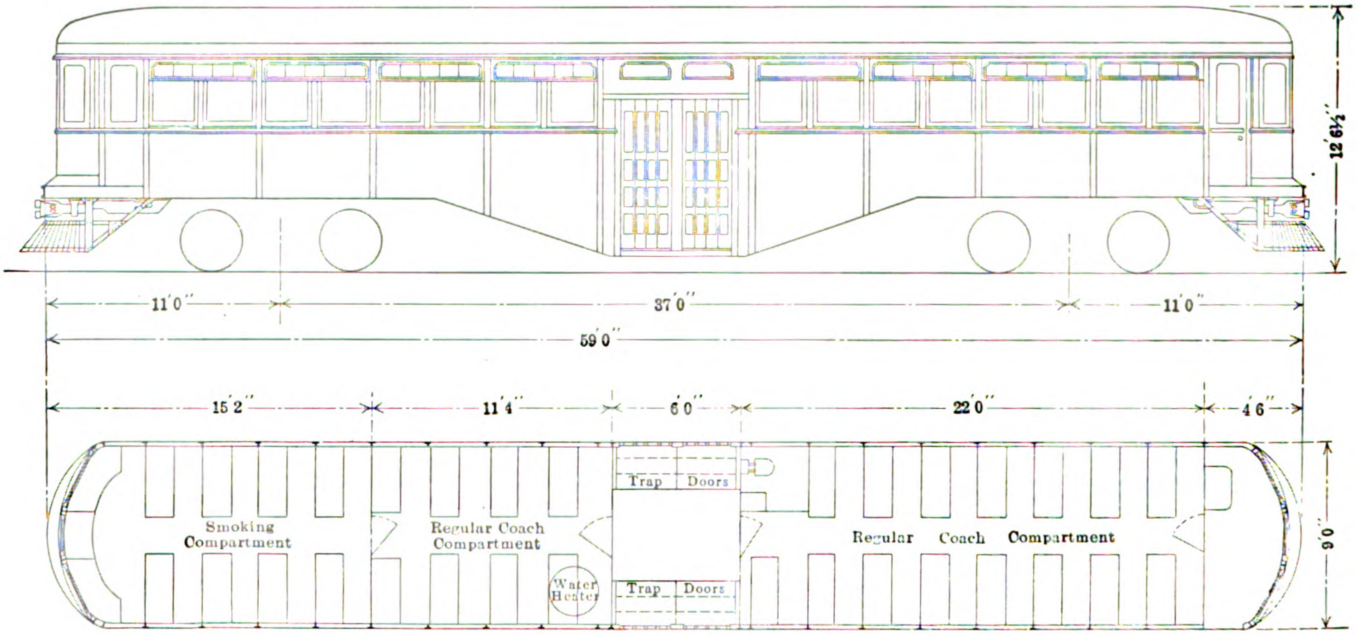
The Kansas City, Clay County & St. Joseph Railway has recently placed in operation four passenger cars built by the Cincinnati Car Company, known as the "60" type. These cars, as shown in an accompanying illustration, are of the center-entrance type, with smoking compartment in the rear end, and have a seating capacity of sixty-six passengers. Completely equipped each car weighs 78,000 lb. The trucks are Baldwin (class 78-30-A) with a 6-ft. 6-in. wheelbase and 36-in. wheels. The air-brake equipment is the Westinghouse type AMM, combined automatic and straight air for double-end operation. Each car is equipped with four No. 334-V-6, 600/1200-volt motors, and HL control, 600/1200-volt, double-end control, designed for half-speed operation of the motors on 600 volts, with changeover switches for the control and lighting circuits when the car is operating in 600-volt zones. The control apparatus is furnished with train and bus-line receptacles and jumpers, so that two or more cars can be operated in a train from one master controller, and with but one trolley on the wire. The cars are also equipped with Westinghouse pneumatic train signals.



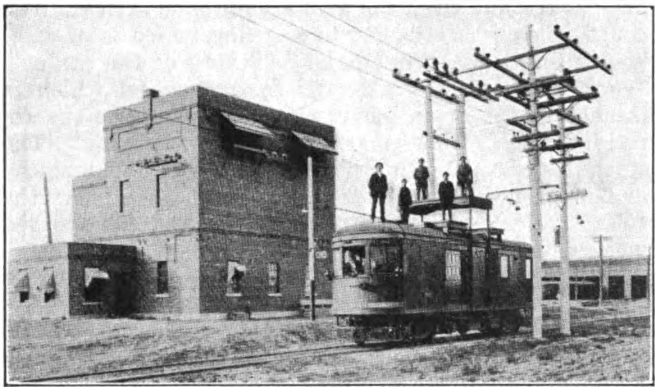
NEW CENTER-ENTRANCE INTERURBAN CAR WITH TRAILER

The accompanying illustration shows a plan and elevation of the new car. It differs in several respects from the type of car previously ordered, which was fully described in the ELECTRIC RAILWAY JOURNAL of Jan. 18, 1913. The smoking compartment has been reduced about one-half by the addition of a partition. The space in the motorman's compartment has also been increased, and a side door was installed so that the motorman can have access to the outside without going through the coach.

For use in connection with the maintenance of its overhead work, the company employs a line car which when completely equipped weighs 60,450 lb. The trucks are of Baldwin make (class 73-18-K) with 6-ft. 6-in. wheelbase and 36-in. wheels. The air-brake equipment is the same as that used for the passenger cars. Four Westinghouse No. 327-C, 50-hp. 600/1200-volt motors are used, having a gear ratio of 22:62. Standard HL, double-end, 1200-volt control is employed. The platform on the roof is operated by an air cylinder under the control of the motorman, by means of which the platform can be raised or lowered as required by the lineman at work on the overhead trolley. The line car is furnished with a complete line of overhead mate-



PLAN AND ELEVATION OF CENTER-ENTRANCE INTERURBAN CAR



LINE CAR WITH PLATFORM OPERATED BY AIR

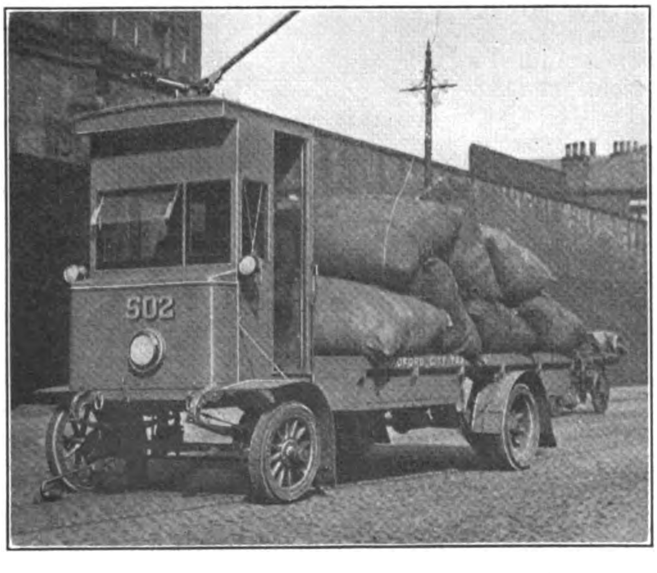
rial and tools necessary for emergency repairs, and in addition is fitted out with an emergency hospital outfit.

Railless Trolley Battery Vehicle

The Bradford (England) City Tramways have just put into operation the new motor wagon shown in the accompanying illustration. It was designed by C. J. Spencer, general manager, for the transportation of merchandise in connection with the ordinary passenger tramway service. It was constructed by building a suitable wagon body upon the chassis of an old trackless trolley car, of the type used on the Bradford Tramways.

The wagon or truck is equipped with two 20-hp. motors with series-parallel control for operation on 500 volts. It has a trolley pole for use under a trolley wire, and an earthing device for making contact with the rail when drawing line current. The earthing device is an extension of the steering arm of the vehicle bearing on the track by means of a cast-iron block and automatically steering the vehicle while serving as a contact maker. This earthing scheme has been used by the City Tramways on the ordinary trackless trolley car when operating over the tramway routes. It was designed by E. Cross, general manager Rotherham Tramways.

The wagon is also equipped with 120 cells of Edison storage battery, giving a normal voltage of 150. The capacity is sufficient to give the vehicle a range of about 10 miles, at a speed corresponding to the reduced voltage. The battery may be charged in series with the motors while the wagon is operating on trolley voltage. A change-over switch is provided to shift the connections from battery to overhead wire and earth connector, and vice versa.

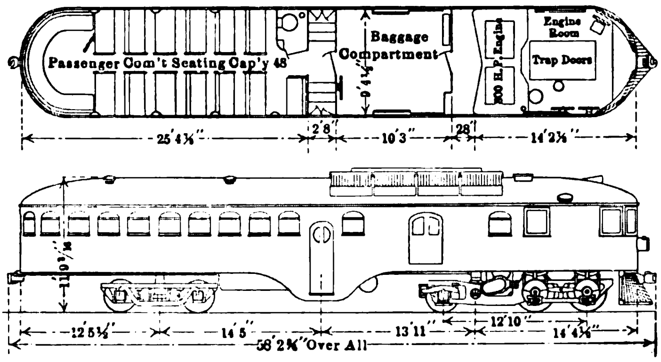


RAILLESS TROLLEY BATTERY VEHICLE FOR BRADFORD (ENGLAND) CITY TRAMWAYS

The new vehicle was designed particularly on account of the high price of gasoline in England at present. The capacity of this first machine is 2 tons.

McKeen "Mallet" Motor Car Sold to Southern Utah Railroad

An application of gasoline motor car service which will be especially interesting to lines having unusual grades is announced by the Southern Utah Railroad Company, Price, Utah, which has purchased one of the McKeen Motor Car Company's "Mallet" motor cars. This car will operate in place of the present consolidation locomotive and combination coach train between Price and the mines at Hiawatha, Utah. This is an 8-mile run of continuous 2½ per cent and 3 per cent grades, with frequent curves and a maximum grade of 4.92 per cent. In order to obtain ample surplus power for ascending these grades, the car will be equipped with the builder's gasoline locomotive-type power unit, consisting of a 300-hp. engine from which the power is transmitted to the driving axles. In this design a third speed is added to the transmission, and the driving wheels are connected by side rods. The car is 58 ft. 2¾ in. long over all and contains a 10-ft. 3-in. baggage compartment, and a main compartment with seats for forty-eight passengers. The plan and elevation of this equipment are shown in the accompanying illustration.



PLAN AND ELEVATION OF SOUTHERN UTAH "MALLET" MOTOR CAR

Exciter Set Used for Track Welding

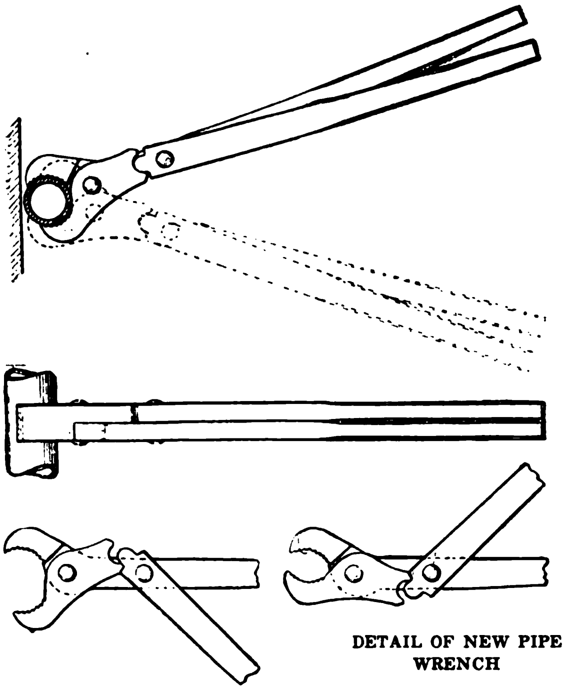
The Hattiesburg Traction Company, Hattiesburg, Miss., was recently confronted with the necessity for either buying five new steam railroad crossings or repairing the old ones. The general manager, H. F. Wheeler, decided in favor of building up the old crossings by means of arc welding.

As the job was not large enough to warrant the company in buying a set of resistors for use with the trolley voltage, a 35-kw., 110-volt exciter set was pressed into service. The voltage was reduced to about 60, and the negative terminal was connected to the trolley wire and the positive to the ground during the period between midnight and 5.30 a. m. With about 1 mile of No. 00 trolley wire there was sufficient resistance in the wire and rail return to limit the current on short-circuit, when starting the arc, to an amount not injurious to the machine.

By this procedure the crossings were repaired at a small cost for welding iron and labor and with very little waste in power. Of course, in a job of the size of this one the power saving was incidental compared with the simplicity of the equipment.

A Pipe Wrench for Limited Clearances

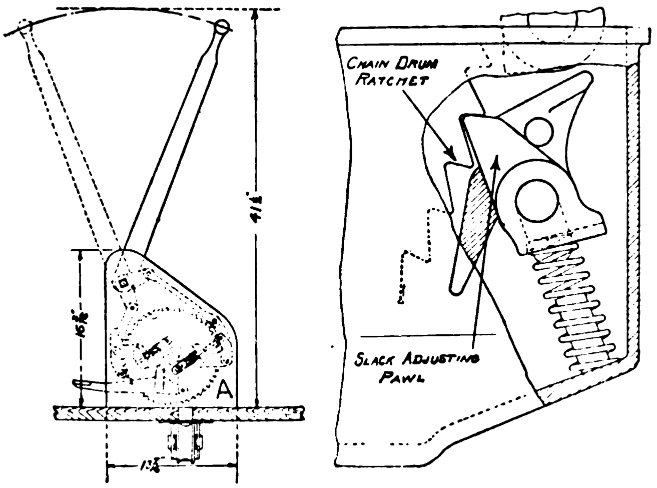
A wrench designed particularly to meet limited clearances such as obtain in pipe and conduit work in car construction has just been put on the market by the Mechanical Specialties Company, Chicago, Ill. The features of this wrench are shown in the accompanying illustration. It will be noted that it is particularly adaptable for pipe work against walls, nested pipe and conduit work within walls. This tool is known as the "LaRock Wrench," and it is quite simple in construction since it contains only three parts, with no screws, springs, pins or ratchet, the absence of which makes adjustment unnecessary, and the jaws in the wrench are always in a position to do pipe work.



DETAIL OF NEW PIPE WRENCH

Hand Brake and Slack Adjuster

The Horne double-acting hand brake, which the Lord Manufacturing Company recently put on the market and which was described on page 574 of the ELECTRIC RAILWAY JOURNAL for March 18, 1916, has been further improved by the addition of a slack adjuster. This new device, which is shown in detail at the right in the accompanying drawing, is placed at the position marked *A* in the assembly drawing of the brake which is reproduced at the left from the above-mentioned article. The adjusting pawl is attached to a spring which is of sufficient strength to overcome any slacking of the chain.

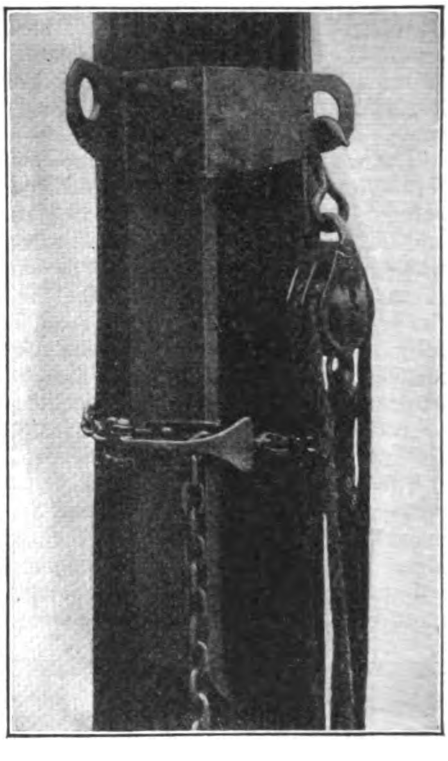


HORNE DOUBLE-ACTING HAND BRAKE AND SLACK ADJUSTER

On releasing the brake, the toothed wheel which is attached to the drum moves clockwise owing to the released energy which was stored up by braking. The force of the spring in the pawl is overcome and the pawl is pushed away from the toothed wheel. As the brake rigging loses its stored energy and the toothed wheel slows up partly due to the friction of the pawl against the wheel, the pawl engages the wheel, causing the release of only sufficient chain to bring the brakeshoes clear of the wheels. As additional slack occurs, due to wear, the pawl automatically checks the rotation of the chain drum as soon as slack occurs, thus keeping excessive chain reeled upon the drum and the entire brake ready for instant action in the same manner as if the brakes had just been adjusted in the shop.

A New Pole-Top Gin

The pole top gin, illustrated herewith, which was designed especially for mounting equipment on wood pole lines, has just been placed on the market by the Railway & Industrial Engineering Company of Pittsburgh, Pa. It consists of a main base, or channel, fitted with four spurs and a chain, and a lever for clamping it to the pole. Tackle can be suspended from the arms at the top. To attach the gin the lineman jabs the lower spurs into the pole as he would a spear; then the top of the channel is thrust towards the pole, and the upper supports sink into the wood. In this position the gin will "stay put" while the handle is opened and the chain carried around the pole and linked into the catch. The handle is then closed, causing the chain to bite into the pole, and in this position it is self-locked. If the chain is too loose and does not bite into the pole firmly enough, the handle is opened, the chain disengaged from the catch and shortened one link. This shortens the chain when the handle is closed again. As the load is shifted to the gin, the lower spurs bite into the pole and become firmly placed. When the work is finished the gin can be readily detached.



NEW POLE-TOP GIN SHOWN IN WORKING POSITION

As designed at present, the gin can safely be used with loads of 1500 lb. or 2000 lb. in emergency. Steel cross-arms weighing from 40 lb. to 120 lb. are, of course, very easily handled.

In addition to its use in handling equipment on poles, this gin can be employed in replacing poles. Other uses will suggest themselves to the reader.

NEWS OF ELECTRIC RAILWAYS

CITY ENGINEER DISCUSSES TRANSIT PROBLEMS

Construction of Elevated Line Urged for San Francisco Within Five Years

M. M. O'Shaughnessy, city engineer of San Francisco, Cal., contributed to a recent issue of the San Francisco *Call* an article reviewing the history of transportation in the city. This account was of unusual interest because in concluding the article Mr. O'Shaughnessy dealt with the situation as it is at present and with the relations of the Municipal line to the problems now presenting themselves. He said that the track mileage in the city was about five years behind the population requirements. His conclusion follows in part:

"Mr. Arnold, in his report of 1913, stated that there was immediate necessity of 72 miles of single track, which should be provided at a rate of not less than 15 miles a year. Since then the municipality has constructed some 28 miles of track, and this represents the total additional trackage in San Francisco since the completion of the Geary Street road.

"The proper and economic development of the transportation facilities in San Francisco will only be possible when all of the railway lines are owned or operated under one management. This is absolutely necessary to permit of extensions being built along logical lines without wasteful duplication of service in certain districts to reach new territory requiring service. The construction of a few blocks of track here and there will not solve the railway problem.

"On account of the location of the business district and the ferry with relation to the residence districts, a tremendous burden has been thrown on Market Street in the way of both vehicular and railway traffic, and this street, with the present modes of transportation, has about reached the limit of its capacity to handle that traffic.

"The real transportation problem confronting us in San Francisco, then, is to relieve this burden on Market Street and at the same time to provide more rapid and adequate transportation to the outlying districts and permit a healthy growth of the city within its own limits. The construction of the Twin Peaks tunnel is the first real step along lines looking to an ultimate solution of the problem, but this does not reach the root of the trouble, as some means must be found to relieve the congestion on lower Market Street and to shorten the time out Market Street.

"Rapid transit systems are either of the elevated or subway type. The first cost of an elevated system is much less than that for a subway. Comparative costs are about $800,000 a mile for the former, as against $3,500,000 a mile for the subway construction. The rapid transit problem has been studied in a large number of Eastern cities, notably in New York, Brooklyn, Chicago, Boston and Philadelphia, and as a result of progress in the art many of the objections and much of the prejudice against the elevated systems have been eliminated. The feature of the noise has been practically eliminated in the Philadelphia system by the use of ballasted construction. The public preference is for riding in the open air and sunlight of the elevated as against the subways.

"The first unit of San Francisco's rapid transit construction will undoubtedly be an elevated road which must be parallel to Market Street, running from about First Street and connecting with the Twin Peaks Tunnel with a branch south in the vicinity of Capp Street, extending toward the county line.

"In order for a rapid transit system to be effective in solving the problem, it is essential that the existing intersecting lines be utilized as feeders, which means, of course, a practical unification of existing systems. Much thought and study throughout the entire United States, and, in fact, throughout the world, is being centered on developing the elevated type of rapid transit, the great effort being to lighten the construction, rendering the elevated structure correspondingly lighter and more open, and reducing the noise by sound-deadening material between the rails and ties or stringers as the type of construction may call for. Very interesting developments have been made in certain types of elevated systems in which the cars are suspended from the trucks which carry the electric equipment overhead. This type of construction can be built for practically half the cost of the standard type of elevated roads in use throughout the United States.

"Construction of this first unit of San Francisco's rapid transit system should be started within the next few years so that operations could be commenced within not more than five years."

SHORE LINE EMPLOYEES STRIKE

Men Return After Several Days on Terms Proposed by Company During Wage Negotiations

The employees of the Shore Line Electric Railway, Norwich, Conn., went on strike on June 1. As a result there was an almost complete suspension of service for several days between New Haven, Conn., and Westerly, R. I., and between New London and West Thompson, Conn. More than 600 men are reported to have been affected. The strike was precipitated through the uncompromising insistence of the men upon the company meeting new wage demands made by them. The old agreement expired at midnight on June 1. The new scale asked for by the men provided for a maximum of 35 cents an hour after three years' service. The company offered a compromise of a 32-cent maximum.

R. W. Perkins, president of the company, on June 1 posted a notice informing the strikers that unless they returned to work within twenty-four hours they could consider themselves no longer in the company's employ, as new men would be brought in to take their places. Many of the men are non-union, and partial service was continued with them as operators at first. Other men, however, were added at once in accordance with the notice of the company to the men who quit and the full quota of cars was soon in service on the New London and other lines. On June 2 another warning notice was posted over the signature of S. Anderson, the general manager. He said that a sufficient number of men had been secured to operate all divisions in full. This was borne out by the arrivals at the New Haven Railroad station in New London, where the men coming in to replace the strikers attracted extraordinary attention on account of their commissary equipment.

Coincident with this Mr. Perkins issued a statement in part as follows:

"I wish that the controversy might be settled by the old men returning to their places. Once again I desire to ask the patience of the public for a day or two until we can get things back to normal shape. We have men enough to do this, men who are experienced motormen and conductors. While not desiring to reiterate any previous statements I have made, I should like once more to make it clear to the public that the demand which has been made by the men is absolutely prohibitive. It simply could not be granted. The revenue of the system would not stand it. For that reason we have been forced to get other men to take the places of the strikers in order that the company may resume traffic accommodations."

Formal announcement was made on June 7 that the strike had been settled. The men accepted the compromise offered by the company previous to the strike and returned to work at once. Under the terms of the agreement the minimum wage scale will be 26 cents an hour and the maximum 32 cents after six years' service. Ten cents an hour additional will be granted for overtime, and an allowance for meal tickets will be made when the men are kept on the cars. The demand of the men for recognition of the union was not granted. The strike was attended with little or no disorder.

WASHINGTON RAILWAY VALUATIONS REDUCED

By the State Tax Commission's actual valuation of railroad and telegraph lines in Washington for 1916 the total valuation of electric and interurban lines has decreased $2,747,180 from the total valuation of $49,211,280 for 1915. What amounts to a total reduction of $48,075 in tax payment is granted by the commission in allowing the decreased valuation, but electric railway representatives are reported as expecting to go before the State Board of Equalization in August and demand still further reduction. The reports of the electric railways for the year ended Dec. 31, 1915, show a consistent decrease in gross and net earnings ascribed largely to competition with automobiles, operated both as public and private conveyances. In the past three years the greatly increased mileage of improved roads has lent an impetus to the use of automobiles and practically all of the electrical lines have good roads paralleling them. The reduced earnings of the roads, due to falling off of freight and passenger business, has prevented the electric railways from adding to their equipment or extending their lines appreciably so that depreciation and obsolescence of equipment which were heretofore overcome by replacements, improvements and betterments, operate to create a decrease in the value of the electric lines generally throughout the State. The complete schedule of valuations of the electric railways for both 1915 and 1916, as arrived at by the State Tax Commission, is as follows:

	1915	1916
Everett Railway, Light & Water Company	$2,075,000	*$1,275,000
Grays Harbor Railway & Light Company.	1,225,000	1,200,000
Lewiston-Clarkston Transportation Company	....	13,700
Loyal Railway	15,000	15,000
Olympia Light & Power Company	330,000	330,000
Pacific Traction Company	245,500	245,500
Puget Sound Traction, Light & Power Company	19,366,780	18,681,600
Seattle, Renton & Southern Railway	1,200,000	1,200,000
Tacoma Railway & Power Company	3,900,000	3,600,000
Western Washington Power Company	44,000	44,000
Willapa Electric Company	128,700	108,700
North Coast Power Company	412,475	373,100
Pacific Northwest Traction Company	2,590,700	2,542,500
Puget Sound Electric Company	3,250,000	3,000,000
Spokane & Inland Empire Railroad	9,000,000	8,700,000
Walla Walla Valley Railway	410,000	372,000
Washington Water Power Company	3,900,000	3,550,000
Yakima Valley Transportation Company	459,000	413,000
Total	$49,211,280	$45,664,100

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*$800,000 deducted on account of the purchase of the water system by the city of Everett.

WORCESTER AND SPRINGFIELD WAGES GO TO ARBITRATION

Failure to reach an agreement on new wage schedules has led the conferees of the Springfield Street Railway, the Worcester Consolidated Street Railway and the representatives of the employees of the two companies to resort to arbitration for the settlement of the issues in controversy. The principal issues in dispute concern wages and working conditions. The Springfield men sought increases averaging from 50 to 65 cents a day. Men in the service of the company six months were to receive $2.75 a day; second six months $3 a day; the second year and thereafter $3.50 a day. At the present time the minimum daily wage is $2.25 and the maximum $2.85. Wage schedules are based on a nine-in-eleven-hour day. The Worcester Consolidated Street Railway employees were seeking a similar wage schedule, based on a nine-in-eleven-hour day instead of an hourly schedule, such as they are now working under. The principal difference was on the methods of working. The company held out for hourly or "platform" time, while the men sought a straight daily wage rate. In the first offer the company submitted a rate of 25 cents an hour for the first six months, 26½ cents an hour for the second six months, 28 cents for the second year, 29 cents for the third year and 31 cents for the fourth year and thereafter. In its second offer, which was in the nature of a compromise proposal, the company agreed to maintain its present daily wage rates, but stipulated that all new employees entering the service of the company should be paid on an hourly basis. A proposal to increase its previous wage offer 1 cent for all grades of employees was also made. This latter proposition was rejected by the men.

MR. TAYLOR TALKS SUBWAY IN PITTSBURGH

The rapid transit problem that confronts Pittsburgh was discussed at a dinner tendered to A. Merritt Taylor at the William Penn Hotel, that city, on June 1. Members of the Council and many prominent business men attended, among them J. D. Callery, president of the Pittsburgh Railways, who promised to co-operate in any plans that are advanced to better conditions. Mr. Taylor, who is about to enter on a preliminary survey of the needs of the city, was the principal speaker. He said that any recommendations for Pittsburgh must be based upon ascertainable facts. The transit problem should be taken up and disposed of in a methodical way, with regard to future development. Lines built first must eventually become terminal lines. An investigation similar to that made in Philadelphia should determine the location and character of high-speed lines which will be needed to serve the present and future requirements of Pittsburgh.

Continuing, Mr. Taylor said that the people should be informed just what saving of time there would be between all points in the city, and made to understand that the discomfort and inconvenience of traveling in surface cars will be eliminated; that congestion in the downtown district will be relieved; that the field for business men and workingmen will be widened, and that passengers will be collected and distributed quickly. It will seem costly and tedious at first, but the resultant advantage will justify the undertaking. Mr. Taylor suggested that an able man of sound judgment, preferably a resident of Pittsburgh, be selected and appointed by Council as transit commissioner, and form an organization of engineers and specialists to diagnose the transit problem. The Mayor and members of the Council present pledged themselves to appropriate $150,000 for the preliminary work which is regarded as necessary to complete the plans.

CITY HELD TO STRICT BUSINESS ACCOUNTABILITY

Judge Frater, in the Superior Court at Seattle, Wash., has handed down a decision stating that the city of Seattle must be held to the same strict business accountability as an individual and that because of the city's attempt to revoke the franchise of the Seattle, Renton & Southern Railway, which attempt resulted in losses to the railway, the city abrogated its right to a claim for 2 per cent of the gross earnings of the road for the years 1912, 1913 and 1914, amounting to $13,078. In his ruling the judge said in part:

"There is no reason in equity, law or justice why a city or its public officials should not be held to the same strict regard in the matter of fair dealings as an individual, and if the city enters into contractural relationship with an individual the city should be held to the same standard of honesty as the individual, and who will contend that a municipal corporation could be authorized to collect rent or compensation for a privilege which it denies to the individual? We submit that there is no reason in law, justice or equity why the claim of the city should be allowed, and it, therefore, follows that the same must be and is hereby rejected."

A franchise was assigned to the railway by W. R. Crawford in May, 1907. The franchise provided that 2 per cent of the gross earnings of the road must be paid annually to the city. In 1912 the City Council passed an ordinance revoking the franchise, and from then until March, 1915, the Council refused to grant any rights or privileges to the railway company according to the decision. Between Aug. 28, 1912, and March, 1913, the receivers tendered to the city the franchise tax of 2 per cent of the gross earnings. It was refused. In March, 1915, the Federal District Court declared the ordinance revoking the franchise to be void. In this connection the court said that it was true the decrees of the United States Court did establish the validity of the ordinance as a binding franchise, but that decree did not and could not restore to the company the benefits which it lost while it had been deprived of its rights by the wrongful act of the city, nor did nor could it establish the right in the city to exact payment for the privileges denied by the city while they were so denied.

ANOTHER DUAL LINE TO OPEN ON JUNE 19

Another part of the dual system of rapid transit in the city of New York has been declared to be ready for operation by the Public Service Commission for the First District, namely, the New Utrecht Avenue branch of the Fourth Avenue subway, the operation to begin at noon on June 24. All tracks of the New Utrecht Avenue line will be placed in operation from Thirty-eighth Street and Fourth Avenue, where connection is made with the Fourth Avenue, Brooklyn, subway, down to the station at Sixty-second Street and New Utrecht Avenue, where the line crosses the Sea Beach branch of the Fourth Avenue subway. In addition, there will be operation over one track from Sixty-second Street south to the Eighteenth Avenue station. Through trains will be run from Manhattan to Eighteenth Avenue, but south of Sixty-second Street the operation will be limited by the fact that only one track is ready for use at this time. Operation of the remainder of the line should begin in the late summer or in the coming fall. Since the signing of the dual system contracts on March 19, 1913, the commission has issued resolutions placing the following city-owned lines of the dual system in operation: The Centre Street loop in Manhattan, the Fourth Avenue subway and the Sea Beach Railway in Brooklyn, all for operation by the New York Municipal Railway Corporation; and the Queensboro subway, for operation by the Interborough Rapid Transit Company. Other parts of the system are nearing completion, and within a few months, it is expected, the commission will be able to place several new lines in service.

COMPLETION OF OREM LINE CELEBRATED

In commemoration of the completion of the Salt Lake & Utah Railroad (the Orem interurban electric line) to its southern terminus at Payson, a grand carnival was held there by the citizens on May 26 and 27. A goodly portion of the population of Utah County, whose fertile fields are put in almost hourly communication with the metropolis of the State by this line, turned out to show their appreciation of W. C. Orem, the president, and his associates for the service they had rendered the communities. Prominent railroad officials and citizens of Salt Lake City went down to Payson to join with the residents in the festivities. Included in the party were W. C. Orem, president of the railroad; Mrs. Orem and their two sons and two daughters; W. R. Armstrong, general manager of the Orem line; Ross Beason, traffic manager; Julian Bamberger, president of the Salt Lake & Ogden Railroad; John Hickey, Stephen L. Chipman, A. J. Evans, James McBeth, D. R. Beebe, J. B. Keeler and others. The golden spikes in the last tie in the roadbed were driven by Mrs. George Done, who had been selected queen of the carnival, and Miss Gladys Orem, President Orem's seventeen-year-old daughter.

With the completion of this line to Payson, the company has inaugurated express service with fast time and few stops between Salt Lake City and its terminus 65 miles south. Two express trains are operated daily in each direction, in addition, to the ten regular trains which make all stops. This is the first express service placed in operation by an electric interurban line in Utah.

PREPARING FOR CINCINNATI BOND SALE

The Rapid Transit Commission of Cincinnati, Ohio, has advised the City Council that the $6,000,000 of bonds for the construction of the rapid transit line are to be sold as the money is needed and that no part of the issue will be sold until a lease is effected and ratified by the voters. Council. however, will be asked to enact the necessary legislation for the issue of the bonds, so that no delays will be necessary when this step has been approved.

Frank S. Krug, city engineer, will be formally chosen as chief engineer of the commission within a short time. On June 2 James A. Stewart was appointed assistant engineer at $25 a day for the time spent in the work. Elmer Humphreys and Donald W. Caven will be assistant engineers in charge of surveying crews.

W. L. Woodward presented a report of the Federated Improvement Association at a hearing on the revision of the Cincinnati Traction Company's franchise on June 1, in which objections were made to the franchise granted recently to the West End Rapid Transit Company, because it does not provide for 5-cent fares and transfers.

The Cincinnati, Lawrenceburg & Aurora Street Railway will within a short time apply for a new franchise between Anderson's Ferry and the corporation line at Fernbank, so that it will cover the same period as that of the West End Rapid Transit Company. It is said that the fare will be reduced from 10 to 5 cents if a new franchise is granted.

NEW TRENTON ARBITRATION PLAN

On June 7 there was what appeared to be an absolute deadlock in the matter of attempting to select the third arbiter to adjust the differences between the Trenton & Mercer County Traction Corporation, Trenton, N. J., and Division No. 540, of the Amalgamated Association, growing out of the dismissal of conductors for alleged fare "sniping." The union, however, proposed a new plan for the selection of the third arbiter and this was adopted by the company.

Under the new plan the company will be represented by Rankin Johnson, president of the corporation, and Edward Peartree, superintendent, and the union by Marcus Minton and W. N. Frizzell, both members of the executive committee of the union, and the latter the union's secretary. These four will attempt to select the fifth man to act on a committee of three or the fifth man to act on a committee of five. The union representatives and the company will meet under this plan in a few days in the company's offices.

Peter E. Hurley, general manager of the company, and C. Howard Severs, of the union, who were the original arbitrators, found that they could not agree upon a third man. Numerous names were presented by each side and some of them were mutually agreeable. In all cases where there was agreement, however, the men selected would not act, for personal or other reasons. Two prominent men asked to serve as the third arbiter were John Rellstab, judge of the United States District Court, and Frederick W. Donnelly, Mayor of Trenton.

It is the intention of the four new arbiters to try and select a third man to work with Messrs. Hurley and Severs, or a new man to work with the new representatives. The four men will first try and settle some of the ten cases up for arbitration before selecting another man.

At a meeting of the union on June 5 it was decided to stand by the set of conditions for a new agreement served upon the company some time ago. The men are now receiving 27 cents an hour, but in the new agreement ask for 34 cents an hour. The company wants to institute a sliding scale, to start at 25 cents an hour, and also wants an "open shop." The union has notified the company that it will not accept either the sliding scale or "open shop" proposition.

Increase in Wages in Allentown.—The Lehigh Valley Transit Company, Allentown, Pa., has again raised the pay of its men. The general advance is 1 cent an hour dating from June 1. This makes the pay for first-year men 25 cents an hour and for five-year men 29 cents an hour.

Short Strike of Power Employees.—Linemen and powerhouse employees of the East St. Louis & Suburban Railway, East St. Louis, Ill., went on strike recently for an increase of 15 per cent in wages. E. E. Parsons, general manager of the company, and Bert S. Reed, chairman of the grievance committee, conducted negotiations and effected a compromise under which the men returned after having been out two days.

Mayor Jost's Services Accepted.—Henry L. Jost, Mayor of Kansas City, Mo., through two administrations, during which the new franchise of the Kansas City Railways was framed and granted, has offered his services without compensation to the city directors of the railway. These directors were appointed by his administration, and were his personal selections. His good offices have been accepted by the city directors.

New Wage Terms Sought in Cincinnati.—The contract between the Cincinnati (Ohio) Traction Company and its platform men expires on June 30, and the men are asking for an increase of 6 cents an hour in the maximum wage and a proportionate increase down the scale. The maximum is now 27 cents an hour. The company is said to have offered the men an increase of 1 cent an hour. The men are also asking for a closed shop and a reduction from seven to three years in the time for reaching the maximum.

Hearing on Lessening of Noise on Elevated.—A hearing will be held by the Public Service Commission for the First District of New York, on June 19, the purpose of which is to bring about the elimination of some of the noise incident to the operation of the elevated railroads in Manhattan, The Bronx, Brooklyn and Queens. At the hearing officials of the companies will be called upon to state what they are willing to do in the direction of providing brakeshoes upon the cars of their lines which will be less noisy than those in operation now.

Commission Appeals Chicago Service Order Decision.—The decision of Judge Thomas Taylor, Jr., of the Circuit Court, Chicago, denying the right of the State Public Utilities Commission to issue orders affecting service and equipment on the Chicago Surface Lines, has been appealed to the Supreme Court. A formal injunction preventing the commission from enforcing its order of Sept. 29, 1915, which was intended to effect service changes, has also been entered in the Circuit Court. The decision was referred to in the ELECTRIC RAILWAY JOURNAL of June 3, page 1056.

Plea for Rehearing of Mill Tax Case.—H. S. Priest, counsel for the United Railways, St. Louis, Mo., on May 30 filed at Washington his petition for a rehearing in the so-called mill tax case, in which the ruling of the United States Supreme Court was adverse to the company. The sending down of its mandate to the Missouri Supreme Court was put off until June 1 by the United States Supreme Court so as to permit the company to file a motion for a rehearing. Mr. Priest contended that the company supposed that its contract with the city protected it against subsequent taxation and brought suit to enjoin the mill tax.

Traveling Track and Equipment Specialists Appointed.—Henry L. Doherty & Company, New York, N. Y., who control the Cities Service Company, New York, N. Y., announce the appointment of a traveling master mechanic and a traveling track specialist, to be followed shortly with a traveling transportation director. Arthur Brown of the Toledo Railways & Light Company has been named as traveling master mechanic and A. Swartz, vice-president of the Toledo & Western Railway, will be the track specialist. One of Mr. Brown's attempts will be a standardization of equipment, and Mr. Swartz will soon start on a journey to look over track construction and maintenance.

Commissioner Carr to Study Foreign Systems.—Commissioner James O. Carr of the Public Service Commission for the Second District of New York plans to spend six weeks studying the transportation systems of England, France and Italy as these systems have developed under war conditions. Governor Whitman has written Mr. Carr that he has heard that tremendous strides have been made in the transportation field abroad. Accordingly Mr. Carr is taking with him official letters which will put him in direct touch with the men who have solved the problems involved in moving millions of men by steam road, electric railway and automobile. He will study the way in which the various agencies have been enlarged, improved, speeded up and co-ordinated.

Wages on Chicago Surface and Elevated Advanced on June 1.—Under the terms of the arbitration award of July 16, 1915, the wages of practically all the employees of the Chicago Surface Lines were automatically advanced approximately 1 cent an hour, making the minimum and maximum for motormen and conductors 27 cents for the first three months of service and 36 cents at the end of the fourth year's service. By an agreement between the management of the Chicago Elevated Railroads and its employees the wages were also automatically advanced on June 1. Motormen's hourly wages were increased from 36 cents to 38 cents, conductors from 29 cents to 31 cents, and regular guards 26 cents to 28 cents. These increases affected approximately 10,000 employees of the two companies.

Kentucky Assessments Increased.—Tentative increases in assessments for State taxation have been announced by the State Board of Valuation and Assessment of Kentucky, sitting at Frankfort, which would increase the State's revenue by $71,000. Electric railways would be affected as follows: Louisville Railway increased from a $13,400,000 valuation to $15,048,673; Louisville & Interurban Railroad, $2,250,000 to $2,601,488; Louisville & Southern Indiana Traction Company, $55,000 to $57,330; Kentucky Traction & Terminal Company, $1,200,000 to $1,643,937; Paducah Traction Company, $260,000 to $295,735. The Ohio Valley Electric Railway assessment was reduced from $500,000 to $496,681. In most cases county taxes are collected on the same valuation as the State taxes.

Decision Favorable to Cleveland Subway.—The Ohio Supreme Court has refused to review the decisions of the lower courts which were favorable to the construction of subway approaches to the new bridge across the Cuyahoga River connecting Superior and Detroit Avenues, Cleveland, Ohio. The legality of the plans has thus been established. As a result County Engineer W. A. Stinchcomb has announced that construction work on the approaches will be commenced within thirty days. W. R. Hopkins, president of the Cleveland Underground Rapid Transit Company, and J. J. Stanley, president of the Cleveland Railway, have agreed to cooperate as far as posible in the work. The subway in Superior Avenue will commence 500 ft. east of the bridge. The one in West Twenty-fifth Street will begin 1200 ft. south of the bridge and the one in Detroit Avenue, 1200 ft. west of that point.

Mr. Doherty Appears Before Milroy Committee.—At a formal meeting of the Milroy street railway committee at Toledo, Ohio, on June 2 Henry L. Doherty, for the Toledo Railways & Light Company, presented a statement as to the course he felt should be followed in working out the plans for securing municipal ownership. He suggested certain substitutes for portions of the original plan. The provisions of this statement were taken up singly and discussed, but no conclusions were reached on any of the points raised. At an informal meeting on May 31 Mr. Doherty explained the steps necessary for the city to finance the proposition in case the property is taken over. He reviewed the history of the Toledo Railways & Light Company and told of the means used to raise money for improvements and in issuing securities when the present owners assumed control.

Recognition of Laurel Company's Work.—The Laurel (Miss.) *Daily Leader* contained recently the following appreciation of the Laurel Light & Railway Company: "No other agency in modern times has done more to develop rural communities or add to the growth of cities than electric interurban railways. Guy M. Walker, owner of the Laurel Light & Railway Company, is aiding immeasurably in the development of Jones County, Laurel and South Mississippi. He has recently acquired the electric properties of McComb City and is negotiating for the Magnolia and Summit electric plants. He proposes to build an interurban railway to connect the three towns. The interurban rialway between Laurel and Ellisville has done more than any other agency to develop this section of Jones County, and the extension of electric railways in the city of Laurel has caused the city to grow to double its former size since the street cars were first started."

Strike on Buffalo Suburban Line.—Motormen and conductors employed by the Buffalo Southern Railway, Buffalo, N. Y., went on strike at midnight on May 16 for an increase in wages from 25 to 38 cents an hour and recognition of the newly organized local of the Amalgamated Association. No attempt was made by Nathan A. Bundy, receiver and general manager of the line, to operate cars on the Buffalo-Hamburg and Ebenezer divisions until May 25 when a number of new men were employed at the old wage scale. Obstructions were placed at points along the line and overhead wires were cut. Mr. Bundy pointed out to the old men that the road was in the hands of a receiver appointed by the court and was not financially able to pay the increase asked for. The company has been able to secure enough experienced platform men to operate cars. The State Board of Mediation and Arbitration has been unable to effect a settlement. About seventy-five men are employed. The company operates 25 miles of line, connecting Buffalo, Hamburg, Orchard Park, Gardenville and East Seneca.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Association

Although it is practically three weeks before the Central Electric Railway Association cruise of June 27-30, 200 reservations have been paid for. John Benham, vice-president of the International Register Company, Chicago, Ill., who is in charge of the work of assigning staterooms, advises that by June 10 space on the upper decks will be almost entirely taken up. He is also pleased to state that reservations have already been made by practically all the prominent members of the association, and by leaders among the manufacturers. Several officers of the American Electric Railway Association have also taken reservations or made application for them.

New York Electric Railway Association

At the annual meeting of the New York Electric Railway Association to be held at the International Hotel, Niagara Falls, on June 27 and 28, the general topic will be "Preparedness." Colonel Bellinger of the United States Army will discuss the problem of troops and munitions transportation, and James E. Hewes, general manager of the Albany Southern Railroad, will speak on "The Advantages of Electrical Transportation in Time of War." At the banquet to be held on Tuesday evening one of the speakers will be Major Babcock. Among the other entertainment features to be provided music will have a large place. A famous band has been engaged to play from 4 p. m. to 7 p. m. on Tuesday, and an orchestra will play all during Tuesday for dancing. A lunch for the ladies will be served at the Buffalo Country Club on Tuesday, and on Wednesday there will be a trip around the Gorge for all. Provision will be made for clock golf on Tuesday morning. The annual business meeting will be held on Wednesday.

M. C. B. and M. M. Associations

The programs have been announced for the meetings of the Master Car Builders' Association and the American Railway Master Mechanics' Association at Atlantic City, N. J., on June 14, 15 and 16 and June 19, 20 and 21, respectively. At the sessions of the master carbuilders the following reports will be discussed: June 14—Nominations; standards and recommended practice; train brake and signal equipment; brakeshoe and brake beam equipments; carwheels; arbitration committee; revision of prices for labor and materials, and settlement prices for reinforced wooden cars. June 15—Couplers; draft gear; safety appliances; loading rules; car construction; car tracks, and train lighting and equipment. June 16—Tank cars; specifications and tests for material; welding of truck sides, and bolsters.

At the sessions of the master mechanics on June 19, the following reports will be discussed: Mechanical stokers; revision of standards; dimensions of flange and screw couplings for injectors, and fuel economy and smoke prevention. There will be an individual paper by F. O. Wells, entitled "Standardization of Screw Threads." There will also be a topical discussion of the subject "Best Material for Metallic Packing for Superheater Locomotives," the discussion to be opened by W. E. Woodhouse, of the Canadian Pacific Railroad.

On June 20 the following reports will be discussed: Locomotive headlights; design, construction and maintenance of locomotive boilers; superheater locomotives; equalization of long locomotives; design, maintenance and operation of electric rolling stock; best design and materials for pistons, valves, rings and bushings; co-operation with other railway mechanical organizations. There will also be an individual paper entitled "Alloy Steel" by L. R. Pomery, and a topical discussion of the subject, "Instructions to Young Firemen."

On June 21, the following reports will be discussed: Powdered fuel; specifications and tests for materials; modernizing of existing locomotives, and train resistance and tonnage rating. At this session there will also be an individual paper on "Tests of Four Types of Passenger Car Radiators," by Prof. A. J. Wood and a topical discussion of the subject: "Best Method of Introducing Oil to Cylinders of Superheater Locomotives."

Financial and Corporate

I. C. C. ISSUES ACCOUNTING ANSWERS

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts Prescribed by Commission for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts prescribed by the Interstate Commerce Commission for electric railways has just been released by the commission. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission. The questions raised and the answers made to them follow:

Q. To what account should be charged the cost of track drips installed for draining tracks? These drips are installed without regard to street intersections or crossings, depending entirely on the condition of the soil.

A. The original cost of such drips, whether installed with new construction or subsequent thereto, should be charged to road and equipment account No. 504, "Grading." The cost of labor, repairing or renewing track drips, should be charged to operating expense account No. 8, "Track and Roadway Labor;" material used in connection therewith should be charged to account No. 9, "Miscellaneous Track and Roadway Expenses."

Q. To what account should be charged expenses in connection with handling electric light and power accounts, including meter reading, billing and collecting by clerks connected with the general office?

A. If the light and power business is not accounted for as an auxiliary operation, the expenses in connection with the handling of the electric light and power accounts should be included in the appropriate general expense accounts for the railway business. Expenses in connection with the reading of meters and the billing and collecting of light and power bills should be charged to operating expense account No. 84, "Salaries and Expenses of General Office Clerks." If the light and power business is accounted for as an auxiliary operation, the expenses in connection with the handling of electric light and power accounts, including meter reading, billing and collecting, should be charged to account No. 214, "Auxiliary Operations—Expenses." If any of such expenses are included in the railway operating expense accounts, they should be cleared therefrom by crediting operating expense account No. 100, "Other Operations—Cr.," and charging account No. 214 (see second and third paragraphs on page 17 of the uniform system of accounts for electric railways).

Q. To what account should be charged amounts paid for alleged damage to water and gas pipes by electrolysis?

A. To operating expense account No. 92, "Injuries and Damages."

Q. To what account should be charged the cost of handling patterns which are kept in the custody of the stores department?

A. To operating expense account No. 95, "Store Expenses."

Q. During the construction of a road, a commissary was operated at a profit. To what account should this profit be credited? Since commencing operations the commissary has been conducted for the benefit of the roadway department at a loss. To what account should this loss be charged?

A. A profit or loss made in the operation of a commissary for employees during the construction period should be credited or debited, as may be appropriate, to road and equipment account No. 550, "Miscellaneous." A profit or loss made in the operation of a commissary for roadway maintenance employees after a road has commenced operations should be credited or debited, as may be appropriate, to operating expense account No. 19, "Miscellaneous Way Expenses."

Q. Stoves have been installed in each of this company's cars for the purpose of heating same by the hot water system. To what accounts should the cost of installing the stoves and piping and repairs thereto be charged?

A. The original cost of the stoves and piping should be charged to road and equipment account No. 530, "Passenger and Combination Cars," or No. 531, "Freight, Express and Mail Cars," as may be appropriate. The cost of repairs should be charged to operating expense account No. 30, "Passenger and Combination Cars," or No. 31, "Freight, Express and Mail Cars," as may be appropriate. The cost of fuel should be charged to operating expense account No. 67, "Miscellaneous Car Service Expenses."

Q. To what account should be charged the rent paid by a company for a power plant building, power plant equipment and transmission lines? The lessee company has the exclusive use and maintains and operates the property leased. The amount of rent paid represents interest on investment only.

A. As the lessee company has the exclusive use of the leased properties, and the amount of rental paid represents interest on investment only, the amount paid should be charged to income account No. 217, "Miscellaneous Rents." The rents chargeable to operating expense account No. 97, "Rent of Tracks and Facilities," represent rents of property used jointly by the accounting and other carriers.

Q. To what account should be charged the cost of teaming materials, and cost of tools, used in construction?

A. The cost of hauling track material by team for construction purposes should be charged as follows: To account No. 504, "Grading," if the cost of material is chargeable thereto; and to account No. 505, "Ballast," if the cost of the material is chargeable thereto (the cost of final distribution of ballast should be charged to account No. 510, "Track and Roadway Labor"). The cost of teaming ties, rails, rail fastenings, special work and material for underground construction, from storerooms or supply yards in final distribution, should be charged to account No. 510, "Track and Roadway Labor." The cost of tools purchased for use in construction should be charged to the same primary account as the cost of work on which they are used. If, however, the tools are used generally, making it impracticable to distribute the cost to the several accounts affected, it may be charged to account No. 529, "Other Expenditures—Way and Structures" (see third paragraph of Section 3 and Section 10 of the general instructions on pages 92 and 93 of the uniform system of accounts for electric railways).

Q. To what account should be charged the first cost of switch lights and switch targets?

A. To road and equipment account No. 517, "Signals and Interlocking Apparatus."

Q. An electric railway crosses a steam railroad at grade and shares in the expense of maintaining the crossing. To what account should be charged the electric railway's proportion of the cost of maintaining this crossing?

A. The electric railway company's proportion of the cost of labor and material should be charged to the same accounts as if the electric railway did the work itself. For example, if the material used is chargeable to accounts No. 2 to No. 7, inclusive, the cost of labor should be charged to account No. 8, "Track and Railway Labor." If repairs are made to signals or interlocking apparatus, the labor and material should be charged to account No. 17, "Signals and Interlocking Apparatus," etc.

Gross earnings of the West India Electric Company, Ltd., Kingston, Jamaica, for 1915 totaled $274,317, a decrease of 5.05 per cent as compared to 1914. The operating expenses at $143,368, however, showed a decrease of 7.64 per cent, so that the net earnings of $130,949 decreased only 2.05 per cent. The falling off came in the railway department, whose earnings dropped from $206,870 to $184,217. The passengers carried decreased 539,563 or 10.72 per cent.

ANNUAL REPORTS

United Railways & Electric Company

The comparative income statement of the United Railways & Electric Company, Baltimore, Md., for the calendar years 1914 and 1915, follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Gross earnings:				
Revenue from transportation	$8,904,857	98.63	$9,083,555	98.69
Revenue from operations other than transportation	123,286	1.37	120,284	1.31
Total	$9,028,143	100.00	$9,203,839	100.00
Operating expenses:				
Maintenance of way and structures	$354,613	3.93	$399,715	4.34
Maintenance of equipment	362,131	4.01	408,211	4.43
Traffic expenses	7,497	0.08	12,563	0.13
Conducting transportation	2,701,045	29.92	2,727,442	29.63
General and miscellaneous	717,411	7.95	764,507	8.32
Total operating expenses	$4,142,699	45.89	$4,312,439	46.85
Net earnings from operation	$4,885,444	54.11	$4,891,400	53.15
Income from other sources	8,334	0.09	24,721	0.26
Total net income	$4,893,778	54.20	$4,916,121	53.41
Fixed charges	2,999,497	33.22	2,964,826	32.21
Balance	$1,894,281	20.98	$1,951,295	21.20
Deduction from income—rental account	67,335	0.74	65,501	0.71
	$1,826,946	20.24	$1,885,794	20.49
Extinguishment of discount on securities	37,950	0.42	37,951	0.41
	$1,788,996	19.82	$1,847,843	20.08
Interest on income bonds and dividend on preferred stock	560,000	6.20	560,000	6.09
Surplus	$1,228,996	13.62	$1,287,843	13.99
Dividends paid on common stock	818,448	9.07	818,448	8.89
Balance carried to the credit of depreciation reserve	$410,548	4.55	$469,395	5.10

By comparing the results for 1915 with those for 1914, it will be noted that the decrease in gross earnings was $175,695 or 1.91 per cent, while the decrease in operating expenses was $169,740 or 3.94 per cent, and the increase in fixed charges was $34,670 or 1.17 per cent. The percentage of operating expenses to gross earnings was 45.89 per cent in 1915 as compared with 46.85 per cent in 1914. If the charges to depreciation were included in the operating expenses, the percentage of operating expenses to gross earnings would have been 50.43 per cent. For maintenance of way, structures and equipment, there was charged to operating expenses during the year $716,744, which with the $410,547 credited to the depreciation reserve made a total of $1,127,291.

It is said that this general showing should be especially gratifying for the following reasons: (1) Because of the industrial, commercial and financial depression which prevailed through the first nine months of the year, throwing large numbers of people out of employment with resulting decreased riding. (2) Because of the unfavorable weather conditions during the summer months, causing a heavy reduction in excursion travel. (3) Because of the unregulated jitney competition, which started early in the month of February and reached its maximum during the summer months.

The company has no floating debt. At the end of the fiscal year, it had cash on hand amounting to $609,771, of which $400,170 was unexpended balance of proceeds of its two-year notes. As a result of the falling off in earnings the company postponed much of its contemplated construction work in 1915.

The average earnings per car-mile were 30.58 cents, an increase of 0.15 cent, and the cost of service (exclusive of depreciation, etc.) 14.03 cents, a decrease of 0.23 cent. The number of car-miles run was 29,522,100, a decrease of 728,094 miles. The total number of revenue passengers carried was 181,744,023, a decrease of 3,552,327. The number of transfers used was 75,807,256, about 42 per cent of the paying passengers having availed themselves of the transfer privilege.

The total amount of taxes and public charges was $1,161,838, an increase of $24,637. This 1915 total represented 12.87 per cent of the gross revenue and 23.78 per cent of the net receipts after paying costs of operation. The park tax for the year was $580,210, as compared with $593,813 in 1914, a decrease of $13,603. This was attributable to the depressed business conditions and unregulated jitney competition.

In discussing the tax question, the report states that through the instrumentality of the street railway system, Baltimore has acquired and is now maintaining nearly 2500 acres of parks. In 1859, the year that street car transportation was inaugurated in Baltimore, there was spent by the city upon its parks but $16,760, as compared to the $580,210 just paid by the company, without imposing any tax whatever upon the ordinary taxpayer. This amount represents, at 4 per cent per annum (the average interest rate of city stock), interest upon an investment of over $14,000,000. The total amount of park tax paid since the consolidation of the different street railway lines in 1899 to 1915, inclusive, is $7,264,945. These figures serve to show how close a relationship exists between the municipality and the railway system.

Tennessee Railway, Light & Power Company

The following statement shows the combined results of the Tennessee Railway, Light & Power Company, the Nashville Railway & Light Company, the Chattanooga Railway & Light Company, and the Tennessee Power Company for 1915 and 1914, all transactions between these companies being eliminated:

	1915	1914	Per Cent Change
Gross earnings	$3,947,268	$3,762,387	+4.9
Operating expenses, rentals and taxes	2,267,394	2,270,989	—0.2
Net earnings	$1,679,874	$1,491,397	+12.6
Interest	$1,320,263	$1,194,419	+10.5
Dividends paid on stocks of constituent companies not owned	108,472	109,049	—0.5
	$1,428,735	$1,303,468	9.6
Balance	$251,139*	$187,929	33.6

*Of this balance $956 accrues to stocks of constituent companies not owned by the Tennessee Railway, Light & Power Company.

The gross earnings shown are derived from street railway, electric light, retail power and wholesale power business, sales to distributing companies controlled not being included in wholesale power. The following statement shows the amount and percentages of each kind of business done by the company:

	Amount	Per Cent of Total
Street railway	$2,031,490	51.5
Retail power and light, etc	1,339,735	33.9
Wholesale power	576,042	14.6
Total	$3,947,268	100.0

The industrial depression of 1914 continued in aggravated form throughout most of 1915 and the resulting economy among all classes of people affected adversely the earnings of public utility companies. In addition the street railway business in Nashville was affected by jitney competition and in Chattanooga by a smallpox epidemic. The improvement shown in the gross and net earnings was due to additional power business and to normal rainfall and stream flow which enabled the hydroelectric plants to supply a very large percentage of the power requirements, whereas in 1914 the drought necessitated an abnormal amount of costly steam generation. Interest charges increased with the completion of the larger construction work and the resulting charge against operation instead of capital.

The street railway earnings of the Nashville Railway & Light Company were about $100,000 less than in 1914, and probably three-fourths of this decrease was caused by jitney competition, the enforcement of the measures passed by the authorities having been delayed by litigation until the end of the year. The industrial depression was seriously felt in Chattanooga, and while the Chattanooga Railway & Light Company did not suffer from jitney competition its patronage was, as before stated, reduced by a smallpox epidemic during the first three months of the year. In September, however, business began to show some improvement, bringing increases in all classes of earnings of the company.

BOSTON ELEVATED INVESTIGATION ASSURED

Governor McCall of Massachusetts has signed a resolution providing for a commission to investigate the financial condition of the Boston Elevated Railway in accordance with the company's recent letter setting forth its need of increased net earnings. The commission will be composed of the Lieutenant-Governor, the President of the Senate, the Speaker of the House, two members of the Senate, four members of the House, and the members of the Public Service Commission and the Boston Transit Commission. The special commission is to consider what changes, if any, should be made in existing laws relative to the company to enable it to meet the reasonable demands of the public for the extension and improvement of its system of transportation; also the advisability of any change in subway rentals, any reduction in taxes, and any increase in fares or changes in the present transfer system. The commission is to report to the next Legislature not later than Jan. 15, 1917, its recommendations for legislation and such further recommendations as in its judgment may be necessary or desirable to enable the company to provide a more efficient service and improve its credit. The Senators and Representatives on the special commission are to receive such compensation as may be approved by the Governor and Council, and the commission may incur any necessary expenses.

American Railways, Philadelphia, Pa.—At a session of the Board of Public Utility Commissioners of New Jersey on June 6 the American Railways informally advised the board that it had contracted to purchase, subject to the approval of the board, the entire capital stock of the Electric Company of New Jersey, the Penns Grove Electric Light, Heat & Power Company, the Woodstown Ice & Cold Storage Company, the Clementon Township United Electric Improvement Company and the Williamstown Electric Company. It also advised the board that every share of the stock of those companies had been deposited under agreements, and that an application would be made to the board for authority to merge and consolidate those companies and for the right of the American Railways to acquire all of their outstanding capital stock.

Bay State Street Railway, Boston, Mass.—The Bay State Street Railway, in a petition filed with the Massachusetts Public Service Commission has asked permission to issue $2,750,000 of 5 per cent coupon notes to be dated Aug. 1, 1916, and to mature serially on dates and in amounts as follows: Aug. 1, 1917, $360,000; Aug. 1, 1918, $370,000; Aug. 1, 1919, $380,000; Aug. 1, 1920, $390,000; Aug. 1, 1921, $405,000; Aug. 1, 1922, $415,000; Aug. 1, 1923, $430,000. The proposed notes are to be issued for the purpose of reconstructing track and overhead equipment and of replacing rolling stock and other property. The directors on May 31 voted to issue the proposed $2,750,000 of notes, which are part of a $3,500,000 issue authorized on March 9, 1916.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—Judge Landis has confirmed the sale of the Chicago & Milwaukee Electric Railroad to the reorganization committee. In passing on claims of various attorneys for services rendered the court allowed only the claims of attorneys for the trustees and said that those of other attorneys cannot be presented as claims against the purchase price of the property. The court, however, took no action in reducing any of the claims. A member of the reorganization committee is reported to have said that under the terms of the present reorganization Samuel Insull will receive some participation certificates, when issued, but no other securities. Under the former reorganization plan he would have received $700,000 in junior securities, with the understanding that he would manage the reorganized company and obtain an entrance for it into downtown Chicago over the tracks of the Northwestern Elevated by an agreement with the Chicago, Milwaukee & St. Paul Railroad. This agreement was not concluded, but it is believed that a similar operating agreement will be made after the reorganization has been effected. Receiver Johnson of the company has called for payment at the office of the Central Trust Company of Illinois at 105 and interest on July 1 all the outstanding first mortgage 5 per cent bonds of the company.

Cumberland County Power & Light Company, Portland, Me.—A petition has been filed with the Maine Public Utilities Commission by the Portland Railroad asking authority to issue and sell $850,000 face value of its first lien and consolidated mortgage 5 per cent gold bonds at 96 per cent of their face value with accrued interest. The company asks for the authority to make the bond issue for the following purposes: Refunding $600,000 of 4½ per cent gold coupon notes of the company, dated Dec. 1, 1911, and maturing on Dec. 1, 1916; reimbursing the company for permanent extensions, enlargements and additions to its properties from Feb. 1, 1912, to Nov. 1, 1915; paying the amount due to the county of Cumberland as its contribution for the new Portland bridge, and for permanent extensions, additions and enlargements of its properties presently needed. A petition has also been filed with the commission by the Cumberland County Power & Light Company to issue and sell $350,000 face value of its first and refunding mortgage 5 per cent bonds due on Sept. 1, 1942, at not less than 94 per cent of their face value with accrued interest. The company states in its petition that it is necessary to acquire additional funds for the following purposes: To reimburse the company for extensions, additions and improvements made to its properties from Jan. 1, 1916, to April 1, 1916, for which bonds have not been authorized, $33,583; for the purchase of the capital stock of the Westbrook Electric Company, amounting to $11,000. The petition further states that the company is entitled under its mortgage to issue and sell the bonds to the extent of 85 per cent of expenditures, or $124,000. The company is proceeding with the development of its water power at Hiram Falls, with other extensive improvements, additions and extensions of its properties and at present needs funds to carry on all this work.

Georgia Railway & Power Company, Atlanta, Ga.—The operating revenues of the Georgia Railway & Power Company and its leased and subsidiary companies for 1915 were $6,507,656, with operating expenses of $3,268,349 and net operating revenue of $3,239,307. Taxes totaled $443,731. After payment of rentals, interest and sinking funds, the surplus on the year's operations amounted to $492,174. No comparative figures by years or by classes of service are presented in this company's report. On Dec. 31, 1915, the total single-track mileage operated was 231.902 miles. During the year 0.817 mile of new track was built and 0.802 mile was abandoned and taken up.

Kansas City (Mo.) Railways.—The Missouri Public Service Commission has authorized the Kansas City Railways to issue $1,000,000 of its bonds to take up a similar amount of certificates issued by the receivers for the Metropolitan Street Railway, the predecessor company.

Oklahoma Railway, Oklahoma City, Okla.—R. J. Edwards, Oklahoma City, recently offered at par and interest $500,000 of short-term 6 per cent coupon bonds of the Oklahoma Railway. The purpose of the issue is to refund a temporary note issue of an equal amount previously issued for construction and cover part payment of a modern terminal station in Oklahoma City and to purchase bonds of the Guthrie Street Railway. The bonds are dated Jan. 1, 1916, and are due $15,000 semi-annually from Jan. 1, 1918, to July, 1925, inclusive. Interest is payable on Jan. 1 and July 1 at the office of the Mississippi Valley Trust Company, St. Louis, Mo. They are redeemable on thirty days' notice on any interest date at a premium of 1½ per cent with accrued interest.

San Diego & South Eastern Railway, San Diego, Cal.—The San Diego & South Eastern Railway has filed with the California Railroad Commission an application for a rescission of its decision permitting the company to issue $343,000 par value of its bonds. The commission three years ago granted the company permission to create a bonded indebtedness of $600,000 and to issue $343,000 of those bonds. None of the bonds have been issued because the company has been unable to earn operating expenses. The application which has just been made says that it is doubtful if the corporation will ever be able to do this and to pay interest on the proposed bonds, so that it has abandoned its intention to create the issue.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The California Railroad Commission has authorized the San Francisco-Oakland Terminal Railways to issue $180,000 of 6 per cent equipment notes to pay in part for thirty-two new cars. The notes are to be in denominations of $500 and $1,000, to be callable at 100½ on sixty days' notice and to mature at the rate of $10,000 every six months beginning May 1, 1917.

Standard Gas & Electric Company, Chicago, Ill.—All of the subsidiaries of the Standard Gas & Electric Company earned in excess of their interest requirements, with the exception of two gas companies, one power company and the Fort Smith Light & Traction Company, Fort Smith, Ark. The gross earnings of this last company amounted to $454,664 in 1915, as compared to $492,397 in 1914, while the net earnings totaled $122,895 and $170,967 respectively. In January, 1916, however, it is said that this company had an increase in both gross and net for the first time in two years. The Arkansas Valley Railway, Light & Power Company, Pueblo, Col., secured gross earnings of $1,171,628 in 1915 and $1,156,851 in 1914, with net earnings of $505,823 and $422,389 respectively, while the gross of the Ottumwa Railway & Light Company, Ottumwa, Iowa, was $329,824 in 1915 and $324,928 in 1914, and the net $151,070 and $145,802 respectively.

Texas Traction Company, Dallas, Tex.—The consolidation of the Texas Traction Company and the Southern Traction Company is said to be assured. The new company will be known as the Texas Electric Railways. Its corporate existence will date from July 1. The properties are generally known as the Strickland lines and have been operated under one management, but as separate corporations. J. F. Strickland, president of the companies, will be president of the new company. The combined system will include more than 250 miles of line.

Toronto (Ont.) Railway.—The stockholders of the Toronto Railway have voted to increase the capital stock of the company by the creation of $3,000,000 of new stock, making the aggregate capital stock $15,000,000. The company controls the Toronto & York Radial Railway, the Toronto & Niagara Power Company and the Electrical Development Company of Ontario. A circular to the stockholders calling the meeting of the stockholders explained that the proposed increase was necessary to provide funds to meet the financial requirements of the company and for financing the requirements of subsidiary companies for extensions and betterments. The new shares will be offered to present holders pro rata, and any balance remaining unsubscribed will be sold to the public. It is explained that steady progress has been made in the sale of power. In 1909 the gross sales of power amounted to $651,830, while in 1915 they aggregated $1,463,639. In 1916 they are expected to reach a total of $1,800,000. In acquiring the properties now forming the Toronto & York Radial Railway and the Shomberg & Aurora Railway the chief object was to foster the growth of suburban traffic and to feed the city system of the Toronto Railway. Should the city elect to purchase the Toronto Railway the security holders will have left a suburban electric railway system and an extensive and profitable plant for the production and distribution of electricity.

Winnipeg (Man.) Electric Railway.—The net earnings from the operations of the combined properties of the Winnipeg Electric Railway for the calendar year 1915 amounted to $1,331,737, in comparison to $1,769,114 for the previous year, a decrease of about 24 per cent. Of this amount, the fixed charges, including taxes, city percentages, car licenses, interest on the funded debt and other contingent charges, absorbed $835,635. The surplus earnings for the year were $496,101, which, when added to the surplus brought forward from the previous year, as adjusted, aggregated $1,637,598. The decrease in earnings was due to the general depression following the first winter of the war, coupled with the advent of the jitneys in the spring. The duration of the depression from both causes was temporary. The excellent crop prospects of the West, followed by an enormous yield, had a stimulating effect upon the business of the company. The net earnings for November, December and January compared favorably with a similar period in previous years.

DIVIDENDS DECLARED

Arkansas Valley Railway, Light & Power Company, Pueblo, Col., quarterly, 1¾ per cent, preferred.

Brazilian Traction, Light & Power Company, Toronto, Ont., quarterly, 1½ per cent, preferred.

Louisville (Ky.) Traction Company, quarterly, 1 per cent, common.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1¾ per cent, preferred; quarterly, 1½ per cent, common.

Virginia Railway & Power Company, Richmond, Va., 3 per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.						
1m., Apr.,	'16	$62,654	*$35,266	$27,388	$17,697	$9,691
1 " "	'15	60,617	*31,000	29,517	17,620	11,897
12 " "	'16	794,421	*420,172	374,249	212,875	161,374
12 " "	'15	787,177	*378,258	408,919	209,796	199,123
BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.						
1m., Apr.,	'16	$78,445	$73,041	$5,404	$28,024	†‡$22,447
1 " "	'15	69,860	61,583	8,277	17,177	†‡8,808
10 " "	'16	789,588	667,715	121,873	201,845	†‡78,153
10 " "	'15	795,162	715,698	79,464	172,337	†‡91,472
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						
1m., Apr.,	'16	$99,983	*$60,498	$39,485	$29,671	$9,814
1 " "	'15	87,745	*58,533	29,212	29,291	†79
12 " "	'16	1,154,663	*739,473	415,190	357,734	57,456
12 " "	'15	1,049,582	*705,016	344,566	346,193	†1,627
COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.						
1m., Apr.,	'16	$1,313,207	*$692,895	$620,312	$427,094	$193,218
1 " "	'15	1,093,746	*585,894	507,852	359,203	148,649
12 " "	'16	15,411,384	*8,202,084	7,209,300	4,726,934	2,482,366
12 " "	'15	14,016,905	*7,521,252	6,495,653	4,277,796	2,217,857
CONNECTICUT COMPANY, NEW HAVEN, CONN.						
1m., Apr.,	'16	$744,170	$546,678	$197,492	$98,009	‡$122,525
1 " "	'15	612,898	449,561	163,337	98,178	‡86,709
10 " "	'16	7,330,975	5,024,550	2,306,425	984,647	‡1,551,881
10 " "	'15	6,587,442	4,809,689	1,777,753	982,710	‡1,011,255
EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.						
1m., Apr.,	'16	$237,646	*$141,270	$96,376	$62,648	$33,728
1 " "	'15	193,827	*119,538	74,289	66,996	13,293
12 " "	'16	2,606,949	*1,553,933	1,053,016	755,424	297,592
12 " "	'15	2,531,939	*1,519,661	1,012,278	737,802	274,476
GRAND RAPIDS (MICH.) RAILWAY						
1m., Apr.,	'16	$103,047	*$67,256	$35,791	$13,700	$22,091
1 " "	'15	83,353	*67,025	16,328	13,702	2,626
12 " "	'16	1,220,107	*829,735	390,372	167,166	223,206
12 " "	'15	1,258,480	*835,100	423,380	162,162	261,218
LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO						
1m., Apr.,	'16	$118,621	*$80,063	$38,558	$36,588	$1,970
1 " "	'15	111,548	*71,191	30,357	35,962	†5,605
4 " "	'16	453,144	*311,823	141,321	145,378	†4,057
4 " "	'15	391,307	*282,175	109,132	143,871	†34,739
LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.						
1m., Apr.,	'16	$60,400	*$41,224	$19,176	$16,120	$3,056
1 " "	'15	53,817	*35,755	18,062	15,681	2,381
12 " "	'16	754,476	*496,289	258,187	191,663	66,524
12 " "	'15	696,011	*459,466	236,545	187,161	49,384
NEW YORK (N. Y.) RAILWAYS						
1m., Apr.,	'16	$1,135,801	$697,054	$438,747	$374,208	‡$110,897
1 " "	'15	1,127,388	715,631	411,757	373,913	‡83,822
10 " "	'16	11,351,420	6,939,954	4,411,466	3,710,734	‡1,170,177
10 " "	'15	11,126,973	7,123,415	4,003,558	3,746,865	‡694,167
NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.						
1m., Apr.,	'16	$44,833	$43,965	$868	§$4,759	†‡$2,558
1 " "	'15	37,555	43,041	†5,486	§5,990	†‡9,943
10 " "	'16	419,987	469,472	†49,485	§62,931	†‡96,361
10 " "	'15	366,508	435,442	†68,934	§63,608	†‡116,243
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO						
1m., April,	'16	$327,672	*$199,281	$128,391	$68,559	‡$60,053
1 " "	'15	237,746	*151,559	86,187	55,211	‡25,957
4 " "	'16	1,286,493	*755,037	531,456	269,925	‡262,694
4 " "	'15	962,583	*610,906	351,677	221,100	‡130,836
RHODE ISLAND COMPANY, PROVIDENCE, R. I.						
1m., Apr.,	'16	$444,826	$311,539	$133,287	$118,902	‡$41,338
1 " "	'15	349,814	329,941	19,873	117,300	†‡70,606
10 " "	'16	4,491,470	3,400,927	1,090,543	1,161,329	‡20,503
10 " "	'15	4,263,808	3,308,088	955,720	1,179,248	†‡129,671
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Apr.,	'16	$816,181	$506,703	$309,478	$140,299	$169,179
1 " "	'15	764,428	490,149	274,279	139,421	134,858
4 " "	'16	3,307,167	2,115,877	1,191,290	568,181	623,109
4 " "	'15	3,042,345	2,045,274	997,071	557,917	439,154

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*Includes taxes. †Deficit. ‡Includes non-operating income.

§Excludes interest on bonds, charged income and paid by the New York, New Haven & Hartford Railroad under guarantee, as well as interest on notes held by the New York, New Haven & Hartford Railroad not credited to income of that company.

Traffic and Transportation

TAMPA PASSES PROGRESSIVE JITNEY MEASURE

The tendency in recent jitney regulation is illustrated strikingly in the ordinance passed on May 24 by the City Council of Tampa, Fla. The measure provides as follows:

1. All jitneys shall operate under licenses issued by the city based on the seating capacity of the jitney as prescribed by a schedule contained in the ordinance.
2. A bond or indemnity insurance policy of $5,000 shall be filed with the application for license. Said bond or indemnity insurance shall be so made that the insurance or bonding company shall be directly liable for a suit in case of accident or death.
3. All jitneys shall operate from 6 a. m. until 11 p. m., over a prescribed route set forth by the operator in writing when he applies for his license. This route cannot be changed and is awarded upon the judgment of the Council.
4. Every jitney shall have painted on sides, front and rear the route it traverses and the terminals thereof and shall be lighted, after sundown, so as to make the signs distinguishable at a reasonable distance. Said signs are to be painted in letters not less than 1½ in. in height.
5. No jitney shall run within 25 ft. of another jitney or street car or run past them in an effort to reach prospective passengers first.
6. Every jitney shall come to a dead stop before crossing any steam railroad.
7. No jitney owner shall change or alter in any manner the body or seating arrangement of his bus.
8. It shall be unlawful for any person to ride on the hood, running board, step or any other place excepting within the bus where seats have been arranged.
9. Jitneys must carry police or firemen or members of the sanitary department, when in uniform, free.
10. All lost articles found in jitneys must be turned over to the police department within twenty-four hours.
11. Any person violating any section of the ordinance shall be subject to a fine not to exceed $75 or imprisonment for thirty days.
12. An operator thrice convicted of violation shall forfeit his license to operate.

The twelfth clause mentioned above applies to the man operating a bus. If the man operating the machine at the time of arrest is merely an employed chauffeur and has been convicted twice before, and he loses his chauffeur's license, is deprived of the privilege of driving any car whatever. However, if the jitney owner is operating the machine and is arrested and convicted three times he loses his license to operate a bus.

NEW SURFACE RULE BOOK FOR BROOKLYN

A new rule book for the surface transportation department of the Brooklyn (N. Y.) Rapid Transit Company has been completed after sixteen months' work by a committee of depot superintendents headed by Superintendent of Employment A. Maxwell. In addition to rules for conductors, motormen and all other car service employees it presents a full résumé of instructions and notices bearing on the operation of cars, the care and protection of passengers, the handling of defective equipment, delays on the line, accidents—in short, every known condition and circumstance that may be encountered in surface railroading.

Of 220 rules appearing in the last rule book, issued on Jan. 1, 1911, no less than 160 have been revised and amplified, and nine new rules of general application have been added. The advent of the center entrance car, presenting an entirely new set of problems, necessitated a supplementary set of twenty-eight rules. The rules for inspectors have been extended to include the duties of inspectors of instruction, these duties having been modified and coded since the previous book was published.

Besides Mr. Maxwell the members of the committee on the new rule book were Superintendents Henry Mueller, Frank O'Keefe, Frank Bush and Herman Bongard. Every change and addition was submitted first to Superintendent of Surface Transportation William Siebert, and later in turn to the other heads of departments, finally going to President Williams for approval.

PROBLEMS OF LOCAL COMMUNITIES DISCUSSED IN BAY STATE HEARINGS

The hearings in the Bay State Street Railway fare case before the Massachusetts Public Service Commission have been devoted since May 31 to the consideration of the effect of the proposed changes in fares upon various local communities. In announcing the program of hearings up to June 8 the commission stated that it assumed that the patrons of the road do not welcome an increase in fares and that the board desires at these hearings no general protests, but the presentation of facts and reasons why the specific increases proposed in the various cities and towns should not be permitted. For many weeks the commission has been holding hearings dealing in the main with the general aspects of the case, viz., with the history, capitalization, investment, property, revenue, expenses, operation and management, and these hearings are not yet concluded. The commission called attention to the fact that it has devoted an unprecedented amount of time to the case and urged the avoidance of cumulative evidence and discussion in future proceedings.

As a result of a conference on May 19 the company has prepared an exhibit segregating the investment receipts and expenses of the system in the 1914 fiscal year into fifteen divisions, and these data afford evidence as to the financial results of operation in each one of the districts assigned for hearing on the local program. The board is of the opinion that the information thus prepared, with the boundaries tentatively shown at the conference will answer all reasonable requirements.

ONE-MAN CAR PERMIT IN SEATTLE

The franchise committee of the City Council of Seattle, Wash., has authorized the use of one-man cars on the Bellevue-Summit line and the Twelfth Avenue line, between Fourteenth and Madison and Jackson Streets, by the Puget Sound Traction, Light & Power Company, providing a suitable ordinance can be furnished by the corporation counsel. The question of the use of one-man cars on the Greenwood Avenue line, operated by the Western Washington Power Company, has been laid over for consideration, owing to a petition of patrons against the change. A. L. Valentine, superintendent of public utilities of the city, in a report to the franchise committee, stated that the new cars could be operated with as much security to passengers as the ordinary cars. One-man cars are already in use on three shuttle lines in Seattle.

The Olympia Light & Power Company, operating in Olympia, Wash., has re-established a one-man car service on the west side. A similar arrangement was used on the line late last year. L. B. Faulkner, manager, said the West Side line had never paid, and that the change was made as a matter of economy.

Otto B. Frank, manager for the North Coast Power Company in Chehalis, Wash., which operates one-man interurban cars between Chehalis and Centralia, states the service is satisfactory. He also reports a considerable increase in travel on the street cars since the fare was lowered to 10 cents each way.

"I BELIEVE" CREED FOR EMPLOYEES

Harry D. Frueauff, vice-president, treasurer and general manager of the City Light & Traction Company, Sedalia, Mo., has prepared a public utility creed which every employee of the company is asked to sign, and must observe in his dealings with the public. The creed reads:

"I believe in Sedalia, and am anxious to see it become the best city in Missouri.

"I believe in its people, and I want to see each and every one of them prosper.

"I believe in electricity, gas, traction, and ice, four of the greatest factors in improving the conditions of mankind.

"I believe in service, the biggest word in our language, and the secret of all success.

"I believe in City Light & Traction Company service, and I will so exemplify and define 'Service' to the public and to our customers, that the terms 'City Light & Traction' and 'Service' shall become synonymous.

"In my contact with every person in my work, I will faithfully represent my company, so that I may make them all my friends, and consequently friends of the company."

Earnings Tax Suggested for Seattle Jitneys.—The City Council of Seattle, Wash., has been petitioned to pass an ordinance which will provide that jitney buses operating in the city be required to pay 2 per cent of their earnings to the city, the same as is now collected from the Puget Sound Traction, Light & Power Company.

Hearing on Service Standards Postponed.—The formal public hearing before the Public Utilities Commission of the District of Columbia to consider standards of street railway service has been postponed from June 14 to June 19. The memorandum showing the commission's tentative results of studies made was referred to in the ELECTRIC RAILWAY JOURNAL of June 3, page 1063.

Traffic Department, Michigan Railway, Removed to Grand Rapids.—Traffic Manager F. W. Brown, of the Michigan Railway, and his staff, including the freight, claim, tariff and traffic departments, have removed to Grand Rapids and established headquarters there. The change is made in consideration of the importance of Grand Rapids as a trade and shipping center and the closer relationship will insure improvements in the service as needed. The offices will be in the terminal building at the Michigan Railway station.

New Orleans Jitney Measure Upheld.—On May 29 Judge Foster, in the Federal Court at New Orleans, La., upheld the constitutionality of the New Orleans jitney ordinance requiring a $5,000 indemnity bond for each car operated, and denied the plea for an injunction to restrain city officials from enforcing the measure. The State Supreme Court recently held the ordinance valid. Three hundred operators are reported to have suspended service the day following the court decision. Only one arrest for violation of the decree was recorded that day.

Trenton Ticket Case Up for Argument.—Argument on the writ of certiorari asked by the Trenton & Mercer County Traction Corporation, Trenton, N. J., in its case against the continuance of strip tickets is set for the June term of the Supreme Court, which opened on June 6. The case was placed on the calendar, but no date was assigned to it, as George L. Record, who conducted the case before the Board of Public Utility Commissioners, is in Detroit. The company is attacking the right of the board to order the tickets continued. L. Edward Hermann, counsel for the commission, will present the case for the commission before the Supreme Court.

Chicago Surface Lines Issues Vacation Folder.—Under the title "How to See Chicago—The Vacation City and Ideal Summer Resort," the Chicago Surface Lines has issued a twelve-page map and guide for the information of visitors. The sight-seeing routes of the Chicago Surface Lines are indicated in red on a map which includes the entire Chicago park and boulevard district. The advantages of Chicago as a vacation city and summer resort are set forth, and the principal points of attraction are described and directions are given how to reach them. One-half million of these folders have been printed, and they are being distributed at the principal hotels, and are advertised in the newspapers.

Safety Advertisements in 100 Newspapers.—As the next step in its efforts for greater safety at grade crossings, the Long Island Railroad is now conducting an advertising campaign in the newspapers of Manhattan, Brooklyn and Long Island. It is advertising primarily to induce automobile drivers to stop at each crossing before going over the railroad tracks. Altogether twenty-four different advertisements will appear in 100 newspapers. On June 6 the company secured its first conviction of an automobile driver for carelessness in managing the machine at one of the company's crossings. A fine of $10 was imposed. The company intends to press other actions against reckless automobilists.

Nashville Jitney Question Before City Attorney.—The City Commission of Nashville, Tenn., is wrestling with a problem as to how to handle the jitney bus proposition, in connection with an application for permit to operate a line made by the Nashville Street Jitney Company. A personal bond was presented to the Mayor, who declined to accept it without approval of the Commission. The city attorney has been asked for an opinion as to what the city should do under the State law on the subject. Nashville formerly had a number of ordinances relating to operation of jitneys, but enactment of the State law nullified them. It is proposed that the city draw up and offer a franchise, stipulating routes and schedules, for sale to the jitney promoters.

Twin City Folder Extols Trolley Trip Attractions.—The alluring call of the many easily accessible lakes, rivers and parks which form a characteristic feature of the country surrounding St. Paul and Minneapolis, Minn., is voiced in a new folder entitled "Twin Cities, 1916," issued by the Twin City Rapid Transit Company, Minneapolis. Effective advertising use of these fruitful sources of electric railway income is utilized by the inclusion of several maps in the folder showing clearly how to reach the numerous places of amusement and recreation near these two cities. The folder also contains information describing all trolley trips in the vicinity and the special points of interest in connection with each trip.

New Portland Jitney Ordinance Contemplated.—City Commissioner Daly of Portland, Ore., recently announced that he was working out plans whereby the jitney interests will be required to obtain franchises and operate on that basis alone. Mr. Daly's ordinance plans to exclude jitneys from operating except as units of a company, or a series of companies pledged to give a certain fixed service. The franchises, according to tentative plans, will be for the various jitney routes. Holders of franchises will be required to maintain a dependable service or forfeit their rights. It is reported that less than 20 per cent of the jitneys operating in Portland are complying with the jitney ordinance regarding service.

Express on Dallas Interurban Lines.—Burr Martin, general manager of the Southern Traction Company and the Texas Traction Company, Dallas, Tex., and Louis Horner, president of the Electric Express & Baggage Company, have announced the details of a system of handling express and baggage in and out of Dallas on all local interurban cars. Hereafter express and baggage will be carried to Denison, Corsicana and Waco and intermediate points on "every other hour" schedule. This is a wide departure from the system now in effect. At present all express shipments and all baggage are handled on special express and baggage cars operated twice daily. To make the new service possible special express and baggage compartments have been installed in all local cars of the companies.

Jitney Certificate Granted in Jamestown.—The Public Service Commission for the Second District of New York has granted a certificate of convenience and necessity to Frank A. Raymond for that part of his motor-bus route between Jamestown and East Randolph which lies in Jamestown and along the streets provided for in the local consent for the line granted by the Jamestown Common Council and Mayor. The certificate restricts the bus line from carrying local passengers in Jamestown, in accordance with the objection of the Jamestown Street Railway, whose lines the bus line will follow. It is pointed out in the commission's order, to the residents of the village of Falconer who objected to the line, that the commission has no jurisdiction outside of cities, but that the police power of the village over its streets might be invoked to control this operation.

Oak Park, Ill., Wants 3⅓ Cent Fare Restored. — In an opinion handed down by the Illinois Supreme Court in the mandamus suit brought against the Chicago Railways and the Chicago & West Towns Railway by the village of Oak Park, Ill., it was decided that the village authorities could not enforce a 5-cent fare over lines which extended beyond the corporate limits. This fare was stipulated in an amendment, passed by the village board in 1903, to an ordinance granted in 1898. The 1898 ordinance gave the now Chicago & West Towns Railway a fifty-year franchise, which was permitted by the Allen law, then in force, and the railway under this ordinance sold twelve tickets for $1. When the village was unable to enforce the amendment to the 1898 ordinance fixing a 5-cent fare from Oak Park to the downtown district of Chicago it asked the railway to restore the 3⅓-cent fare which was provided under the 1898 ordinance.

Massachusetts Jitney Bill Signed.—Governor McCall of Massachusetts signed a bill in the closing hours of the legislative session which authorizes cities and towns to license and regulate the transportation of passengers for hire as a business between fixed and regular termini by means of any motor vehicle except the trackless trolley vehicle. No such motor vehicle can be operated as above until the licensee has deposited with the city or town treasurer security by bond or otherwise, approved by the city or town treasurer, conditioned to pay any final judgment obtained against the principal for any injury to person or property or damage for causing the death of any person by reason of any negligent or unlawful act in the operation of the vehicle. Only one bond need be filed by a licensee, and the act is to take effect in cities upon being accepted by the City Council and in towns when accepted by the voters at any duly called town meeting.

Reading Jitneys Disappearing Without Regulation.—During the season of 1915, Reading, Pa., like many other cities, was struck with the jitney craze, the maximum number of cars operating in any one day being 300. There was no attempt during 1915 on the part of the City Council to pass any legislation. Reading is under the commission form of government, consisting of five commissioners, including the Mayor and various department heads. The 1916 commission passed an ordinance on April 5, 1916, regulating the operation of motor buses in Reading. This ordinance, among other clauses, provided for the deposit of a bond of $1,500 or $2,000, according to the capacity of the vehicle. It also required license fees varying from $5 to $15. The day after the passage of the ordinance, the jitney people presented a petition to the city clerk, asking him to prepare a referendum on the ordinance. This petition was granted and a referendum petition submitted to the people was successful in obtaining the desired number of votes. The commission then repealed the ordinance. Reading is, therefore, without any jitney legislation whatever. The number of jitneys operating this year, however, is extremely small, and it is thought that the high price of gasoline will eventually wipe them out entirely.

Increase in Interurban Fare Upheld.—The Public Service Commission of the State of Washington has dismissed the case brought against the Pacific Traction Company and the Tacoma Railway & Power Company by the Central Improvement League. It states that the 30-cent fare charged by the Tacoma Railway & Power Company on its line between Tacoma and American Lake is neither unjust nor excessive. The line in question was owned originally by the Pacific Traction Company, and a fare of 25 cents for the round trip was charged. The fare was raised to 30 cents when the line was taken over by the Tacoma Railway & Power Company. The commission stated: "It appeared from the evidence that the earning capacity of the respondent companies under the rates now charged is sufficient after paying necessary operating expenses to pay a reasonable return on the market value of the properties, as found by the commission, and the rates now charged are not inherently unjust or excessive." The finding of facts showed that the cost of the property of the company on Dec. 31, 1915, was $6,244,000, including stores and real property. The investigation was begun in 1913, and for the last six months of that year net earnings of the company were $175,120; in 1914, the net earnings were $81,440, and in 1915, $133,024. The Pacific Traction Company, a subsidiary of the Tacoma Railway & Power Co., showed net earnings in 1913 of $11,435, in 1914, $7,413, and in 1915, $6,882. The market value of the property of the Pacific Traction Company on Dec. 31, 1915, was set at $648,800. The report of the commission stated that the company was earning 3½ per cent on its investment, and that on June 30, 1913, it would have cost $5,334,783 to reproduce the property of the company. The total value of the property now used for public convenience was set at $6,244,000.

Personal Mention

Mr. G. S. Storrs has been elected assistant treasurer of the Maryland Electric Railways, Annapolis, Md.

Mr. Charles Duffer has been appointed superintendent of the Jacksonville Railway & Light Company, Jacksonville, Ill., to succeed Mr. Otto Kuchman.

Mr. R. McKee, formerly foreman of overhead line construction for the Memphis (Tenn.) Street Railway, has been appointed general foreman of overhead lines of the company, succeeding Mr. C. W. Blackinton, resigned.

Mr. F. J. Derge, chief engineer for Henry L. Doherty & Company, New York, N. Y., since the resignation of Mr. Milan R. Bump, will return to Toledo, Ohio, as assistant manager of the Toledo Railways & Light Company.

Mr. G. W. Manley has been appointed commercial agent for the Illinois Traction System with offices in Champaign, Ill. His territory embraces a section of the eastern line. He retains the agency of the Champaign local station.

Mr. Otto Kuchman has resigned as superintendent of the Jacksonville Railway & Light Company, Jacksonville, Ill., to take a similar position with the Quincy (Ill.) Railway. Both properties are part of the Illinois Traction System.

Mr. J. G. Holtzclaw, formerly superintendent of railway of the Pensacola (Fla.) Electric Company, is now general superintendent of the company. This position is a combination of his former position and that of superintendent of lighting.

Mr. E. M. Carr, who has been general foreman at the shops of the Kentucky Traction & Terminal Company, Lexington, Ky., for the last five years, has resigned to accept a position as master mechanic with the Kewanee Light & Power Company at Kewanee, Ill.

Mr. Milan R. Bump will again resume the duties of chief engineer of Henry L. Doherty & Company, New York, N. Y. Mr. Bump, who had been with the Doherty interests for some years, resigned last fall as chief engineer to assume the vice-presidency of the Picher Lead Company, Joplin, Mo.

Mr. J. N. Shannahan of Allen & Peck, Inc., who manage the Maryland Electric Railways, Annapolis, Md., has been elected vice-president and treasurer of the railway, succeeding Mr. T. C. Cherry, who has resigned as vice-president and general manager, and Mr. Alan P. Norris, who has resigned as treasurer.

Mr. Ernest Gonzenbach has resigned as general manager for the receivers of the Empire United Railways, Syracuse, N. Y., the resignation taking effect as of June 1. He will continue as receiver of the Syracuse & South Bay Electric Railroad and the Syracuse, Watertown & St. Lawrence River Railroad until the reorganization of these properties is completed.

Mr. A. Swartz, vice-president of the Toledo & Western Railway, Toledo, Ohio, has been appointed traveling track specialist of the Cities Service Company, New York, N. Y., which controls the Toledo Railways & Light Company and ten other railway properties. Mr. Swartz will start soon on a journey to inspect track construction and maintenance as followed on the properties.

Mr. James R. Hammond, Fort Worth, Tex., has been appointed engineer of maintenance of way of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohic. Mr. Hammond has worked on steam and interurban electric railway construction and maintenance as civil engineer in the West and Southwest and prior to going to Youngstown spent seven years in various sections of Texas. He was also engaged for two years on similar work in Central America.

Mr. Arthur Brown of the Toledo Railways & Light Company, Toledo, Ohio, has been appointed traveling master mechanic of the Cities Service Company, New York, N. Y., which controls the Toledo property and street railways in Amarillo, Tex.; Athens, Ga.; Bartlesville, Okla.; Sedalia, Mo.; Cumberland, Md.; Durham, N. C.; Meridian, Miss.; Hattiesburg, Miss., and St. Joseph, Mo. Mr. Brown will direct his efforts toward the standardization of the equipment of the properties operated.

Mr. C. D. Porter has been appointed general manager of the Maryland Electric Railways, Annapolis, Md., to succeed Mr. T. C. Cherry, resigned. Mr. Porter was graduated as a civil engineer from the Rensselaer Polytechnic Institute, Troy, N. Y., in 1906. He has since then been employed in the construction or operation of the following properties: Hudson & Manhattan Railroad, Greenwich & Johnsonville Railway and the Washington, Baltimore & Annapolis Electric Railway. Since 1912 Mr. Porter has been chief engineer of the Newport News & Hampton Railway, Gas & Electric Company.

Mr. Charles N. Black, whose resignation from the position of vice-president and general manager of the United Railroads, San Francisco, Cal., was announced in the ELECTRIC RAILWAY JOURNAL of May 13, was the guest of honor at a farewell banquet on May 23 attended by forty business associates, all of whom were United Railroads' officials. The company's chief legal counsel acted as toastmaster and paid high tribute to Mr. Black for his work in rehabilitating the system after the disaster of 1906. Mr. Jesse W. Lilienthal, president of the company, complimented Mr. Black upon his management of the company's affairs and presented a beautiful silver trophy to him as a token of esteem from the heads of departments. As a more personal token Mr. Black received a set of diamond studded platinum cuff links. In expressing his appreciation of the loyalty of his associates, Mr. Black referred to the work still to be done if the system is to be operated successfully.

T. C. CHERRY

Mr. T. C. Cherry, whose appointment as second vice-president and general manager of the Auburn & Syracuse Electric Railway, Syracuse, N. Y., was noted in the ELECTRIC RAILWAY JOURNAL for May 27, has been appointed by the receivers as general manager of the Empire United Railways, Inc., Syracuse, N. Y., to succeed Mr. Ernest Gonzenbach. Mr. Cherry was born in 1876 and was graduated from Syracuse High School in 1894 and entered Syracuse University, where he took a two-year course in engineering. He also took a two-year course in Syracuse law school. In May, 1898, he entered railway work as timekeeper on construction and track work and as rodman with the engineers of the Syracuse Rapid Transit Railway. On Jan. 1, 1900, he was made superintendent of track of the Syracuse Rapid Transit Railway. Later in 1900 Mr. Cherry went to Lorain, Ohio, as superintendent of construction of line and track of the Lorain Street Railway. Mr. Cherry also served as dispatcher on the Lorain Street Railway, and from August, 1901, to December, 1903, he was general manager of the company. He has also been connected at various times with the Saginaw Valley Traction, Light & Gas Company as general superintendent, with the Ohio Central Traction Company as general manager, with the Buffalo & Lake Erie Traction Company as superintendent, with the Utica & Mohawk Valley Railway as superintendent, with the Schenectady (N. Y.) Railway as general manager, and for the last four years with the Maryland Electric Railways as vice-president and general manager. Mr. Cherry is a director of the firm of Allen & Peck, Inc., electric railway managers and engineers. He was prominent in the work of the New York Electric Railway Association during his connection with roads in that State and has always taken an active interest in the affairs of the American Electric Railway Transportation and Traffic Association. Having spent most of his life in the territory through which the Empire United Railways operates Mr. Cherry is unusually well qualified through his intimate knowledge of men and affairs to assist materially in the task that confronts the receivers.

Construction News

Construction News Notes are classified under each heading alphabetically by States.
An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Central Florida Interurban Railway, St. Cloud, Fla.**—Application for a charter has been made by this company for the construction of an electric railway from St. Cloud to Sanford, Dunnellon and Tampa; also through Volusia County to a point on the Atlantic Coast; also through Osceola and Brevard Counties to a point on the Atlantic Coast, in all about 300 miles. Incorporators: Carl E. Carlton, William S. Alyea and William Hall.

FRANCHISES

Hartford, Conn.—The Public Utilities Commission of Connecticut has approved the plans of the Connecticut Company for the reconstruction of its double tracks on Albany Avenue between Magnolia and Woodland Streets, Hartford.

Lawrence, Mass.—The Bay State Street Railway has asked the Council for a franchise to construct a double-track extension from the present terminus of the single track on Water Street to the Lawrence-Methuen boundary line via the Lawrence-Lowell Boulevard.

New Bedford, Mass.—The Union Street Railway has received a franchise from the Council to construct double tracks on Brock Avenue from Oakland Street to Rodman Avenue.

***Newark, N. J.**—The Balbach Smelting & Refining Company has asked the Board of Public Works for permission to construct a private trolley line along Doremus Avenue from Hamburg Place to its factory in Bay Avenue to accommodate employees.

TRACK AND ROADWAY

Northern Electric Railway, Chico, Cal.—The receiver of this company has received permission to contract for the reconstruction of its bridges over the American and Feather Rivers. It is estimated that the work will cost about $70,000.

Pacific Electric Railway, Los Angeles, Cal.—The City Council of Los Angeles has asked the Railroad Commission of California to compel the Pacific Electric Railway to construct a new bridge approximately 300 ft. wide across the Arroyo Seco, between the city limits and South Pasadena. The Council has ordered the company to construct a viaduct over its tracks at Vineyard Station. The order opening a right-of-way across the tracks connecting Sherman Drive with West Boulevard at Sixteenth Street was rescinded.

Martinez & Concord Interurban Railway, Martinez, Cal.—This company has filed with the Railroad Commission of California a second amended application changing the route of its line, and for authority to issue and sell 600 shares of its capital stock at $80 per share and $125,000 face value of its first mortgage bonds at 90 per cent. [May 27, '16.]

Castro Point Railway & Terminal Company, Richmond, Cal.—Preliminary work has been begun by this company on its project to connect the lines of the San Francisco-Oakland Terminal Railway and the Richmond Belt Railway.

Southern Pacific Company, San Francisco, Cal.—Surveys have been begun for a system of interurban electric lines subsidiary to the Southern Pacific Company to be built through the mining section and into orchard areas where new groves are coming into bearing.

Connecticut Company, New Haven, Conn.—Work has been begun by this company installing new track on Arch Street, Hartford.

Aurora, Mendota & Western Railroad, Aurora, Ill.—Grading has been begun by this company on its line to connect Aurora, Plano and Sandwich. [April 8, '16.]

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company is relaying the tracks on its John Street line, Champaign.

Rapid Transit Company of Illinois, East St. Louis, Ill.—It is reported that this company has disposed of $3,500,000 worth of bonds for the construction of its proposed electric railway from East St. Louis to Mount Carmel. A contract has been let to William Martin, St. Louis, for the construction of the line. It is stated that the company has practically concluded negotiations for the purchase of the Wabash, Chester & Western Railroad, a steam road which operates between Chester and Mount Vernon, and which will be electrified. D. P. Roberts, manager. [March 4, '16.]

Southern Illinois Railway & Power Company, Harrisburg, Ill.—It is reported that this company will extend its line to Marion, Herrin and Benton and will build a loop which will reach from Benton to Herrin via DuQuoin, Pickneyville, Murphysboro and Carbondale.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company plans to extend its South Wayne car line to Rudisill Boulevard. The company has secured the permission of the Park Department to construct its tracks across the Boulevard at South Wayne Street.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—It is reported that the Vandalia Coal Company of Sullivan, Ind., is negotiating with this company for an extension of its line from Terre Haute to Sullivan.

Topeka (Kan.) Street Railway.—Work has been begun on the construction of a three-arch cement bridge at East Sixth Street, Topeka. The structure will be more than 160 ft. long and about 40 ft. wide, with a roadway 30 ft. wide and a 5-ft. walk on each side. The street car tracks will run in the center of the road. The Topeka Street Railway will pay $2,000 to the city of Topeka for the use of the bridge.

Shelbyville & Frankfort Realty Company, Shelbyville, Ky.—The project for construction of the electric railway to connect existing lines terminating at Frankfort and Shelbyville, Ky., is reported to be advancing favorably. A second survey is now in progress. J. W. Gudgell, secretary, states that Yorkville (Ill.) interests will finance the project. [May 20, '16.]

Alexandria (La.) Municipal Railway.—Work will soon be begun by the Alexandria Municipal Railway on the construction of an extension to connect all the depots in the city. The extension will begin at the corner of Second and Casson Streets at the Southern Pacific Company depot, extending across the city property adjacent to the tracks of the Southern Pacific Company, entering Third Street in front of the Louisiana Railway & Navigation Company station, thence down Third Street to or below the Louisiana & Arkansas Railway freight depot. It is the ultimate intention of the City Commissioners to extend the line to Bogan Lane, out to the Ruston Foundry and through the hardwood mill district to connect with the Lee Street line, probably at Vance Avenue, making a complete belt line of the Lee Street line.

Cumberland County Power & Light Company, Portland, Me.—A report from this company states that it expects to install eleven sets of Chapman block signals before June 30.

Winnipeg (Man.) Electric Railway.—Work will be begun at once by this company on the double-tracking of its line from the city limits to Kildonan Park.

United Railways & Electric Company, Baltimore, Md.—A plan has been submitted to the Public Service Commission of Maryland by the United Railways & Electric Company to give direct service to the center of the city, to some parts of the northwestern suburban section, and to give quicker service to most of it. The plan provides that part of the Edmondson Avenue line be extended from Walbrook Junction to Electric Park; that part of the Edmondson Avenue line be extended from Walbrook Junction to Windsor Hills, and that the service on the Edmondson Avenue line from Walbrook Junction to Charles and Lexington Streets also be increased by five cars an hour during the non-rush hours. Further, the plan provides the withdrawal of the Electric Park branch of the North Avenue line, and the use of that service in increasing the service to Woodlawn and Windsor Hills. The three present branches of the North Avenue line will be reduced to two branches, one to Woodlawn and one to Windsor Hills.

Cumberland (Md.) Electric Railway.—This company will construct an extension out Green Street Road to the Dingle, about 1 mile.

Hannibal Railway & Electric Company, Hannibal, Mo.—Work has been begun by this company reconstructing its tracks along West Market Street.

***Great Falls, Mont.**—L. D. Urton and J. P. McDonald, Genou, Mont., representing farming and ranching interests north of Great Falls, Mont., backed by the Commercial Club of Great Falls, are promoting the construction of an electric line into that section.

Bay State Street Railway, Boston, Mass.—Plans are being made by this company for the construction of a ¾-mile extension of its Lynnfield Street line, Lynn.

Manchester (N. H.) Street Railway.—Work has been begun by this company improving its tracks on Beech Street, Manchester.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has awarded a contract for the construction of Section 2 of Route No. 8, a part of the Fourteenth Street-Eastern District subway. to the Degnon Contracting Company, New York, at $1,972,349. A contract has also been awarded to Dennis E. Conners, New York, for the construction of Route No. 31 of the Livonia Avenue elevated extension of the Eastern Parkway, Brooklyn, subway at $1,376,122.

***Asheville, N. C.**—Work has been begun on the construction of an electric railway from Biltmore Avenue to the residence portion of Kenilworth Park, in connection with extensive developments to be made in Kenilworth Park. The improvements are being undertaken by the Kenilworth Development Company, Patton Avenue, composed of E. G. Hester, Roland A. Wilson and J. M. Chiles.

Mount McKay & Kakabeka Falls Railway, Fort William, Ont.—Permission has been received by this company from the Ontario Legislature to use steam as an alternative motive power to electricity on its railway. The company has been granted an extension of time in which to construct the uncompleted portion of its line to Kakabeka Falls.

Ottawa (Ont.) Electric Railway.—This company is reconstructing its track on Rideau Street between Sussex and Waller Streets with 108-lb. and 115-lb. T-rails.

Toronto (Ont.) Civic Railway.—The Toronto City Council has awarded a contract to the General Railway Signal Company of Canada at $2,400 for the installation of a signal system in connection with the operation of the Lansdowne Avenue branch of the Toronto Civic Railway at its crossings with the Toronto Suburban Railway.

Montreal (Que.) Tramways.—The Board of Control of Montreal has asked the Montreal Tramways to extend its service from Park Avenue to the Canadian Pacific Railway station at Mile End. The tracks for this extension have already been laid. The Council of Montreal has accepted the offer of the Montreal Tramways to purchase the overhead material removed from St. Catherine and Bleury Streets for $19,400. This material was discarded on account of the installation of the conduit system.

Jackson Railway & Light Company, Jackson, Tenn.—Plans are being made by this company to reconstruct its tracks on Main Street, Highland Avenue and Royal Street. The order has been placed for heavy steel rails to be used. Delivery will be made about July or August. About $45,000 will be spent by the company on this track improvement. The company will also spend about $15,000 as its share of permanent street improvement.

El Paso (Tex.) Electric Railway.—Work will soon be begun by this company on the construction of double track on Alameda Avenue.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—This company's extension to Payson has been completed, as noted on page 1103 of this issue.

SHOPS AND BUILDINGS

Albany (Ga.) Transit Company.—Work has been begun by this company on the construction of a carhouse on Seventh Street near Tift Park. The building will be 30 ft. x 165 ft., of sheet iron, and will cost about $1,500. R. S. Smith, Albany, has the contract for the construction of the carhouse.

Georgia Railway & Power Company, Atlanta, Ga.—Plans are being made by this company to construct a new car house to cost about $18,000. The location has not as yet been decided.

Rockford & Interurban Railway, Rockford, Ill.—It is reported that this company is considering the erection of a freight depot in Freeport, Ill.

Union Traction Company, Coffeyville, Kan.—This company has purchased a site on South Depot Street from the city of Cherryvale for the construction of a new passenger and freight station.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has awarded a contract at $278,182 to John Roberts, New York, for station finish on Sections Nos. 7 to 11 inclusive of Route No. 5 of the Lexington Avenue subway. The lowest bid opened on June 1 by the Public Service Commission for station finish on Sections 12 to 15 of Route No. 5 of the Lexington Avenue subway was submitted by A. W. King & Company, New York, at $316,000.

Ardmore (Okla.) Railway.—This company has awarded a contract to I. M. Putnam, Ardmore, for the construction of a new carhouse and shops in Ardmore. The building will be 40 ft. x 155 ft., one and two stories, of fireproof construction, with corrugated iron and other fireproof roofing.

Lake Erie & Northern Railway, Brantford, Ont.—It is reported that a contract has been awarded to Schultz Brothers & Company, Ltd., Brantford, for the construction of a brick station on Colburn Street, to be used jointly by the Lake Erie & Northern Railway and the Brantford & Hamilton Railway.

Monongahela Valley Traction Company, Failmont, W. Va.—This company has awarded a contract to E. Elford, Columbus, Ohio, for the construction of its new interurban station at Clarksburg.

POWER HOUSES AND SUBSTATIONS

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—This company has ordered a 1500 kw. frequency changer for installation in its Pueblo power house. All poles for the transmission lines between Manzanola and Crowley have been set and construction crews are now working on the line to Olney Springs, after which the work of building a new line from Holbrook to Cheraw will be started.

Richmond Light & Railroad Company, New Brighton. N. Y.—This company is installing in its power house at Livingston, Staten Island, a 6000-kw. Westinghouse unit, including steam turbine, generators, condenser and pump equipment. The new generator will be air cooled by means of an air washer and pump outfit manufactured by the American Spray Company, 201 Devonshire Street, Boston, Mass., which will have a capacity of 37,000 cu. ft. of air per minute. The new generator unit is expected to be in operation in about three weeks.

Columbus Railway, Power & Light Company, Columbus, Ohio.—This company has announced that it will abandon its site for a new power station on the Scioto River, just north of West Broad Street, in view of the fact that the Chamber of Commerce has requested this step, in order that a plan to protect the city from floods may be carried out. The company will probably select another site if the city takes this over, as it is expected it will do.

Montreal (Que.) Tramways.—A contract has been let by the Montreal Tramways to the Canadian General Electric Company for a new a.c. switchboard for its Hochelaga power station. The board is of the vertical type and is planned for a double busbar layout.

Manufactures and Supplies

HIGH PRICE OF COPPER RETARDS POLE MARKET

A combination of circumstances, including a shortage in the production of poles, an uncertainty of market conditions and the high price of copper, has greatly retarded the purchase of Northern cedar poles both for line extensions and renewals. The depressed market during the latter part of the summer of 1915 influenced the producers of poles in the timber regions of northern Minnesota, Wisconsin and the northern peninsula of Michigan to cut a smaller number than usual. Labor also was scarce and high priced, and unusually heavy snows fell during the winter, all of which reduced the quantity of the poles cut to about 60 per cent of normal. About 1,000,000 Northern cedar poles were cut for 1916 requirements, whereas 1,500,000 were cut during the years 1914 and 1915, and an average of 2,000,000 has been cut in this industry for a number of years prior to 1914. This shortage in the total number of poles cut created a scarcity in certain sizes in the storage yards where as a rule one year's supply is carried. There are plenty of 20-ft. and 25-ft. 4-in. poles in stock, however, but the quantity of 5-in., 6-in. and 7-in. top poles of these lengths is limited. The standard 30-ft. and 35-ft. 7-in. and 8-in. Northern cedar poles generally used in railway work are quite scarce. Under the present market conditions, however, the prices for poles are but slightly increased over those obtaining for the past few years, and this advance was prompted by the shortage of certain sizes. Those familiar with market conditions and the influences which control the quantity of poles cut predict that the existing uncertainty in the pole market will greatly reduce the number of poles taken out of timber regions during the winter of 1916 and 1917.

ROLLING STOCK

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., is reported to be in the market for two cars.

Chicago, Lake Shore & South Bend Railway, Michigan City, Ind., is reported to be in the market for two baggage and express cars.

New York Central Railroad, New York, N. Y., has decided on a type of car, 70 ft. long, to seat ninety persons, twelve of which will be ordered shortly for its suburban electric service.

Carolina & Yadkin River Railway, High Point, N. C., has leased a test car of the Railway Storage Battery Car Company for trial operation on its line from High Point to Thomasville.

North Carolina Public Service Company, Greensboro, N. C., has recently placed in service on its Salisbury-Spencer lines two cars which were overhauled and rebuilt at the Salisbury carhouse.

Montgomery Light & Traction Company, Montgomery, Ala., noted in the ELECTRIC RAILWAY JOURNAL of May 6 as having ordered six cars from the Southern Car Company, is reported to have increased the order to ten cars, delivery to be made by Oct. 1.

Boston (Mass.) Elevated Railway is making informal inquiries from manufacturers regarding 100 new center-entrance motor cars and forty-two elevated cars. It is not asking for formal bids as the cars have not as yet been approved by the Public Service Commission.

San Francisco-Oakland Terminal Railways, Oakland, Cal., noted in the ELECTRIC RAILWAY JOURNAL of May 13 as having applied to the Railroad Commission of California for permission to issue car trust certificates to provide funds with which to purchase new car equipment, has received authorization from the commission for this purpose.

New York State Railways, Syracuse, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of April 15 as having ordered thirty-five city cars from the G. C. Kuhlman Car Company, ten of which are for the Utica lines, have specified the following details for this equipment, which is to be of "The Witt" front-entrance, center exit type:

Date of delivery	July and August
Seating capacity	51
Weight of car body	12,500 lb.
Bolster centers, length	25 ft.
Length of body	35 ft. 5¾ in.
Length over vestibule	46 ft. 7 in.
Width over sills	8 ft. 2 in.
Width over all	8 ft. 4 in.
Height, rail to sills	25¼ in.
Height, sill to trolley base,	8 ft. 8 in.
Body	Metal
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Air brakes	West.
Axles	Std. Steel Works
Bumpers	Channel iron
Cables	West.
Car trimmings	Bronze
Control	West. K-6
Curtain material	Pantasote
Destination signs	Keystone
Door-operating devices,	Nat'l pneumatic
Fare boxes: Utica lines,	Cleveland
Syracuse lines	Johnson
Fenders	Eclipse
Gears and pinions,	Tool Steel Gear & Pinion Co.
Gongs	Brill
Hand brakes	Peacock
Heaters	Peter Smith
Headlights,	Crouse-Hinds—W. B. F.
Journal boxes,	Symington & Rollway
Motors,	4 West. 506-A, inside hung
Paint	Flood & Conklin
Registers: Utica Lines,	Sterling-Meaker
Syracuse Lines	International
Sanders	Ohio Brass
Sash fixtures	Brill
Seating material	Rattan
Step treads	Feralun
Trolley retrievers	Earll
Trolley base	Ohio Brass
Trucks	Baldwin
Varnish	Beckwith-Chandler
Ventilators	Automatic
Wheels	National Car Wheel Co.
Window fixtures,	Brill renitent post construction

Reading Transit & Light Company, Reading, Pa., noted in the ELECTRIC RAILWAY JOURNAL of May 6 as being in the market for additional equipment, has placed an order with The J. G. Brill Company for ten semi-convertible one-man motor cars. The following details of equipment have been specified:

Seating capacity	32
Length of car body over corner posts	19 ft. 6¾ in.
Length of each platform from end of car body to outside vestibule sheathing	5 ft. 6 in.
Length of car body over vestibules	30 ft. 6¾ in.
Length of car body over bumpers	31 ft. 6¾ in.
Width of car body over sills including panels	7 ft. 8½ in.
Width of car body over posts,	7 ft. 11 in.
Height from rail over trolley boards	11 ft. 4½ in.
Center to center of side posts,	2 ft. 4½ in.
Window arrangement,	Brill patented semi-convertible tandem sash arrangement
Window sash	Cherry
Vestibules,	Round end, sheathed outside and inside with sheet steel.
Doors,	Four-part in two sections; glazed in upper panels
Steps,	Folding, Brill mechanism; Universal safety treads
Underframe	Steel
Flooring,	Yellow pine, 13/16 in.; maple mat strips in body and on platform
Posts	Ash
Body frame	Ash and yellow pine
Roof,	Brill plain arch; poplar covered with duck
Hoods	Same as roof
Ventilators	Brill "Exhaust"
Bumpers,	Brill patented angle iron; Hedley anti-climbers.
Drawbars	Brill radial
Brakes,	Brill patented ratchet brake handles, solid bronze
Gongs	Brill patented "Dedenda"
Trimmings	Bronze
Curtains	Pantasote
Trolley catchers	Wilson
Seats and backs.	Brill "Winner"; rattan
Inside finish,	Cherry stained mahogany; dull
Signs	Keystone
Sand boxes	Brill "Dumpit"
Hand straps	Rico
Life guards	H-B
Push buttons	Farraday
Headlights	Elec. Ser. Sup.
Heaters	Consol.
Registers	International
Paint	Chicago Varnish Company
Light fixtures	Safety Car H. & L.
Trucks,	Brill 21-E, single; wide-wing journal boxes, Brill half-ball brake hangers
Motors	G. E. 247-D; 35 hp.

TRADE NOTES

National Scale Company, Chicopee Falls, Mass., announces that its New York City agency is now located at 20 Vesey Street, Room 309, with H. S. Trezevant in charge.

General Electric Company, Schenectady, N. Y., has received an order for GE-247 motors and PC multiple-unit control for the fifteen cars recently ordered by the Buffalo & Lake Erie Traction Company, Buffalo, N. Y.

James A. Nolan, for some years superintendent of the track tool department of Hubbard & Company, Pittsburgh, Pa., has resigned to accept a similar position with the Oliver Plow Company, Hamilton, Ont.

Standard Underground Cable Company, Pittsburgh, Pa., has recently opened a branch office at 704 Wilkins Building, Washington, D. C., in charge of Edward Kerschner, formerly with the Philadelphia office.

White Company, Cleveland, Ohio, has recently delivered to the New York State Railways-Rochester Lines, a second White truck with tower, similar in all respects to the one described in the ELECTRIC RAILWAY JOURNAL for April 8.

W. E. Greenwood has been appointed assistant manager of the railway sales and fuel oil department of the Texas Company, to succeed L. S. Jordan, resigned, effective June 1. Mr. Greenwood's headquarters will be at 17 Battery Place, New York City.

Clyde E. Dickey announces that he has resigned his position as secretary and sales manager of Denman & Davis, New York, with whom he has been associated for the past eleven years, and has organized the Dickey Steel Company, of which he is president, with offices in the Woolworth Building, New York City. The new company will represent several manufacturers of high-grade steel. Mr. Dickey was with the Crucible Steel Company of America for nearly five years prior to his connection with Denman & Davis.

Lord Manufacturing Company, New York, N. Y., has received the following orders: 100 Lord screenless air cleaners from the General Electric Company for use on the air-brake equipment of the new cars for the Bay State Street Railway; Lord screenless air cleaners from the Westinghouse Air Brake Company for installation on air-brake equipment going to the various properties of the American Railways Company; twenty-eight new Horne double-acting hand brakes from the Osgood Bradley Car Company for the new express and passenger cars being built for the Worcester Consolidated Street Railway; new Horne double-acting hand brakes from the Southern Car Company for the cars being built for the Lehigh Valley Transit Company; 287 Giant brakes from the Public Service Railway for cars which they are building; seventy-eight Giant brakes from the American Car Company for installation on cars being built for various Stone & Webster properties; 100 Giant brakes from the Laconia Car Company for installation on cars being built for the Rhode Island Company, and thirty-eight Giant brakes from the St. Louis Car Company for one of the Stone & Webster properties. The New York State Railways, Rochester Lines, after a thorough test, have ordered fifty-three Q-P trolley catchers to fill their present requirements. The Southern Car Company has ordered Q-P trolley catchers for the cars being built for the Scranton Railway, and the Three-Cent Fare Line has ordered Q-P trolley catchers for all of its lines. The Cincinnati Car Company recently ordered fourteen differential staffless brakes for installation on the cars being built for the Manhattan & Queens Traction Corporation, as well as Giant brakes for the new cars for the Muskegon Traction & Lighting Company. The Rhode Island Company has ordered 100 of the improved Sterling wheelguards for installation on its new cars.

ADVERTISING LITERATURE

Western Electric Company, New York, N. Y., has issued an unusually complete catalog of telephone apparatus and supplies.

Terry Steam Turbine Company, Hartford, Conn., is distributing a loose-leaf folder containing data and representative photographs of its duplex exciter sets.

Frankel Connector Company, Inc., New York, N. Y., has issued a catalog which contains price lists and describes and illustrates its various types of solderless electrical connector, testing clips and spark plugs.

NEW PUBLICATIONS

Proceedings of American Wood Preservers' Association, published by the secretary of the association, F. J. Angier, B. & O. RR., Baltimore, Md. 470 pages.

The American Wood Preservers' Association has issued the complete stenographic report of the twelfth annual meeting of this association held at the Hotel Sherman, Chicago, Ill., on Jan. 18, 19 and 20, 1915. The report contains the constitution and by-laws of the association, a classification of the membership, reports of committees relating to the materials, methods and principles involved in the design, maintenance and operation of wood-preserving plants and specifications for wood preservatives. Statistical data compiled by this association show that the first timber-treating plant was established in 1860, and that the number of plants in operation in the United States has grown to 102. During the past fifteen years, however, the increase in the number of plants has been most marked, there being fifteen in operation in 1900 and 102 in 1915. Although there were seven more plants in operation in 1915 than there were during the previous year, the amount of timber treated fell off 10 per cent. There was a reduction in the number of cross-ties treated of more than 6,700,000, while the quantity of paving material increased in excess of 300,000 sq. yd., or 11 per cent. Less than one-half as many cross-arms were treated during the year 1915 as were treated the previous year, and there was a reduction in the miscellaneous timbers treated of 14 per cent.

Railroad Valuation and Rates. By Mark Wymond. Wymond & Clark, 909 Rand-McNally Building, Chicago, Ill. 344 pages. Buckram, $1.50.

This book contains a general discussion of the historical facts regarding steam railroads and of the subjects of promotion, construction, reconstruction and capitalization, in order to show the influence of these factors upon valuation and rate making. The remainder of the book is then devoted to a treatise on the latter subject. The work is confined almost entirely to the steam railroad field but some general valuation points might be interesting to street railway men.

Industrial Arbitration. By Carl H. Mote. Bobbs-Merrill Company, Indianapolis, Ind. 351 pages. Cloth, $1.50 net.

Originally undertaken with an object of finding some tangible device for the prevention of strikes and lock-outs, this work in its present form aims to present a consideration of those devices now existing. In summing up his book, Mr. Mote states that neither voluntary nor compulsory arbitration will work with any conspicuous degree of success in this country until the worker receives a compelling voice against his employer as to wages, hours and working conditions. When these steps have been taken, the public may well insist upon its right to prevent strikes and lock-outs altogether in those industries to which the public looks for daily conveniences.

Auditing Theory and Practice. By Robert H. Montgomery. The Ronald Press Company, 20 Vesey Street, New York, N. Y. 900 pages. Leather, $5 postpaid.

Not alone for the several pages dealing specifically with electric railway auditing but also for the generally excellent information in regard to auditing theory and practice, should every electric railway accounting officer with a broad vision have this second edition of Mr. Montgomery's authoritative work, if the first is not already in his library. Even in the latter case, the new material in the second edition, on such subjects as the income tax, would probably make the purchase worth while. A book so well known as that by Mr. Montgomery needs no detailed description; suffice it to say that it should be in the accounting library of every electric railway.

Value for Rate Making. By Henry Floy. McGraw-Hill Book Company, Inc., New York, N. Y. 222 pages. Cloth, $4.

Four years ago Mr. Floy, with the hope of helping to define methods used and of standardizing practices in valuation procedure, brought out the first book relating to the general subject of the valuation of public utility properties. He has now followed this with the present volume in an attempt to emphasize further at least three principles that seem to him to be essential in determining the fair value for use in fixing rates. These are as follows: (1) To conform to the rulings of the courts the basis for rate making should be the fair present value of the property used, regardless of the amount of the original investment in utilities established previous to the present public regulations régime. (2) Present value for rate making is obtained by making deduction for absolute depreciation only and not for theoretical depreciation. Absolute depreciation is that depreciation which is in evidence, existing and determined by inspection. Theoretical depreciation is an estimate only, based on assumptions and computations. (3) Practically every utility includes certain intangible non-visible elements, which should be evaluated and allowed in addition to the material, sensible elements. The value of a non-visible part may vary from a few per cent to 100 per cent or more of the value of the visible parts of a property. In elaborating these principles the author has reviewed the various decisions of public authorities that seem to him correct and sensible and has in general outlined the valuation course that he thinks it would be fair to follow.

Electric Railway Journal

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A CONFLICT OF DATES

June is beloved not only by the poets but by the delegates, and besides the two national political conventions a large number of technical associations have scheduled meetings for this month. Among those associations of electric railway interest which are to meet or have met during June are the Master Mechanics and Master Car Builders at Atlantic City, the Central Electric Railway Accountants Association, the Illinois Electric Railway Association, the Central Electric Railway Association, the New York Electric Railway Association, the American Society for Testing Materials and the American Institute of Electrical Engineers. In many respects June is a good month for conventions. The weather is nearly always propitious and it is not so hot that traveling is uncomfortable. The trouble is that the dates for these conventions have been set with little regard to question of overlapping. While there has been some conflict up to this week, the climax comes in the last three days in June, when no less than four of the associations mentioned above, namely, the last four in the list, bid for the attendance of electric railway men. This is regrettable. One cannot be at all, and there are a number of men, who, we know, would like to go to two or more of these meetings. As matters are arranged, they have to make a choice. We hope that before next June some working agreement will be reached by which at least the electric railway associations mentioned will select dates which will not coincide.

HOME RULE QUESTION AGAIN

While recognizing that very successful results have followed municipal regulation of city transportation facilities in Chicago, we believe that state regulation is usually preferable. Hence, the recent ruling by Judge Taylor denying the right of the Illinois Public Utilities Commission to issue orders affecting the service and the equipment of the Chicago street railways should not be considered a desirable precedent elsewhere for the substitution of city for state regulation. The Chicago situation is unique in many respects. In the first place, the entire surface railway situation had to be cared for, beginning with the franchises, continuing through the physical rehabilitation of the entire system and fundamental changes in transportation features and including a partnership agreement with the city by which the latter, so far as net earnings are concerned, is practically an equal partner with the companies. Another fundamental factor to be considered is that the plan was initiated long before the idea of state regulation of public utilities had gained much ground and was in full operation long before there was any commission in Illinois with extensive powers to regulate service. Finally, the results at Chicago are undoubtedly attributable not so much to the method employed as to the men who were made responsible for the direction of the undertaking, and the success being due to men, it is not an argument in favor of municipal regulation, because the same men if acting for the state in that or any other case would undoubtedly have accomplished equally as satisfactory results. If the Board of Supervising Engineers in Chicago had state-wide powers as great as those which they exercise within the limits of that city, they could undoubtedly accomplish a great deal more for the benefit of the transportation facilities of that city than they could at present, because many of the lines extend beyond the city limits. This same situation is bound to be true in other cities, and this is one reason why state regulation is to be preferred to city regulation.

UNIT PRICES FOR ELECTRIC ENERGY

A newspaper report of one of the recent sessions in the interminable Thompson legislative investigation in New York City ended thus: "Frank Hedley, vice-president and general manager of the Interborough, has already testified that, without increasing its plant, the Interborough could generate enough surplus electricity to sell at 1 cent a kilowatt-hour and make a profit. The Edison company charges 8 cents a kilowatt-hour." While the statement is undoubtedly true, the inference which the casual reader would draw from it is that either there is a radical difference between the power plants of the two companies or that the difference between 1 cent and 8 cents represents "velvet" for the New York Edison Company. Such an inference would be decidedly unfair, for it is quite possible that the profit at the higher figure may be smaller than that at the lower. Energy is not a commodity like grain or apples for which there can be a fixed market price, regardless of the conditions of generation, distribution and utilization. As we have shown from time to time, peak-load energy may cost a dollar or more per kilowatt-hour to generate due to the investment of large sums in equipment used for but short periods. In the case cited in the above quotation a large part of the 8-cent charge is due to high distribution expense which, with the average small lighting customer, amounts to a large part of the income. The customer is supplied through transformers which absorb exciting current continuously although the average customer uses an almost negligible part of the all-day capacity of the transformer. The cost of energy depends upon the load factor and the magnitude of the load. Either the Interborough or the Edison company could afford to sell energy at 1 cent per kilowatt-hour with proper values of these two elements. Fortunately power for electric railways can, in general, be produced cheaply because the load factor is fairly good and the load is reasonably large. This is one reason why so much transportation can be given for the nickel fare. Railway employees have a good talking point here in discussing transportation problems with the public.

"DAYLIGHT SAVING" AND ELECTRIC RAILWAY TRAFFIC

At the present moment it looks as though the daylight saving movement were a thing the probability of which in this country must be gravely considered. The scheme was proposed in England some eight or ten years ago and, according to the press dispatches, has now been officially adopted in that country, having gone into effect on the morning of May 21. According to the published reports, all public institutions in England, as well as the factories, shops, theaters and restaurants, will follow the new schedule until Sept. 20. But one exception is made. This is the public parks, which will stay open on the old schedule. The shift was made at 2 o'clock in the morning by shoving the clocks forward one hour. By a curious spontaneity, the plan has also been favorably considered by a number of other European countries this year and has taken so firm a grip on the popular imagination that it has actually been put into effect in Austria-Hungary, Germany and Holland, has been authorized for immediate adoption in Denmark, probably to be followed by Sweden and Norway. It has also just been adopted by France, according to newspaper report. Add to these European examples the fact that some Canadian towns have already tried the scheme and several cities in our own country are seriously considering it, and it will be realized that we are confronted by what is an accomplished fact elsewhere, and must be taken seriously here.

Of course, the plan is familiar to our readers through casual mention in the daily press, being merely to set the clocks forward, pursuant to legal enactment, somewhere about the first of May and to keep them running an hour fast of sun time until about the first of October, when they would be set back to assume the winter schedule. Germany and Austria-Hungary adopted the plan the first of last month, as also did Holland, where the clocks were set forward an hour at the midnight beginning May 1. Of course, it is a fact that the civilized world at large does not utilize the early hours of good daylight through the summer months. People get up at nearly the same time summer and winter, in winter near or before sunrise, in summer two or three hours after it.

On principle the scheme seems not an unreasonable adjustment of man to nature, although the economies to be effected look to be somewhat dubious. No artificial light can be saved by getting up an hour earlier in the morning at the dictation of a manipulated clock or otherwise. If any saving can be made by the people at large in their electric light and gas bills it will have to be at the end of the day. If everybody went to bed an hour earlier than usual that much of the lighting bill would be cut off. As a rule, however, the people who sit up latest are those who are not doing long hours of hard work, but rather those who get up late and reach the evening hours tolerably fresh, so that it seems more than likely that the people who determine the time when the last lights are extinguished will take advantage of the blessed opportunity to lie in bed an alleged hour longer and sit up correspondingly later.

From the standpoint of the electric railway operator the situation is a rather singular one. It should not affect the total traffic to any perceptible extent, for about the same number of people will be carried, whether the day begins at one hour or another and whenever it officially ends, but it will tend to shift the distribution of the traffic and probably will require an hour longer active service on the part of the cars. The traffic of the early hours will begin earlier and very likely string out over a slightly longer period. The afternoon rush hour reckoned on sun time will be similarly affected. The results as regards evening traffic are not quite easy to foresee. It is possible that places of amusement would shift without change to the new time, letting out the theater crowds after the usual interval. But there is also a rather good chance that the existing tendency of theaters and the like to throw their beginning hour further into the evening would be increased, so that it is very doubtful whether the service, on which the late homecomers depend, could be suspended any earlier in actual time than it now is. In other words, it looks very much as though carrying out the daylight saving scheme might extend the active service period for about an hour, with a strong likelihood that the extension will come at or near what is now the evening rush period. If so, the effect should be to flatten at least somewhat the evening peak and so relieve the strain on the power station, car and car crew demand. Such a change ought to be reflected in operating economies.

There is also a possibility that the lengthened hours of daylight in the evening would result in more pleasure riding after the evening peak, the likelihood of this event being strengthened by the fact that the old schedule has been retained for the closing time of the English parks, as already mentioned. Such a plan ought to mean that all this additional pleasure and park traveling would take place to a large extent after the evening business rush-hour peak and hence at a time when it could easily be taken care of by the trolley systems. Details of this sort, however, can only be discovered when the thing is actually tried. All in all, therefore, the adoption of the daylight schedule would be of benefit to the electric railways.

There are certain grave inconveniences attending the proposition which will have a stronger effect in checking its adoption here than in some of the foreign countries that are trying it. For example, standard time is worked in 15-deg. belts, each carrying throughout its extent the sun time of the center. At each edge the standard time is half an hour away from sun time, an amount which has been found sufficient to cause some little inconvenience when the days are not at their longest. Under the daylight-saving scheme the added hour where the clocks were already half an hour fast of sun time would aggravate the trouble rather seriously. Indeed this very objection has been raised against the adoption of the plan in France, which is in much the same condition as a single belt would be here. Small countries would not suffer this inconvenience to anything like the same extent as the big ones, especially our own. In Holland, for example, everything is reported as going on automatically with perfect smoothness. What will be the result of the agitation here no one can tell, yet if it should be generally adopted in Europe the possibility of assuming it here would be by no means remote.

PENNSYLVANIA-TYPE LOCOMOTIVE MAINTENANCE

The maintenance cost figures for the Pennsylvania Railroad's electric locomotives during the past year, as outlined on another page, are worthy of more than mere passing comment on the excellent record that they display. The low average cost of repairs, approximately 3.5 cents per locomotive-mile for engines weighing 156 tons, has been attained directly by application of the principle of making all repairs at inspections and practically eliminating the periodic overhaulings customary with steam locomotives. The success that has attended the change in methods in this case, as well as that which has accompanied the use of the same plan on the New York Central Railroad for a number of years past, demonstrates its thorough practicability.

That the electric locomotive needs no periodic shopping for general repairs is due primarily to the fact that it has no boiler subject to progressive deterioration in service. In place of the boiler is electrical equipment which, when not overworked, remains in good condition for years, except for minor replacements and the possibility of accidental damage. Since running gears in general can be kept up by making light repairs from time to time as they are needed, there is really nothing in the normal course of events that requires a complete dismantling and rebuilding of the electric machine, and this cannot but make for economy. Stripping an engine and rebuilding it complete, as is practically done at a general overhauling in a steam locomotive repair shop, is bound to result in a lot of unnecessary work in the case of an electric locomotive, simply because of the removal and replacement of many parts that may be just as well inspected and repaired in place. Otherwise, much material would have to be dismantled and assembled at considerable cost even though obviously there was no need for repairs of any kind on the equipment.

On the Pennsylvania locomotives, for example, the first operation, under the original plan of having general overhaulings, was the removal of the cab. Yet this has been shown to be quite unnecessary except for repairs to the armature of the main motor which the cab incloses. Even then, the removal of the cab could be avoided by installing a hatchway in the cab roof, but since the protected location of the motor practically eliminates the possibility of mechanical injury, such a facility would be used too seldom to make it worth while.

Repair work for the Pennsylvania locomotives, therefore, is carried out almost in its entirety at an inspection shed, or engine house, that was originally provided only for light running repairs, with the result that, roughly, one-third has been cut from the expense of maintenance. What the resulting figure means may perhaps best be exemplified by comparing it with the maintenance costs for steam locomotives for the same railroad, as displayed in the I. C. C. reports. The steam machines average about 30,000 miles per annum at a cost of approximately 13 cents per locomotive-mile, the average steam locomotive weight being about 90 tons. As opposed to this the 156-ton electric locomotives are maintained for 3.5 cents per locomotive-mile, in a service which is in effect a combination of high-speed transfer movements and switching, with no long runs—conditions that make high annual mileages impossible and exaggerate the cost of repairs.

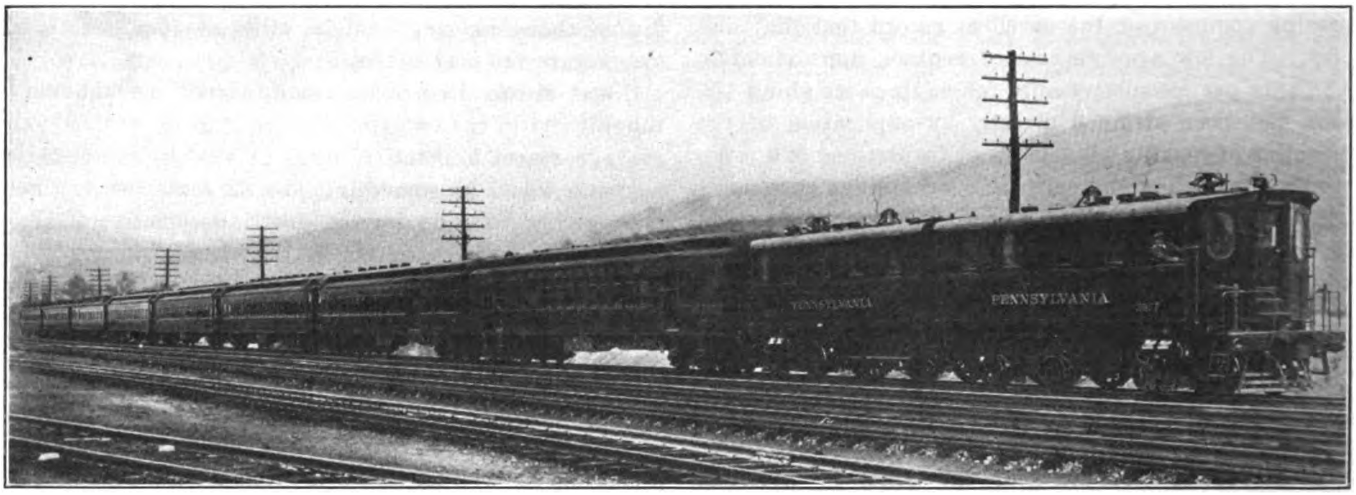
Since steam locomotive maintenance should vary roughly with the weight, the equivalent cost of an average steam locomotive equal in size to the electric machine would be something like 22 cents per engine-mile, giving a saving for the electric locomotive of 18.5 cents. The service in which the electric locomotives are working permits a mileage of about 36,000, and on this basis the saving in maintenance is equivalent to about 11 per cent on the cost of the electric engine. As twice this mileage would seem to be easily attainable in ordinary service, the saving in maintenance cost alone at this rate would pay for interest and depreciation as well as afford a profit on the cost of the electric machines that could be substituted for the steam locomotives.

There is still another point that might be touched upon in connection with the record of the Pennsylvania engines, and this is that the figures demonstrate the thorough practicability of the side-rod drive from a maintenance standpoint. There has been a very general impression that the additional parts introduced in this type through the necessity for coupling driving wheels with a jack-shaft, constituted an undesirable complication, but the present results seem to be ample evidence to the contrary. Of course, simplicity is and always will be the most important attainment in locomotive design, but at the same time real simplicity may be accomplished in other ways than by a reduction in the number of parts. If the parts in themselves are inherently simple and rugged in construction, they may in the end produce thoroughly satisfactory results, and this seems to have been the case with the Pennsylvania locomotive.

Electric Locomotive Maintenance on Pennsylvania Railroad

Elimination of Periodic Overhaulings for These 156-Ton Engines, Which Are of the Side-Rod Type, Has Reduced the Maintenance Cost to Less Than 4 Cents per Locomotive-Mile

CHANGES in the maintenance practice of the Pennsylvania Railroad in connection with the locomotives on its electric zone in New York City have effected a remarkable reduction in the cost of repairs. The engines have been in service since 1910-1911, and each has made a total mileage averaging 155,000. Yet the maintenance cost for the year between May, 1915, and April, 1916, approximated 3.5 cents per locomotive-mile, and this seems to constitute a low record for engines of such large size, the total weight of the two units that form a complete locomotive being 156 tons. In brief, the change has consisted in the elimination of periodic overhaulings such as were described in the ELECTRIC RAILWAY JOURNAL for March 15, 1913, and for the past fifteen months there has been adopted, instead, the practice of making repairs to worn parts whenever they are discovered at inspections. Thus practically all work is done at the engine house located in the Sunnyside Yard, the main storage point for the passenger-coach equipment handled by the engines.

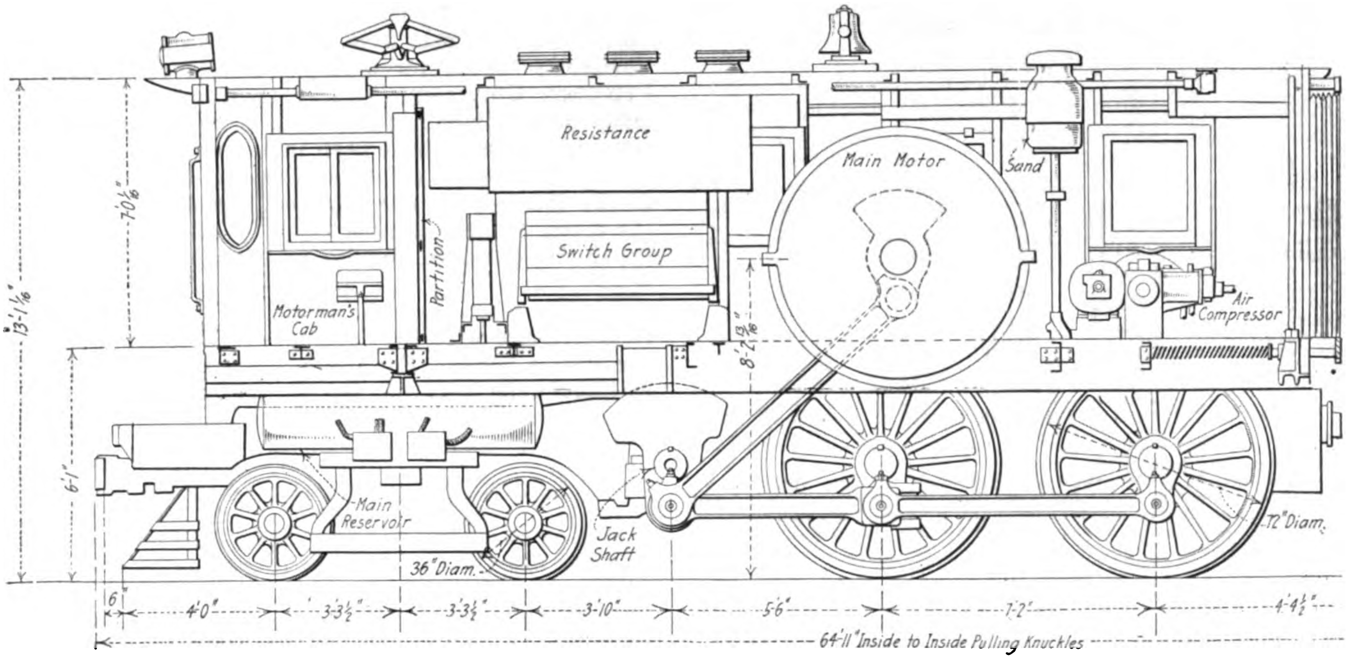

P. R. R. LOCOMOTIVE MAINTENANCE—ELECTRIC LOCOMOTIVE AND TRAIN OF ALL-STEEL CARS

This building is equipped with a drop pit, and under the new plan of maintaining the engines, whenever tires become worn, the pit is used to drop out successive pairs of driving wheels, and the engine is then set outside of the house on dummy wheels while the tires are being turned and the rods and boxes are being repaired—the only heavy operations that are regularly needed. The driving wheels that are removed are sent to the nearest steam locomotive repair shop for turning, because the engine house is not equipped with a driving wheel lathe, and the same procedure is followed in case heavy repairs are required for the main motor armatures. Aside from this, however, all work can be more profitably done at the engine house, as it has been found that the repair force necessary to handle the running repairs can also handle the heavier repairs.

Changes also have been made in the method of handling the locomotive inspections. Originally the engines were inspected at both Sunnyside Yard and Manhattan Transfer, the western terminus of the electric zone, but no provision was made whereby the engines could be set out of service at definite times for the inspections, and these had to be made, therefore, whenever the inspector could find a locomotive that was idle for a few minutes. Under the present scheme the engines are inspected once each day over a pit located in the Sunnyside Yard, and they are sent to this point by the operating department as a regular part of the day's routine. Thus the locomotives are now given a daily inspection under conditions where ample time and facilities are provided to do such light work as replacement of brakeshoes, contact fingers, arc-chute slides, headlight resistances and the like.

In addition each engine is given a general inspection at intervals of 3000 miles, this distance being covered usually during the course of about one month. At these general inspections the whole engine is given a very thorough examination, including especially the control, wiring and switch groups. Contact tips are renewed as necessary, together with switch shunts and main resistance grids if they are burned, while auxiliary circuits are tested for continuity and grounds. Also, the contact shoes on the engine trucks are gaged and readjusted, the motors are thoroughly blown out with compressed air, and the sequence of operation of the switches in the switch group is tested.

The mechanical part of the general inspection includes examination of all of the running gear, and practically all work that appears is done at this time. This includes reducing rod brasses in case the wear limit of 1/16 in. has been reached. The jackshaft brasses are tested for lost motion, and they are closed if this is required. The same thing is done with the main motor bearings, which are tested for lift, and if the limit of 1/16 in. is reached they are replaced, this operation being effected by removing the bearing caps and jacking


Resistance
Main Motor
Sand
Switch Group
Partition
Motorman's Cab
Air Compressor
Main Reservoir
Jack Shaft
36" Diam.
72" Diam.
13'-1 1/16"
7'0 1/16"
8'-2 13/16"
6'-1"
6"
4'0"
3'3½"
3'3½"
3'10"
5'6"
7'2"
4'4½"
64'11" Inside to Inside Pulling Knuckles

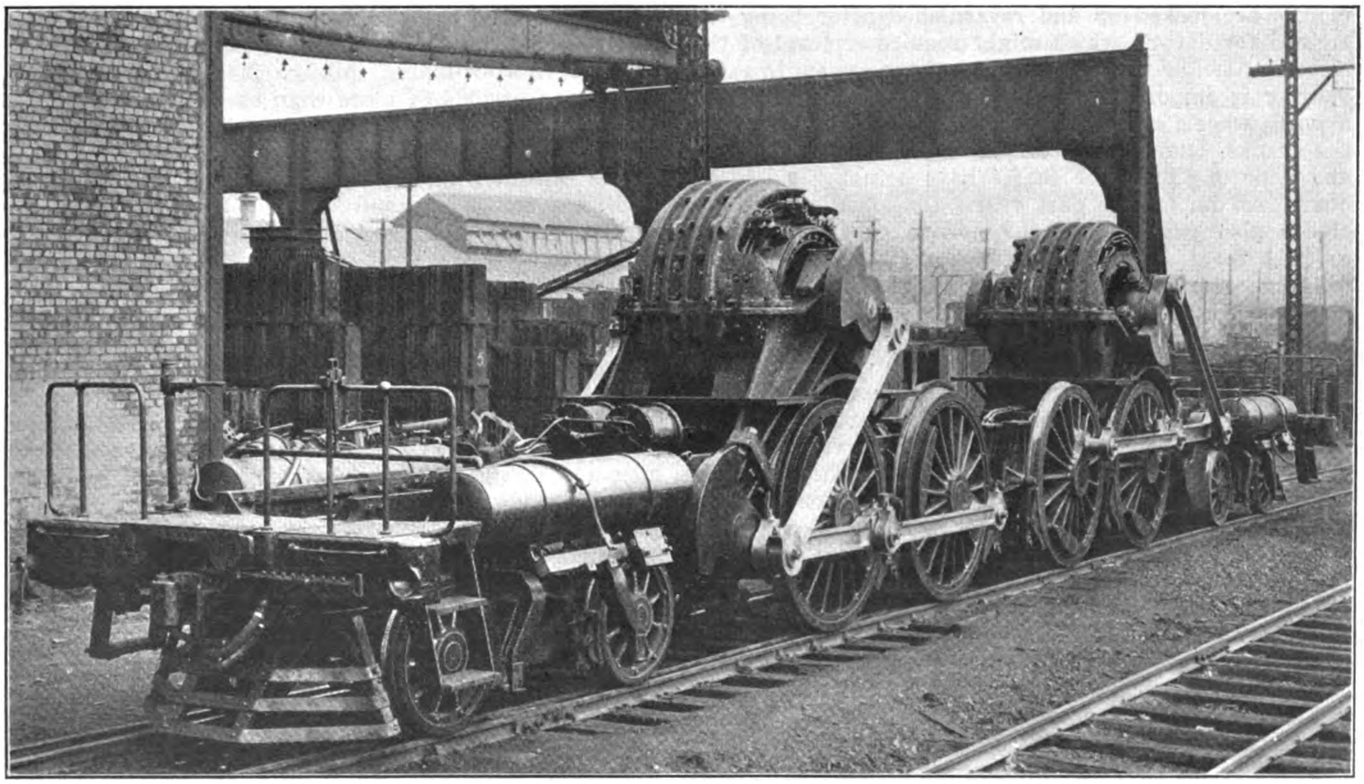
P. R. R. LOCOMOTIVE MAINTENANCE—DIAGRAMMATIC ELEVATION OF SINGLE UNIT OR HALF-LOCOMOTIVE SHOWING RELATIVE POSITION OF WHEELS, RODS AND ELECTRICAL EQUIPMENT

up the armature without removal of the motor from the engine. At the general inspections, also, the engine truck wheels are renewed if the flanges are sufficiently worn, and the engine-truck boxes are babbitted as required to take up any side play.

At 15,000-mile intervals there is made what is called a heavy inspection. As a matter of fact, this is really a duplication of the general inspection in so far as mechanical repairs are concerned, but electrical apparatus receives more elaborate tests and all classes of electrical repairs are made. The covers on the main motor armatures are removed, and the hand-hole plates at the bottom of the motor casing are taken off, so that the armature banding, as well as the condition of the armature coils at the back end of the armature, can be examined thoroughly. The compressor armatures are also inspected in greater detail than at the 3000-mile inspections, and the switch groups are gone over more carefully, the switch-group studs and straps being tightened and the magnet valve stems being replaced if worn. Junction box covers are removed and examination for loose terminals is made, while the same procedure is followed with the bus line and main fuse-box covers, as well as the receptacles for the jumpers between units.

CLASSIFIED REPAIRS

When it becomes necessary to turn tires, the heavy inspection at which the work falls due is considered



P. R. R. LOCOMOTIVE MAINTENANCE—RUNNING GEAR WITH CAB REMOVED

TABLE I—COST OF ELECTRIC LOCOMOTIVE MAINTENANCE, PENNSYLVANIA RAILROAD, 1915-1916

Month and Year	Mechanical	Electrical	Total	Total Locomotive Mileage	Cost per Locomotive Mile (Cents)
May, 1915......	$2,180.96	$995.12	$3,176.08	81,126	3.91
June, 1915.....	1,731.64	1,018.97	2,750.61	83.145	3.31
July, 1915......	2,499.72	1,439.21	3,938.93	88,792	4.44
August, 1915...	2,268.33	737.13	3.005.46	88,433	3.40
September, 1915	1,808.85	999.23	2,808.08	85,054	3.30
October, 1915...	2,118.38	847.78	2,966.16	83.121	3.57
November, 1915.	1,630.41	855.07	2.485.48	82,438	3.02
December, 1915.	2,105.56	927.29	3.032.85	84,677	3.58
January, 1916..	1,919.19	610.42	2,529.61	83.797	3.02
February, 1916.	2,342.45	859.26	3,201.71	80,819	3.96
March, 1916....	2,091.34	1,127.42	3,218.76	85,299	3.77
April, 1916.....	1,506.20	814.45	2.320.65	83,604	2.78
Totals	$24,203.03	$11,231.35	$35,434.38	1,010,305	3.51

Note: Mileage figures made up with two locomotive-units considered as one locomotive.

Costs include all charges for inspection, repairs and superintendence in electric zone; for work done on the electric equipment by steam locomotive shops; for material either purchased direct or through purchasing agent; and for freight except over Pennsylvania Railroad.

equivalent to classified repairs, although the engine is not sent to the repair shop unless it is necessary to remove the cab, this being required in case the armature of the main motor has to be removed for any purpose. The engine house is equipped with a 25-ton traveling crane, but this is not high enough to permit the cab to be lifted off the engine, and therefore, in case an armature has to be rebanded or requires some other heavy work, the engine has to be sent to the nearest steam locomotive repair shop. Under ordinary circumstances, however, the procedure, as mentioned previously, is to drop out successive pairs of drivers in the engine house drop pit, replacing them with dummy wheels and setting the engine outside until the tires can be turned. At the same time the engine trucks are removed and completely overhauled, the shoes and wedges are squared up and relined and the driving boxes have the side play taken out, the driving-box brasses at the same time being overhauled if they have become loose in the box or large on the journal.

For the electrical repairs, the armatures of the main motors are jacked up and revarnished after being examined for defects which might require removal of the motor. Also, as the maintenance of the cranks in exact quarter is important, the motor shaft, jackshaft and driving wheels are all tested for proper angularity of the cranks, but as a matter of fact only one jackshaft and none of the motor shafts have actually had to be quartered during the past year. Classified repairs includes also painting the locomotive cabs, which are given a good finish because the engines are used in passenger service. This work is done in the engine house, one painter being regularly employed on this work for a large part of the time.

Classified repairs are made dependent upon the driving wheel wear under ordinary conditions, and as driving wheel tires are invariably turned because of worn flanges rather than tread wear, the intervals between turnings are extremely irregular, depending largely upon the class of service in which the engine happens to be. An interval of 50,000 miles between tire turnings is considered to be an average, but instances as low as 25,000 miles and as high as 100,000 miles have occurred not infrequently, and one unit actually made 142,000 miles between August, 1912, and November, 1915, without being shopped, this high mileage being ascribed to a particularly advantageous run on which the engine worked. Generally speaking, therefore, classified repairs are given at about every third heavy inspection.

Owing to the fact that the number of electric locomotives is ample to take care of the traffic under normal conditions, the electric zone is never short of power except during rush days, such as brought about by Christmas travel, for example, or a football game at Princeton University. Under these circumstances, as many as thirty-one engines out of the total of thirty-three in operation have been in service, but under average circumstances only about twenty-four engines out of the thirty-three are required. In consequence it is the policy to hold engines out of service in the engine house for classified repairs preferably when their absence from service will not be felt and to do the work upon them when it can be handled to the best advantage in accordance with the demands of the regular work in the engine house. For the heavy inspections, or those at 15,000-mile intervals, the engines are held for two or three days, while at the general inspections they are usually held one day and sometimes two days.

MAINTENANCE COSTS AND PRACTICE

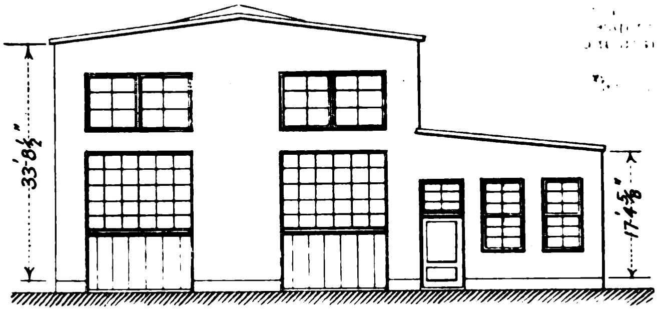
The costs of maintenance under the practice above outlined are shown in Table I by months from May, 1915, to April, 1916. These figures apply to complete locomotives, each of which is composed of two units weighing 78 tons apiece, so that the whole locomotive weighs 156 tons. The weights of the major items which make up each unit are as follows: Cab, control and compressor, 22 tons; motor, 21 tons; running gear, 18 tons; chassis, 17 tons. In brief, the service in which the locomotives operate is that of hauling passenger trains between Manhattan Transfer and the Pennsylvania Station in New York City, a distance of 8.8 miles. In addition, there are several trains hauled to Jamaica on the Long Island Railroad, a distance of 11.3 miles. The passenger-coach storage yards are at Sunnyside, some 4 miles east of the Pennsylvania Station, and reached by tunnels under the East River. Each engine, when it picks up a train either in the yard or at the zone terminals, hauls it through the under-river tunnels, so that the average run approximates 11 miles in length.

In case the engine bringing a draft from the yard should reach the New York station ahead of time, it may be called upon to do some switching in the station yard during the wait before pulling out its train, and for this switching mileage it receives no credit, except for periods of more than one-half hour. Three engines, however, are kept regularly in switching service at the Sunnyside Yard, being credited with mileage at the rate of 6 m.p.h. The latter engines, it may be said, are not permanently assigned to the switching service, but are placed in it if their tires are found to be approaching the limit of flange wear, so as to raise the average tire mileage.

Each unit, or half-locomotive, is complete in itself, having a 2000-hp. motor connected to the driving wheels through a jackshaft and side rods. There is a four-wheel truck at the front end of each unit and two pairs of 72-in. drivers at the rear. The jackshaft is carried in a housing placed between the upper and the lower members of the locomotive frames. At this point the frame is made up with jaws having a binder below them, just as would be the case were the jackshaft replaced by a pair of drivers. Lost motion in the jackshaft bearing causes a serious pound if it is allowed to go beyond about 1/16 in., and as most of the wear takes place at the bottom half of the brass, it is the practice to take this up by loosening the lower part of the box, removing a liner, and then tightening the lower part of the box into place again. The intervals at which this work becomes necessary are variable, ranging anywhere between 2000 miles and 7000 miles. The average is about 3000 miles, which corresponds to the intervals between general inspections. The two halves of the brass are originally left a full 1/32 in. open, and when the removal of liners brings them together, they are rebabbitted, thus separating the two halves again. This has to be done about once a year. These brasses run hot at long intervals, about four out of the 132 which are at present in service getting hot during one course of twelve months.

The diagonal motor rods which extend between the cranks on the motor shaft and those on the jackshaft, as well as the horizontal side rods, are provided with bushings at the ends, and these are renewed after 1/16 in. of wear has taken place, or, in general after 15,000 miles or 20,000 miles have been run, the side-rod bushings lasting about one-third longer than the motor-rod bushings. The main rods, or those extending between the jackshaft and the forward pair of drivers, are provided with brasses at one end and bushings at the other, the former requiring reducing about twice a year, or on a mileage basis, at intervals of approximately about 20,000 miles. All rods, brasses and bushings are left 1/64 in. large when applied, as no direct reciprocating motion takes place as it does on a steam locomotive, and on account of the gradual application of all forces, small amounts of lost motion are taken up without severe shock. But on the other hand, rod bushings cannot be allowed to run more than 1/16 in. loose, because they will then develop a severe pound. Wedges are set up by the inspectors as required, but they never require lining down between tire turnings, so that this needs to be done only when the engine is held out of service for tire work. Driving-box shoes tend to wear about as much as on a steam locomotive, so that these are refitted when the engine is held for classified repairs. Motor bearings are renewed after 1/16-in. wear or at 30,000-mile intervals. No springs have been replaced as yet, although a number have been reset. Only one of the sixty-six air compressors in service has had to be rebored on.

As shown by the table of maintenance costs, the charges for electrical repairs are very light. Since the engines were placed in service all armatures have been rebanded on account of coil shrinkage, but very few of them have been rebanded a second time. None of the main motor commutators have been turned on account of wear, and only two have had to be machined on account of accidental damage. Third-rail shoes, which are of the over-running bracket type, run for about 15,000 miles in summer, and for about 3000 miles in winter before replacement. The main motor brushes have a very long life, or an average between two and three years. Some have even lasted for 150,000 miles, being removed then for side burning. Some chipping and breakage, however, has taken place, especially in winter weather, in which case mileages as low as 3000 have been made, this applying only to, say, three or four brushes out of the forty with which each motor is equipped. Compressor brushes run about 3000 miles, being generally removed for side burning.

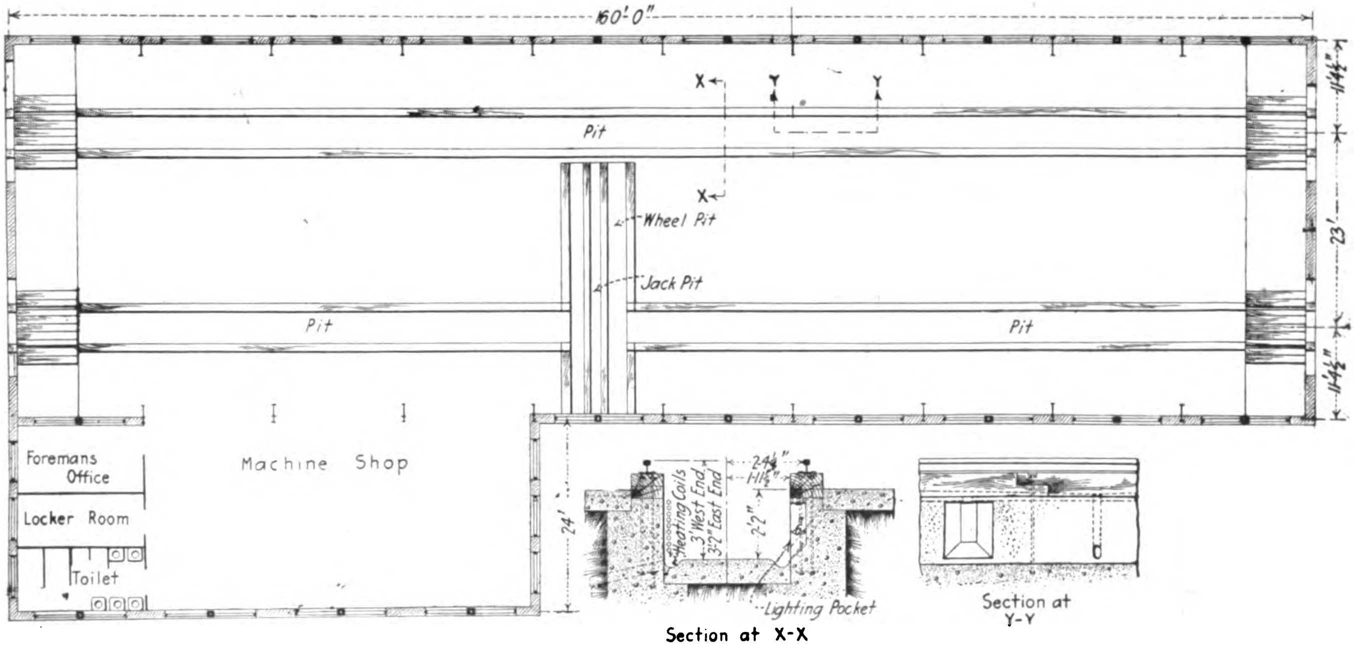


P. R. R. LOCOMOTIVE MAINTENANCE—ELEVATION OF ENGINE HOUSE

During the past year four flashovers occurred, the arc in one case going to the motor frame, and in the other three cases extending only between brushes. In no case was any damage done to the commutator which could not be cleaned up with a file, so that it was not necessary to remove the armature for any of these electrical disturbances. There were also two cases wherein circuit breakers burned up, the breaker having tripped upon an overload and grounded to the box which contains it, the arc being maintained by the ground from the circuit-breaker frame. One other unusual case of repairs was involved when a canopy switch terminal became grounded and thus burnt out a number of the auxiliary circuits. The direct cause was the disconnection of a terminal screw, which grounded the circuit on the cab frame.

In Table II on page 1124 are shown total figures for the year 1915 covering various operations at the Sunnyside engine houses.

In this the class 1 painting that is listed covers burn-



P. R. R. LOCOMOTIVE MAINTENANCE—PLAN OF SUNNYSIDE ENGINE HOUSE

TABLE II—1915 RECORD OF VARIOUS OPERATIONS AT SUNNYSIDE ENGINE HOUSE

Electric locomotives receiving classified repairs	9
Electric locomotives receiving class 1 painting	6
Electric locomotives receiving class 2 painting	4
Electric locomotives receiving class 3 painting	4
Locomotives held in shop for inspection and repairs	465
Driving-wheel tires shimmed	5
Engine truck-wheel tires shimmed	3
Engine truck wheels applied	64
Engine truck wheels removed for side play	3
Main motor armatures and fields painted	2
Main motor bearings renewed	18
Jackshaft bearings renewed	24
Jackshaft bearings reduced	631
Rod bushings renewed or reduced	123
Rod brasses reduced	143
Compressor armature commutators turned and slotted	16
Main motor resistances welded	53

ing off complete and repainting and varnishing. Class 2 painting covers the application of a color coat and the necessary varnishing, while class 3 painting covers touching up and varnishing. The item covering the welding of main motor resistances refers to the rebuilding of grids by welding, as described in the ELECTRIC RAILWAY JOURNAL for Feb. 12, 1916.

USE OF ENGINE HOUSE FOR REPAIR WORK

All of the foregoing operations with the exceptions noted are now being done at the Sunnyside engine house. This building is rectangular in form, about 161 ft. long and 72 ft. wide, with a lean-to at one side to house machine tools. It has two tracks devoted to work on electric locomotives, and these hold four complete engines, or eight units out of the sixty-six available for service. This track space, with an inspection pit outside of the building, has been found to be ample for the requirements of the equipment, and as a matter of fact, eight multiple-unit cars, in addition to the electric locomotives, are maintained at this point. A drop-pit is provided for removing single pairs of driving wheels, the engines being moved across this while the drivers are dropped successively whenever it is necessary to remove wheels for tire turning. No attempt, therefore, is made to use the 25-ton overhead crane for any purpose other than lifting wheels out of the pit, or transporting rods or heavy pieces from one part of the engine house to another.

A list of the machine tools installed within the building is appended, and in connection with this note should be made of the absence of a driving-wheel lathe or an engine lathe large enough to swing the large armatures of the 2000-hp. motors, this being because the engine house was originally designed and equipped for running repair work rather than for overhauling operations.

60-in. horizontal boring machine.
24-in. back-geared shaper.
30-in. x 8-ft. planer.
60-ton vertical hydraulic press.
16-in. engine lathe.
36-in. engine lathe.
10-in. speed lathe.
5-ft. radial drill.
Pneumatic pit jack.
Grindstone.
Power hack saw.
Double spindle drill press.
Two forges.
250-lb. air hammer.

TABLE III—NUMBER AND MINUTES DETENTION TO TRAINS DUE TO ELECTRIC LOCOMOTIVES FROM 1911 TO 1915, INCLUDING TOTAL MILEAGE AND MILEAGE PER DETENTION, PENNSYLVANIA RAILROAD

	1911		1912		1913		1914		1915	
Failures	No.	Minutes	No.	Minutes	No.	Minutes	No.	Minutes	No.	Minutes
Mechanical	3	10	7	27	1	6	7	43	5	27
Electrical	11	71	10	31	4	35	8	48	5	16
Man	2	19	4	13	4	37	3	11	3	39
Total	16	100	21	71	9	78	18	102	13	82
Total mileage	909,238		994,592		1,046,613		1,016,044		995,141	
Mileage per detention	56,827		47,362		116,290		56,447		76,550	

NOTE: Figures apply to trains on which trouble occurred and do not include other trains delayed because of the failure.

TABLE IV—TRAIN DETENTIONS FOR CALENDAR YEAR 1915 DUE TO ELECTRIC LOCOMOTIVES, PENNSYLVANIA RAILROAD

Cause of Detention	Minutes Delay to Train	Class of Failure
Main switch left open on one unit	21	Man
Fuse blown in starting train	15	Man
Air hose	6	Mechanical
Air hose	7	Mechanical
Shunt-field resistance terminal broken	5	Electrical
Control wire broken	1	Electrical
Circuit breaker opened and not reset	2	Man
Air hose	3	Mechanical
Contact shoe broken	6	Electrical
Spring hanger and sand pipe broken	6	Mechanical
Coupler knuckle opened	6	Mechanical
Fuse failed	3	Electrical
Circuit breaker opened—overload	1	Man
Total	82	

Summary:
Mechanical failures, 5.
Electrical failures, 4.
Total locomotive mileage, 995,141.
Miles per locomotive failure, 110,570.

The force employed in the building for maintaining the electric locomotives, together with the previously mentioned eight multiple-unit cars, consists of four machinists and four machinists' helpers, who work on the shop floor. There are two general machine-tool hands, who spend their time at the machines, and one blacksmith and a helper. Only one general laborer is employed, but there are three engine cleaners or wipers, who are called upon, when the occasion arises, to help on other work. The electrical work is handled by one electrician, two electrical machinists and five electricians' helpers. During the day time two inspectors are stationed at the inspection pit outside of the engine house, no work being done at night and all employees working on a ten-hour day. Two air-brake machinists and one painter complete the force, the latter doing such odd jobs, in addition to his regular work, as putting in broken panes of glass and repairing doors and sashes.

TRAIN-DETENTION RECORD

A record of train detentions between the years 1911 and 1915, and a classified list of causes of detentions during 1915, are displayed in Tables III and IV. These show that, notwithstanding the reduced cost of maintenance, there has been no increase in the number of delays chargeable to the locomotive department. In fact, the record for reliability that was established for this installation in its early years of operation has been fully maintained during the past fifteen months, or since the maintenance methods have been changed to eliminate the periodical overhaulings of the locomotives. During the past five years the average mileage per detention, including those due to man failures, is 64,437.

Fare Increase Sought in Germany

The street and suburban railways of Germany are agitating for permission to raise their minimum fare from 2½ to 3¾ cents, and a recommendation to that effect was made by their rate-making committee at a special meeting in Berlin of the management of the various companies. *Vorwärts* of April 18, in reporting this action, remarks that nobody was aware that the companies were in difficulties, as they had continued to show good balances even during the war. The Berlin Omnibus Company, however, seems to have good basis for its move toward an increase in rates, as the report presented to the shareholders by Director Kaufmann at a general meeting held in Berlin on April 17 showed that the rate of loss this year was higher than that of last year, when the deficit reached about $190,000. The number of passengers carried in 1915 was only 79,000,000, against 104,000,000 in 1913. The Greater Berlin Street Railway is the largest stockholder in the Omnibus Company. The street railway's attempt to raise fares last year was a failure, but its net receipts increased about $200,000, nevertheless, and it paid a dividend of 6 per cent.

Illinois Association Discusses Modern Motors and Anti-Friction Bearings

The Merits of Roller and Ball Bearings for Railway Service, the Comparative Efficiency of Old and Modern Motors and Safety Methods Were the Three Topics Discussed at the Recent Chicago Meeting

THE regular meeting of the Illinois Electric Railways Association was held in Chicago on June 9, 1916. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., and president of the association, presided, and sixty members and their guests were in attendance. H. A. Johnson, master mechanic Chicago Elevated Railways, read the first paper entitled "Results Obtained from Tests of Roller Journal Bearings on the Chicago Elevated Railroads," which is abstracted elsewhere in this issue. Before reading his paper he reminded the members of the various parts of the equipment to which the cost of electric current in car operation should be distributed. These included that necessary to overcome the inertia of the car, the internal motor losses, the gear and axle bearing losses, the rheostatic losses, the air resistance and journal friction and that for the air compressors and lights.

In connection with the tests, the results of which were outlined in his paper, Mr. Johnson said that the same crew was used on all test runs so that the human factor would be kept uniform, and the trains were the same except for the axles, bearings and journals. The control on all elevated trains is equipped with automatic acceleration through current limiting switches so that the rate of acceleration was practically the same as were all the other factors which are shown in one of the tables accompanying his paper. In connection with the tables showing the comparative energy consumption of the two typical trains, one equipped with roller bearings and the other with babbitted bearings, Mr. Johnson called attention to the significance of the four lines of figures. He said that the first line was the average of a large number of local runs, the second line was the average of all runs both local and express, the third line was for express runs exclusively, and the fourth line was for those portions of the express trips which were run at high speeds. The fourth line of results shows that whereas in the local runs the roller bearings made a saving over babbitted bearings, in the express or high-speed runs the roller bearings were not as efficient as the babbitted bearings.

Otto Bruenauer of the Gurney Ball Bearing Company then read a paper setting forth the merits of ball-bearing journals and the difficulties which have been overcome in connection with their adoption for electric railway service. This paper was abstracted in last week's issue of the ELECTRIC RAILWAY JOURNAL.

COSTS OF ANTI-FRICTION BEARINGS

R. H. Carhart, Railway Roller Bearing Company, Syracuse, N. Y., also read a paper, abstracted this week, describing the application of roller bearings to electric railway cars and the success which has attended the installations now in service. At the close of these papers President Blackhall asked about the comparative cost of anti-friction bearings and ordinary babbitted bearings and the approximate service life of anti-friction bearings. Mr. Bruenauer responded that at the present market prices a 10-ton car could be fitted with eight ball-bearing journal boxes at $55 per bearing. Under normal market conditions this cost would approximate $50. As regards the life of ball bearings in service, he said that at the present time he did not have any definite information, but knew of instances where they had been in service for two years without showing any evidence of wear. He estimated, however, that ball-bearing equipment correctly selected for the service and loads it was to carry would last from four to five years. He said that both the manufacturers and the railway engineers had, in the beginning, made the mistake of selecting ball bearings of too small sizes for the service they were to perform. Experience has corrected this error and at the same time the bearings have been perfected. He said that their safety and economy had been demonstrated, but that tests, which were now under way, would have to be concluded before he would be able to give definite information concerning these claims.

Mr. Carhart, in response to an inquiry concerning the roller bearings used on the Philadelphia Rapid Transit Company's lines, said that the severe end thrust had made changes necessary in the design of these bearings. He said that roller bearings on cars in New York City had been in service five years without showing appreciable wear on the rollers or in the raceways. Improper adjustment of these bearings, perhaps, more than any other one factor was responsible for the difficulties experienced in initial installations.

Mr. Carhart also mentioned an instance which occurred in Rochester, N. Y., where the current was off the line for a short time. In this case the men were able to push an 80,000-lb. locomotive into the carhouse by hand, whereas a freight car weighing about half of this amount could not be moved except with pinch bars. He also mentioned the installation of roller bearings which had been in service on the Seattle, Renton & Southern Railway, Seattle, Wash., for about four years. These bearings were placed under 30-ton to 35-ton cars and have given excellent service. The exact condition of the bearings, however, was unknown, because it has never been necessary to open the boxes to inspect them. Mr. Carhart said the price for roller bearings for an eight-wheel, 10-ton car was approximately $46 per bearing, and for a 40-ton car, approximately $62. He also said that the Westinghouse Type-56 motor could be fitted with roller bearings for about $75, an amount which included the cost of the bearings and the labor of installation. During the discussion it was also brought out that the cost of maintaining and lubricating ball bearings in so far as present experience went, amounted to practically nothing. The original difficulty was to keep out foreign matter, and this has been accomplished by the dirt seal. Although the cost of the bearing was increased, the increase was more than offset by the longer life which resulted.

F. W. Gurney, chief engineer Gurney Ball Bearing Company, Jamestown, N. Y., closed the discussion of anti-friction bearings with the statement that the increased friction with roller bearings at high speeds did not hold with ball bearings. He said that roller bearings and ball bearings could not be compared in this respect. The friction in any bearing resulted from sliding surfaces, and perfect alignment was inherently difficult and practically impossible with roller bearings. With ball bearings, however, there was no question about alignment, because the balls cannot assume a position in the raceway which is out of alignment. In tests made in New York City it was also found that the friction with roller bearings increased with excessive loads and was even greater than plain bearings, a fact which was not true of ball bearings. He mentioned a recent installation of ball bearings in connection with a grinding machine operating at 4000 r.p.m. The ball bearings, at this speed and under the varying loads applied by the grinding machine, so adjusted themselves that friction was practically negligible.

Mr. Gurney said that the life of ball bearings, if dirt is kept out of the boxes and loads not in excess of the capacity of the balls are applied, would be indefinite and that wear would be negligible. In a test made on ball bearings applied to an automobile where the entire load of the machine was put on two wheels instead of on four, the car ran 108,000 miles. During this test the bearings were kept free from dirt and at the end of the test they were found tight and in perfect condition. The entrance of dirt or grit would have caused wear in this case, but the load would not have worn the bearings appreciably. Mr. Gurney said that the dirt seal which had been applied to ball bearings was of the grist-mill type, which made it practically impossible for dirt to enter the ball raceways. He closed his remarks with the statement that it was too soon to say how long ball bearings would last, because none had been worn out in electric-railway service.

DISCUSSION ON FIELD CONTROL

H. A. Johnson then read another paper, which will be abstracted later, entitled "The Results Obtained with Field Control Motors on the Chicago Elevated Railroads." At the close of his paper he said that the tests from which these results were taken were made in exactly the same service and with the same trainmen. The data shown are the averages of a large number of runs and, therefore, are quite typical of the results to be expected in a service such as that operated by the elevated railroads.

D. C. Hershberger, Westinghouse Electric & Manufacturing Company, read a paper outlining the "History and Performance of Railway Motor Field Control." W. A. Clough, engineer General Electric Company, followed with a paper entitled "Comparative Economies of Old and New Motors." Both of these papers will be abstracted in a later issue. At the close of this paper, H. A. Johnson called attention to the fact that his comparative results had shown a saving of 8½ per cent for field-control motors over non-field control, whereas Mr. Clough's paper had shown savings up to 17½ per cent. He said this was probably due to the fact that his results were obtained under specific conditions, whereas Mr. Clough's paper, perhaps, dealt with conditions other than these. Mr. Clough in continuing the discussion said that he knew of a certain railway that had its cars equipped with GE-1000 motors. These had given considerable trouble and replacement had been considered for about eight or nine years. Modern motors had not been purchased, however, because this railway kept the cars equipped with the old motors in rush-hour service where the mileage was small. If it had been necessary to use these motors in regular service they would have been replaced a number of years ago.

President Blackhall then said that a little more than three years ago his cars were equipped with a number of different types of motors, but these were all replaced by modern motors. At that time he had fifteen cross-seat, open, summer cars and the demands of the service required all of the equipment available. These cars were scrapped and ten new cars with modern motors were substituted, but notwithstanding this reduction in equipment and in the face of an increase in traffic, it was possible to give better service with fewer cars. This also reduced the primary charge for energy 15 per cent, and at the same time heavier cars were put into the interurban service without affecting the amount of energy saved. He closed with a statement that from his experience the savings made possible by modern motors over the older types would pay for the new motors in two or three years.

H. B. Adams, safety supervisor Aurora, Elgin & Chicago Railroad, concluded the regular program with a talk on safety methods. In connection with his address he had on exhibit a large amount of safety literature and a number of posters which he used in his safety work. He opened with the statement that co-operation was invaluable to the success of the safety movement. The electric railway employees as a rule are high-grade men, and he was of the opinion that more good could be accomplished by talking with them rather than to them. A personal talk with the men will go farther toward gaining their confidence and assistance than written instructions in the form of bulletins. Mr. Adams also urged the safety habit in all purchases, not only in the purchase of cars, but in equipment of all kinds. He said that it was generally accepted that 80 per cent of the accidents were due to the public. Education appeared to be the only way in which the public could be brought to understand or realize this condition, and he endeavored to reach them through the schools and through exhibits of safety literature. Mr. Adams said he had also been successful in interesting commercial clubs in the work, with the result that safety zones had been established at street intersections. He reminded the members that 282 persons were killed in Chicago during the year 1915, and of that number 156 were killed at points between the street intersections.

Mr. Adams also called attention to the great and increasing menace of automobile traffic. Automobile traffic was responsible for more injuries than the cars of street railways, because their line of travel was not fixed. He said that not long ago his company had sent out 3000 letters to automobile owners calling their attention to the hazards accompanying careless driving and the importance of more care along the streets over which the street railway company's cars operated. The company received 118 written replies and a great many verbal responses to these letters. After these letters were sent out the car crews were instructed to report all carelessness on the part of automobile drivers and wherever possible the owners were warned by letter. He concluded with a statement that every electric railway should become a member of the National Safety Council so that it could partake of the tremendous fund of information and helpful suggestions that were available to the members. He said that eighty-two electric railways were now members of the National Safety Council and that a special section had been created which devoted its entire program to the interests of electric railways.

Energy Savings with Roller Bearings

BY H. A. JOHNSON
Master Mechanic Chicago Elevated Railroads

At the last meeting of the association a paper was presented showing the distribution of the costs of electrical energy in car operation. The discussion covered possible economies which can be obtained by means of proper train operation, including efficient handling of the cars by the transportation department.* At this succeeding meeting it was thought opportune to present for discussion the economies which can be brought about by the mechanical and electrical departments, including the use of roller or ball bearings and field control motors.

TESTS OF ROLLER AND BABBITTED BEARINGS

To begin with, let us consider the part which journal friction plays in the waste of electrical energy. Journal friction and air resistance together account for 6.6 per cent to 11 per cent of the total electrical energy losses, the exact amount depending upon the class of service. If the elimination of journal friction is to effect any substantial saving it must be brought about by allowing a higher rate of acceleration and therefore increased coasting. But the rates of acceleration in common use to-day are the maximum allowable from considerations of wheel slippage and comfort of passengers. Accordingly the economy in electrical energy possible by the entire elimination of journal friction appears to be limited to a rather small percentage of the total power consumed.

Various forms of ball bearings and roller bearings have been in common use on automobiles and other vehicles for a number of years, and their more extensive application to electric railway cars and even ordinary freight cars has been advocated. A number of railways, both in this country and in Europe, have adopted these types of axle and armature bearings for storage-battery cars, but as yet they have not been applied extensively on electric cars in the average city and interurban service.

More or less careful comparative tests have been made by users of ball and roller bearings, but the published results in many cases do not agree. It was, therefore, deemed advisable to make a few independent tests under known conditions to determine how much economy, in energy consumption, if any, would result from the use of such bearings in service on the Chicago Elevated Railroads.

For the purposes of the tests two cars were equipped with one of the commercial forms of roller journal bearings designed by the manufacturers for the service requirements. One was a double-truck motor car, weighing about 65,000 lb., equipped with two GE-55 motors of 175-hp. capacity each and GE-Type M automatic control. The other car was a double-truck trailer, weighing 33,000 lb.

Tests were made on this typical train in both local and express services. The roller journal bearings were then replaced with the ordinary babbitted bearings on the same two cars, and the tests were repeated under otherwise identical conditions.

The motor car was equipped with a calibrated Sangamo watt-hour meter, and automatic, calibrated time recorders to obtain a complete time record of every run, including the length of the power-on, coasting and braking periods. The duration of station stops was taken with a stop watch. With these records it was possible to compare series of runs having the same braking and station-stop periods, and differing only in the time of "power on" and coasting required to make the same running time. Instruments and accelerating current limit switch settings were rechecked after the tests and found to be correct.

TABLE I.—AVERAGE RESULTS OF TESTS WITH ROLLER AND BABBITTED JOURNAL BEARINGS IN TYPICAL MIDDAY EXPRESS SERVICE

Journal Bearings	Running Time	Kw.-Hr., 12.73 Miles	Coasting, Per Cent	Station Stops, Seconds	Power on per Station, Seconds	Braking per Station, Seconds
Roller	43 min. 38 sec.	49.6	27.4	9.6	56.2	20.1
Babbitted ..	43 min. 53 sec.	49.6	27.2	9.6	55.4	21.2

TABLE II.—COMPARATIVE ENERGY CONSUMPTION OF TYPICAL TWO-CAR TRAIN

Kind of Runs	Schedule Speed, M.p.h.	Station Stops Per Mile	Kw.-Hr. per Ton-Mile		Saving by Roller Bearings, Per Cent
			Roller Bearings	Babbitted Bearings	
Local runs	12.7	3.79	0.115	0.120	4.2
Average of all runs.	15.2	3.07	0.135	0.136	0.8
Express runs	17.4	1.73	0.079	0.079	0.0
High-speed portion of express run	21.9	0.61	0.060	0.067	—5.2*

*Loss.

The observations were taken in three classes of service, with different schedule speeds and frequency of stops. Typical results are given in Tables I and II. Where the stops are frequent and the schedule speed is not high the roller bearings show a saving in energy. This result should be expected from the commonly observed fact, also noted in this test, that the frictional resistance of babbitted bearings is greater just at starting than that of the roller bearings. With increased schedule speed this advantage is lost, and with less frequent stops the roller bearings tested showed appreciably more frictional resistance than ordinary babbitted bearings.

It must be remembered that these tests covered a certain stated range of schedule speeds, frequency of stops, and weight of equipment such as obtain on the Chicago Elevated Railroads. They determined only the possible saving in power and did not touch upon the difference in first cost and maintenance of the various types of bearings. In low-speed street car service, especially where the cost of electrical energy is high, conditions should be more favorable to the ball or roller bearing.

Roller Bearings for Railway Use

BY RAYMOND H. CARHART
Railway Roller Bearing Company, Syracuse, N. Y.

In discussing anti-friction bearings, I shall confine myself to roller bearings suitable for heavy duty, such as journal boxes and motor bearings for railway cars and motors. The Railway Roller Bearing Company is the pioneer in the commercial manufacture of roller bearings for railway use. After considerable time had been spent by this company in development, "Rollway" bearings were installed on street cars of the Philadelphia Rapid Transit Company. These bearings were similar to our present bearings except that a single-end thrust was used instead of the double-roller end thrust, and the boxes were not as completely oil and dust-tight as at present.

These original bearings, as those of present commercial construction, embodied a double line of short rollers of large diameter, one at each side of the pedestal. Then as now no cages or separators were used, allowing a full line of rollers, increasing the carrying capacity of the bearing and decreasing the number of parts liable to cause trouble. We have found separators unnecessary save in high-speed motor bearings, where we have used them to eliminate the noise produced by the rollers clicking together.

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*See issue of ELECTRIC RAILWAY JOURNAL for April 8, 1916, page 685.

The Philadelphia Rapid Transit Company made an elaborate test of "Rollway" bearings which extended over a period of eleven months, beginning in November, 1909. The power saving thus determined was from 17 per cent to 22 per cent. Although this saving is in strict accordance with later tests, it is somewhat greater than will be obtained by the ordinary motorman, owing to the fact that these Philadelphia tests were made by skilled operators, who took advantage of all coasting possibilities of the car. The average saving of power by the ordinary motorman is from 12 per cent to 15 per cent.

After the completion of the test the car tested and twelve others equipped with the same make of bearings were used in general service by the Philadelphia Rapid Transit Company. Then for the first time it developed that the single-thrust bearing was a source of trouble, particularly in that the springing of the truck frame permitted the journal to slide lengthwise in the bearing and to carry the rollers into the end walls of the box, setting up a scouring action. This did not develop during the test as the test car contained new rigid trucks and the end thrust was properly adjusted. If the other cars had received the constant attention of a skilled mechanic so that the end thrust was kept properly adjusted they would have given satisfactory results.

However, the bearing company realized that its bearings must be foolproof, and has since made all bearings with the double-end thrust, which prevents any longitudinal movement of the journal in relation to its bearing. Most of the bearings previously installed with a single-end thrust have also been equipped with the double-end thrust.

A number of "Rollway" bearings originally having a single-end thrust when installed, and subsequently equipped with the double-end thrust, have been in use continuously since installed. Since about five years ago all "Rollway" bearings sold have been equipped with double-end thrust, but not of the latest type. The first "Rollway" double-end thrust consisted of two lines of balls, traveling on opposite sides of a grooved plate. The inner line thrusts against the end of the journal sleeve and the outer against an adjustable nut on the end of the journal. This nut required adjustment by the carhouse men when installing the bearing. In some cases these adjustments were not made so as to preclude all endwise movement of the journal, and trouble resulted. There was also some trouble from broken balls. Hence the double-end thrust was redesigned to eliminate all adjustable members. The parts of the double-end thrust are now completely assembled at the factory, and do not require or permit adjustment by the carhouse men. This non-adjustable, cone-disc-roller double-end thrust is now standard. We have had no trouble from endwise movement of the journals in the bearings, and none of the cone-disc rollers have ever given out.

In the "Rollway" bearing approximately one-third of the rollers are under load at one time, and the others of the line have a chance while free to square or align themselves between the flat end walls of their raceways. The rollers are made of chrome tool steel, and are accurately machined and ground to size. The outer and inner raceways are made of high-grade steel alloy, tempered and accurately ground. They are so constructed that they can be renewed, although they are practically indestructible and renewals are exceptional.

The last test, demonstrating the saving of power due to the use of these bearings, was made by the Empire United Railways, Inc. The results are shown in a recently-published article by Messrs. Voth and Metcalfe, respectively chief engineer and master mechanic of this company.* These tests showed a net annual saving of $481.45 per car, or 12.8 per cent saving of the total cost of power, lubrication and maintenance of bearings. The car tested weighed 70,000 lb. It ran between Syracuse and Rochester, and made more than 100,000 miles per year, at a running speed between stations of between 62 and 65 m.p.h. If this car had been running at a lower speed, or had made more frequent stops, the saving would have been greater. There was practically no wear between the rollers and their raceways. After making a mileage of over 100,000, the rollers had worn in diameter but 0.001 in. and the raceways of but three-fourths of this amount. A wear of 1/64 in. would not materially reduce the efficiency of the bearing.

A later type of cone-disc roller was used on this car. The bearing consists of two lines of rollers traveling on opposite sides of a flat steel ring. The inner thrust rollers bear against a flat steel plate forming the end guide for the outer line of journal rollers, and the outer thrust rollers bear against a flat steel plate carried by the end cover of the box. The end-thrust bearing is completely assembled on the nut and is screwed onto the end of the journal.

As the end thrust prevents movement of the journal in either direction, the bearings when installed tend to stiffen the truck frame and positively prevent either pedestal from springing relatively to the other. The bearing is assembled in the standard pedestal and does not require a skilled mechanic to install it.

Perjury Confessed in Portland Cases

Three persons appeared before District Attorney Evans of Portland, Ore., in the course of a month and confessed to lying testimony that won damage verdicts against the Portland Railway, Light & Power Company. As a result of volunteer confessions, Edson K. Carr was indicted by the Multnomah County Grand Jury for perjury on June 3 and Thomas S. Molesworth, Mrs. Selma L. Wallace and Clyde E. Wallace were indicted for subornation of perjury in connection with the suit of Mrs. Wallace against the Portland Railway, Light & Power Company, in which a $5,000 verdict was won. The indictment of several persons connected with a similar damage suit against the railway will be considered by the Grand Jury. Edson Carr, who swore on the witness stand to a set of incidents which he said came under his observation, in connection with injuries to Mrs. Selma L. Wallace on May 8, 1915, in a fall from a street car on Eleventh Street between Hall and Montgomery Streets, has confessed, it is said by the District Attorney's office, he was not near the scene at the time of the accident he described as an eye-witness. Mrs. Wallace sued the Portland Railway, Light & Power for $25,600. She said a car from which she was alighting had started before she had stepped to the ground, throwing her and inflicting severe injuries. The case went to trial before Circuit Judge Kavanaugh on Sept. 15, 1915, and two days later a verdict of $5,000 for the plaintiff was returned. Carr testified, it is reported, that he saw a Chinaman leave the car, and then the car started just as Mrs. Wallace was going down the steps. He told of picking her up and helping her to the sidewalk. Molesworth is another man who is said to have told the Grand Jury all he knew about this affair, and to have admitted an agreement by which he was to secure perjured testimony from Carr with the promise that they would receive a share of the judgment money in the case.

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*See issue of the ELECTRIC RAILWAY JOURNAL for May 6, 1916, page 865.

Water Works Association Considers Electrolysis

Report of A. W. W. A. Committee on Electrolysis Presented at Annual Meeting Is Received but Not Approved

AT the convention of the American Water Works Association held in New York last week the report of the committee on electrolysis was presented by Prof. A. F. Ganz, Stevens Institute of Technology, Hoboken, N. J., chairman. The report caused a lively debate which occupied the greater part of two sessions. The report and the association's action are of interest to electric railways as showing the attitude of this utility to the subject. It must be remembered, however, that the report as received aroused considerable opposition and does not represent the official sentiment of the association. The report as presented by Professor Ganz is as follows:

"Your committee on electrolysis begs leave to submit the following report:

"Your association has affiliated itself during the past year with the joint national committee on electrolysis and appointed three members on this joint committee. In view of the fact that the joint national committee has in preparation a preliminary report reviewing the status of the electrolysis situation, your committee will confine its report to the following brief statements of fact and of the stand which it believes this association may properly take:

"1. An increasing amount of damage from stray electric currents is occurring on the underground water-piping systems in many localities throughout the country where adequate measures have not been taken to reduce this damage.

"2. The principal and generally the sole sources of stray electric currents causing this damage are single-trolley direct-current electric railways employing the running tracks in contact with earth as part of the return circuit.

"3. Inasmuch as such electric railways are the chief and generally the sole sources of stray currents causing the damage, and as the owners of such railways have no right to so operate their railway systems as to cause serious damage to the property of others, it is the duty of the owners of these railways to provide measures for reducing this trouble by removing its cause as far as this is practicable.

"4. Experience extending over many years in foreign countries and over ten years in this country has shown that methods which are practicable and economical can be applied to electric railway systems which will remove acute dangers from stray currents and which will very greatly reduce the danger in all cases where bad electrolysis conditions exist, and in most cases will reduce this danger to negligible amounts.

"5. Your committee finds that mitigating methods applied to underground water pipes fail to attack the real cause of the trouble, and when used as the sole mitigating means fail to give adequate and permanent relief. Your committee further believes that mitigating methods should be applied to underground pipes, if at all, only in special cases and only after adequate methods of minimizing the production of stray currents have been applied to the railway system.

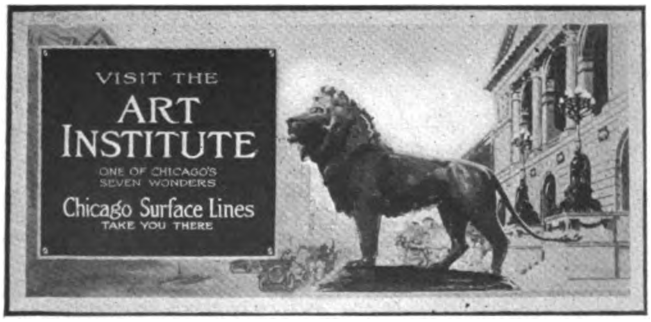
"6. Your committee disapproves as not only inadequate but frequently, also, as dangerous, such metallic connections from underground water pipes to the railway return circuit as cause these pipes to become a substanial part of the railway return circuit. Such connections greatly increase current flow on pipes; and, while they may afford local protection, they generally distribute electrolysis troubles to other localities where these are more difficult to find, and thus frequently give a false impression of immunity. Your committee therefore believes that metallic connections from water pipes to the railway return circuit should never be applied as the principal means for electrolysis mitigation.

"7. Your committee believes, in view of the fact that the railway companies in common with the pipe-owning companies are public utilities operating under public franchises and utilizing city streets, that it is the duty of both of these utilities to co-operate in order that the causes and extent of any danger from stray current can be more readily ascertained and the problem can be attacked along broad engineering lines."

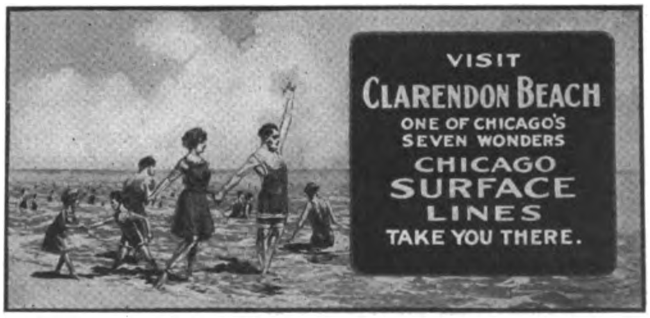
Chicago Electric Roads Use Outdoor Advertising

THE Chicago Surface Lines and the Chicago Elevated System have had prepared some very attractive traffic posters and will engage this summer in an outdoor publicity campaign for more passenger business. The posters of the Surface Lines are being furnished by the Thomas Cusack Company and a series of twenty-one will be supplied during the year. Most of the displays are already in place and are showing a series of seven advertisements announcing the "Seven Wonders of Chicago." The seven subjects are the Chicago Stockyards, the Art Institute, the Lincoln Park Zoo, the Field Museum, the Garfield Park Conservatory, the Municipal Pier, and Clarendon Beach. Each is being advertised away from its own neighborhood. The bulletins are samples of the very best in outdoor advertising art, and make the trips suggested appear very attractive.

The Elevated System has purchased five display locations outright for its permanent use and will use the space to advertise that travel on the elevated is safe and speedy and that employees are courteous and to call attention to the golf courses, amusement places and bathing beaches that can be reached by the elevated.



CHICAGO POSTER ADVERTISING ART INSTITUTE



CHICAGO POSTER ADVERTISING CLARENDON BEACH

Electric Operation on the St. Paul

In a Collection of Notes on This Electrification the Author Points Out the Simplicity of Construction of the Locomotives, the High Current Collecting Capacity of the Twin Trolley Wires and the Economy of Having Engine Divisions 220 Miles Long

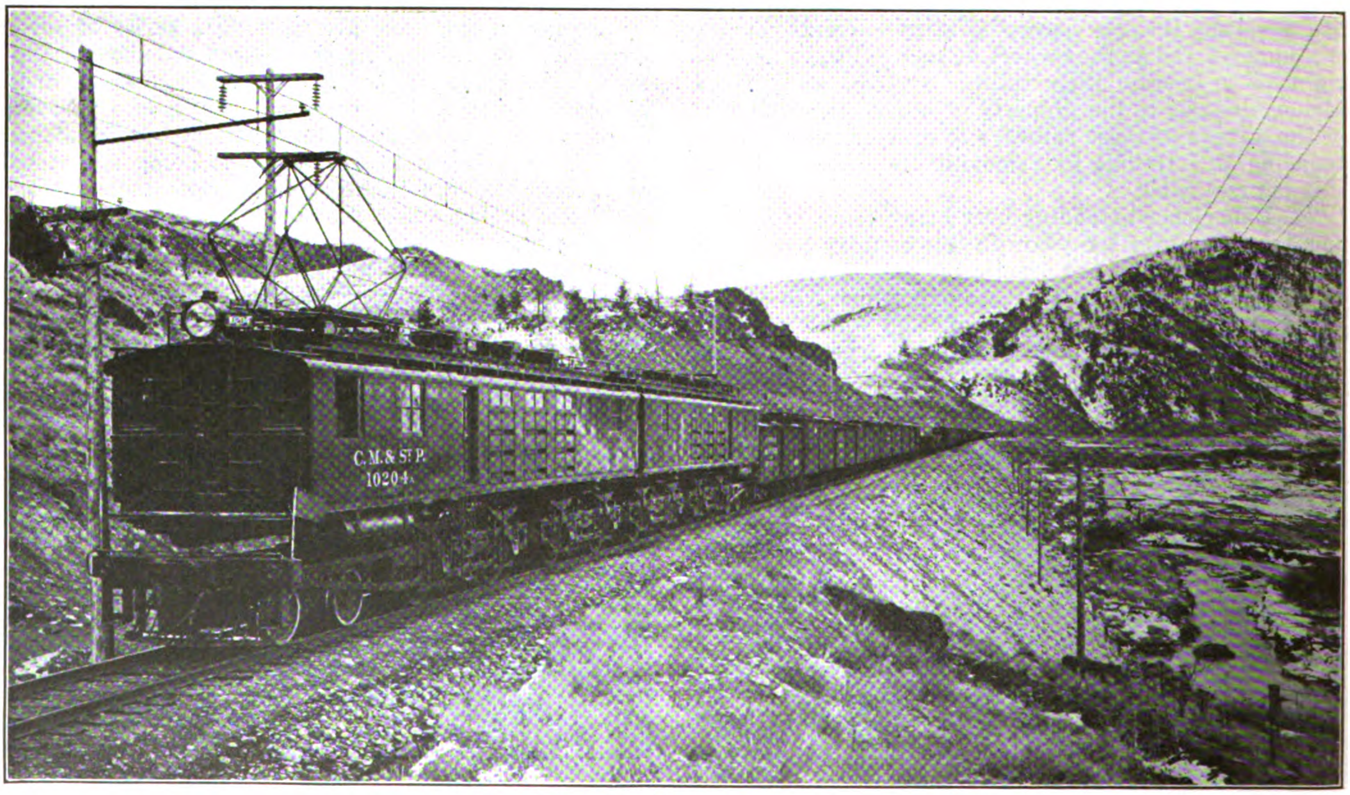
By A. H. ARMSTRONG
Chairman Electrification Committee, General Electric Company

DURING the past six months electricity has replaced steam on 220 miles of track on the Chicago, Milwaukee & St. Paul Railway. This mileage comprises two steam-engine divisions, and, in war terms, the new facilities thus introduced have been "consolidated" since the territory was occupied.

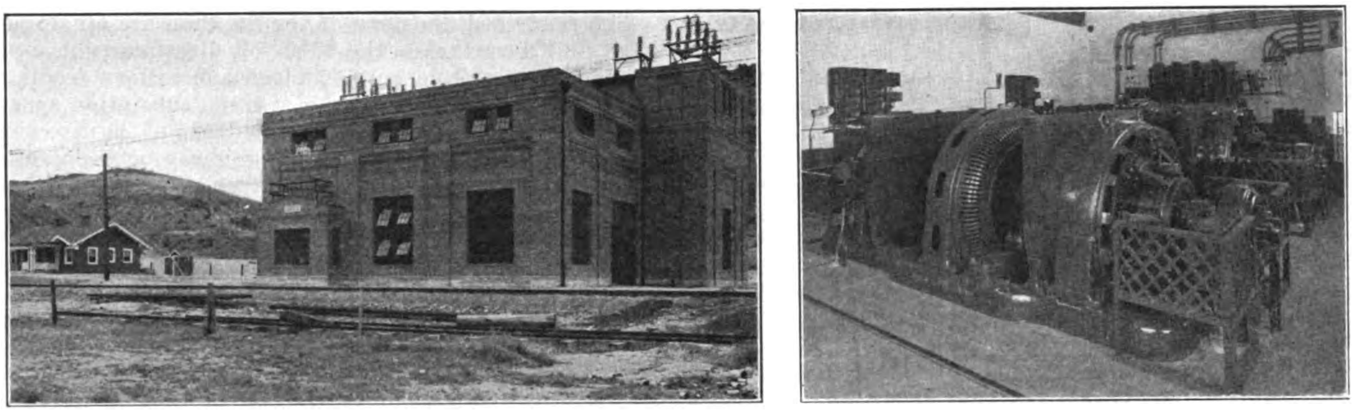
Naturally, any such radical change as the substitution of electricity for steam gives rise to equally great operating changes just as soon as the capabilities of the new type of motive power become understood and fully appreciated. Not until a complete change in motive power is made can it be realized how many of the previous rules and regulations are, in effect, only the traditions handed down from generations of steam-engine practice. Very many such rules reflect dearly-bought operating experience and apply equally to the operation of any type of motive power, but with the electric locomotive, the greater tractive power at higher speeds, the independence from the individual efficiency of the operating crew, the freedom from any restrictions of coal and water supply, the higher speeds on down grades made possible by the use of electric brakes, and the many other operating advantages must result in radical changes from previous steam operating methods. An often-used phrase best describes the original method of operation as "steam railroading subject to all the limitations of the steam engine," and in the future, railroad transportation will undoubtedly be conducted on a broader basis with the greater facilities and flexibility provided by electric locomotives.

A story is told of an engineer making his first trip on a St. Paul electric locomotive run between Deer Lodge and Three Forks. He had full charge of the running of the locomotive, under the direction of an instructor, and he handled his train over the Rocky Mountain Divide without giving any outward expression to his thoughts until reaching the tunnel at the summit, when he exclaimed: "This is the first time I ever saw the inside of this tunnel." Having ridden through tunnels in the cab of a steam engine, the writer can fully appreciate how it affected an old steam engineer to ride on an electric locomotive for the first time and to be free from the gases, steam and smoke that make tunnel operation with the steam engine hazardous, as well as most uncomfortable for the crew.

On the Chicago, Milwaukee & St. Paul the operation of the electric locomotives has been taken over by the regular steam engine crews after proper instructions, and it is interesting to note how smoothly the change from steam to electricity has been accomplished. Of course, the handling of the air brakes is identical with steam-engine practice, although in this matter of braking the use of the air brakes is restricted to the stopping of trains, as the electric brakes are used exclusively to hold the trains at constant speed on the down grades.



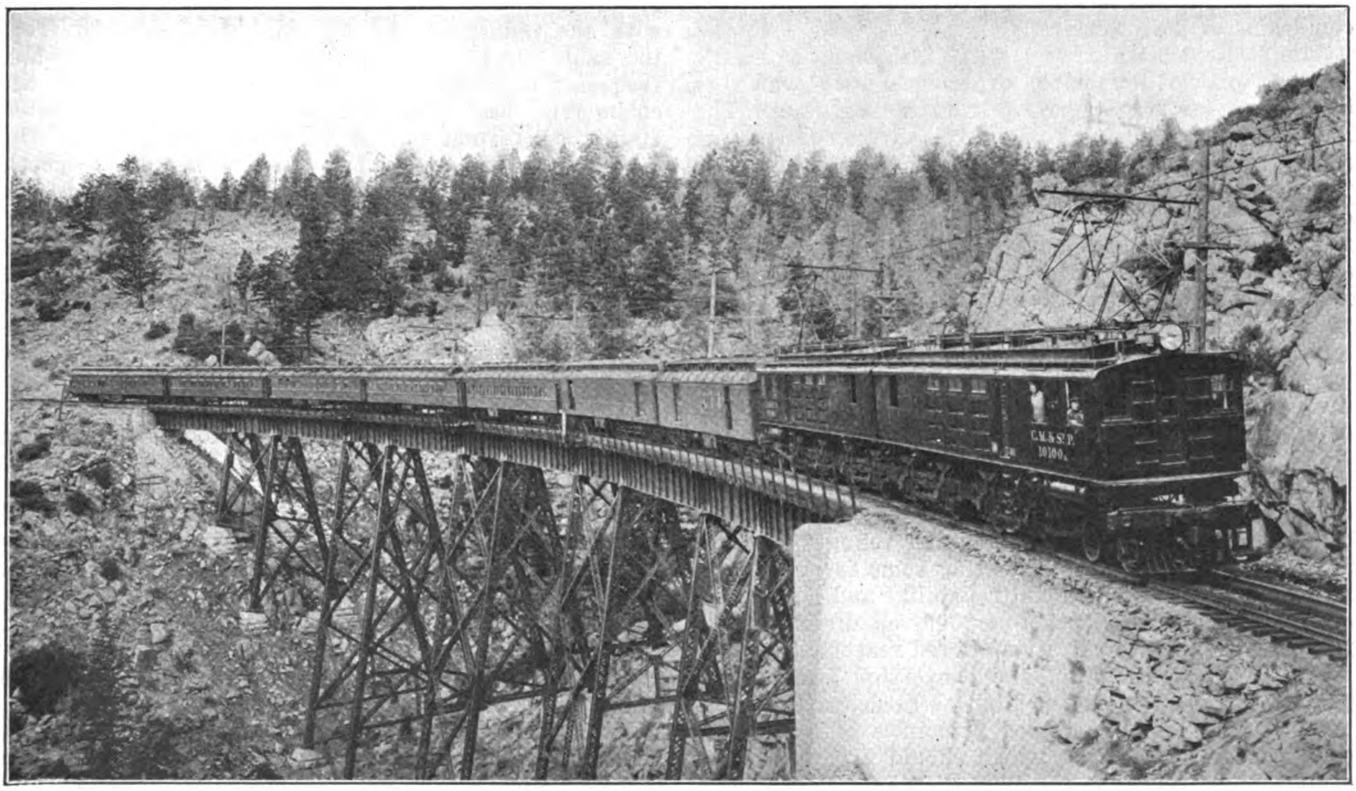
ST. PAUL ELECTRIFICATION—EIGHTY-TWO-CAR FREIGHT TRAIN HAULED BY SINGLE ELECTRIC LOCOMOTIVE



ST. PAUL ELECTRIFICATION—EXTERIOR AND INTERIOR OF EUSTIS SUBSTATION ON EASTERN ENGINE DIVISION

Perhaps there is no feature of the St. Paul electrification that is more impressive than the operation of this regenerative electric braking. In the early consideration of plans for the electrification, electric brakes were considered, and they were finally insisted upon by the railway officials when their full advantages became apparent. The perfection of regenerative electric braking with series direct-current motors called for considerable development work, as nothing of the kind had ever been done on a scale approaching the magnitude of 282-ton locomotives equipped with motors aggregating 3400 hp. The direct-current locomotive, however, offered so many advantages for main line service in this instance that it was considered of the greatest importance to adhere to this type, especially if electric braking could be made operative with the series-wound direct-current motors operating from a fluctuating trolley voltage. Fulfilling the promise of early experiments made at Schenectady, direct-current motor regenerative braking was successfully developed and put into service without losing the ruggedness in operation of the series-motor characteristics. The result has been a locomotive of remarkable flexibility, with speed and tractive power admirably suited to train haulage over a broken profile and, withal, of an extremely simple mechanical and electrical construction that has been patterned closely after well-known designs of proven superiority and reliability.

On these locomotives, the motors are of practically standard design and they present no features of special interest except the large continuous capacity of 375 hp. and the fact that each has a potential of 1500 volts across its brushes, operating two in series on 3000 volts. The motors are geared to the axles through twin gears, an arrangement that has proved so successful on the Butte, Anaconda & Pacific, Detroit Tunnel, Baltimore & Ohio, Cascade Tunnel, and other electrifications having operating records of several years with this method of drive. In the St. Paul locomotive construction, the motors are spring suspended on the bolster and also drive through springs in the twin gears, thus providing great flexibility, cushioning all shocks and eliminating all noise of grinding gears. The high efficiency, simple construction and low cost of twin-gear drive were fundamental facts of importance influencing its adoption on the St. Paul locomotive, and the results of six



ST. PAUL ELECTRIFICATION—PASSENGER TRAIN DESCENDING A 2 PER CENT GRADE months' operation fully justify the preference for this design.

The efficiency from trolley to the rim of driving wheels approximates 89 per cent, including all motor and gear losses when delivering full rated tractive effort. The construction is simple, rugged and well able to withstand the strains incident to heavy train haulage over mountain grades of 2 per cent, one such grade on the St. Paul extending unbroken for 21 miles over the main divide of the Rocky Mountains. During six months of operation no failure or delay of any kind has been due to the twin gear drive, and all indications are that in this item cost of upkeep will be small.

The St. Paul freight locomotives are rated at 2500 tons trailing load on a 1 per cent grade, and this calls for a tractive effort of 72,500 lb. and a current input to the motors of 860 amp. at 3000 volts, the speed being 15.75 m.p.h. Such a large current could readily be collected from a third-rail, but the problem of current collection presented some difficulties with existing forms of overhead construction and pantograph collector. Elaborate experiments were made at Schenectady with different methods of trolley suspension and roller and pan collectors and these formed the basis for the adoption of the current-collecting facilities on the St. Paul. In this case the trolley consists of two No. 0000 wires side by side and alternately suspended from the same catenary by the usual loop hangers. The construction offers great flexibility in the overhead conductor, provides for contact with at least one wire at all times with consequent elimination of flashing, and permits the collection of heavy currents at high speeds. Pan collectors with copper contact surfaces are used and lubrication is successfully depended upon to reduce wear. This construction has already been described in previous publications, but it is worthy of additional comment as it has solved the question of collection of large currents at high speed. Tests made at Schenectady and Erie have demonstrated that it is perfectly feasible to collect 2000 amp. at speeds as high as 60 m.ph. with this construction, and subsequent operation on the St. Paul has resulted in no flashing or even sparking under the conditions of daily service.

The electrification of the Butte, Anaconda & Pacific Railway provided valuable experience upon which to base plans for the larger work on the St. Paul. The increase from 2400-volt to 3000-volt direct current was found to be possible without sacrificing anything in the simplicity and ruggedness of the twin-gear drive on the locomotive and it offered certain advantages in reducing feeder copper and providing for greater substation spacing. Taken in connection with the improvements in overhead construction and pan collection, 3000 volts was sufficiently high to insure the satisfactory collection of current under all possible conditions of service operation. At the same time this voltage did not involve anything beyond conservative design in the case of single-conductor, 1500-volt motors operating two in series on 3000-volt supply, thus permitting the use of the simple twin-gear drive. Experiments with direct-current apparatus with potentials as high as 6000 volts demonstrated the possibility of higher voltages, but also indicated the necessity of adopting some form of freak mechanical drive of doubtful reliability and poorer efficiency. Hence the adoption of 3000-volt direct current for the St. Paul electrification offered reasonable advantages in the distribution and conversion system, and yet the voltage was not so high as to demand any departure from the understood principles of sound and conservative engineering which should govern in such a huge undertaking as the immediate electrification of 440 miles of trunk line railway.

The electrified divisions of the St. Paul are all single track, but nevertheless the 3000-volt direct-current supply is obtained from only fourteen substations feeding 440 miles of route, making an average substation spacing of 31 miles. Maximum trolley drops of 20 per cent are obtained with 2500-ton trains midway between substations, but the average voltage drop with the variable tonnage of passenger and freight trains of all classes will be less than 10 per cent. This reasonable distribution loss is obtained with trolley feeders of 500,000 circ. mil. cross-section extending over 85 per cent of the entire route mileage, or where the ruling grade is 1 per cent or less. Heavier feeders up to 1,400,000 circ. mil. section are used on higher gradients up to the 2 per cent ruling grade. The entire cost of this feeder copper, figured on a 20-cent basis, amounts to less than 8 per cent of the total cost of electrification.

It is as yet too early to expect any operating figures as to economies effected by the electrification. Full electrical operation of all freight trains, and all passenger trains except one on a local run, is now in effect on two steam engine divisions totaling 220 miles of track. These two steam engine divisions have been consolidated into one electric locomotive run, crews being changed midway at the old division point. An additional 220 miles of track will be in operation by the end of this year, and here also two steam engine runs will be combined into one electric division.

Partial operation for six months has proved the physical success of the undertaking and the general fitness of the locomotives and distribution system for this very severe mountain service. The high-voltage direct-current system offers special advantages for the conditions obtaining in the Northwest with its abundant supply of 60-cycle power and the broken profiles of the railroads. In the substations, synchronous motor generator sets, which have a combined efficiency at full load of approximately 92 per cent, and automatically providing a power factor of 100 per cent or a slightly leading current at practically all loads, permits feeding the St. Paul substations from the general transmission networks of the Montana Power Company without causing interference with the industrial and lighting loads supplied from the same lines. In fact, this ability of utilizing any frequency of power supply without interfering with the commercial load connected to the same transmission circuit, constitutes one of the chief advantages of the high-voltage direct-current system. In other respects, also, direct-current construction is well adapted to the work in view. The profile calls for crossing three mountain ranges with long stretches of level and low-grade track intervening. Freight trains mount the ruling grades at approximately 15 m.p.h. with two locomotives, and run on level track at double this speed with one locomotive, an accomplishment readily achieved with the flexible characteristics of the direct-current motor. Moreover, the locomotive speed is automatically proportioned to all intermediate gradients, thus resulting as nearly as possible in a constant-output locomotive and minimizing the load fluctuations due to the very broken profile. As a matter of fact, a variable speed characteristic for the locomotive is pre-eminently adapted to general railroad operating conditions, as questions of alignment of tracks and peak-load power supply place limits on the speeds up grades while it is desirable to operate on level track and on the lesser grades at as high a speed as the track alignment and condition of rolling stock will permit.

Much of the engineering success of the St. Paul installation is the result of the gradual development of a direct-current motor for locomotive construction and the advance in the art of generation, transmission and conversion of alternating-current power. Two novel features, however, stand out conspicuously as being introduced for the first time and completing the development of the 3000-volt direct-current system. These are, first, the twin conductor flexible overhead construction with lubricated, copper-pan collectors, and, second, the regenerative braking control of the series-wound, direct-current locomotive motors. The first has made possible the collection of current far in excess of operating requirements and has settled for all time any claims for higher trolley voltage based upon the question of current collection. Thus, it is perfectly feasible with the St. Paul construction to collect 2000 amp. at practically any speed and this makes it possible to receive 6000 kw. at 3000 volts through one pan collector, more than enough to slip the wheels of the 282-ton locomotive at 30 per cent coefficient of adhesion. Then, too, the introduction of regenerative braking control with direct-current, series motors greatly broadens the field of the locomotive and permits placing a proper value upon this one feature of electric operation, because it is not secured at the expense of sound and conservative engineering in other respects. Regenerative electric braking undoubtedly has an important value in electric railroading by adding to the safety and economy of operation, and it is a welcome addition to the other advantages of the direct-current-motor locomotive.

In general, the St. Paul electrification extends over such a length of track, 440 miles, that no restrictions need be placed upon the free operation of the electric locomotives. The Mallet locomotives previously used over the mountains are being transferred to the adjoining non-electrified division as fast as they are released, with a view to handling the heavier tonnage trains delivered to that division by the electric locomotives, thus resulting in raising the weight of trains moved over the road and effecting material economies.

Progress of Car Building Industry

A PRELIMINARY summary of the general results of the 1914 census of manufactures with reference to the construction of steam and electric railway cars was issued this week by Director S. L. Rogers, of the Bureau of the Census, Department of Commerce. It consists of a detailed statement of the quantities and values of the various products manufactured, prepared under the direction of William M. Steuart, chief statistician for manufactures.

Returns for 1914 were received from 242 establishments which manufactured 138,178 steam and electric cars, valued at $165,071,427. These totals include figures for 118 railroad repair shops which reported the construction of 11,049 new cars, valued at $12,811,087, and seven establishments engaged primarily in other lines of manufacture but which produced 4481 railway cars, valued at $3,178,677, as subsidiary products. For 1909 there were reported 280 establishments which manufactured 101,243 cars, valued at $102,147,396. Of these 280 establishments, 140 were railroad repair shops which constructed 14,792 cars, valued at $13,952,923, and sixteen were establishments engaged primarily in other industries but which built 8981 cars, valued at $5,934,871, as subsidiary products. The number of establishments engaged in this industry thus decreased by thirty-eight, or 13.6 per cent, during the five-year period, but the number of cars built increased by 36.5 per cent, while their value increased by 61.6 per cent.

The number of electric cars manufactured in 1914 was 2821, and their value was $10,041,888. In 1909 there were built 2772 electric cars, valued at $7,263,109. The number of cars constructed was thus only 1.8 per cent greater in the later year than in the earlier, but during the five-year period their value increased by 38.3 per cent. The output of electric cars in 1914 comprised 2583 passenger cars, 110 freight cars and 128 other cars. The statistics for 1914 and 1909 are summarized in the following table:

CONSTRUCTION OF CARS FOR USE ON STEAM AND ELECTRIC RAILROADS—COMPARATIVE SUMMARY: 1914 AND 1909

	1914	1909	Per Cent of Increase, 1909-1914
Number of establishments..	242	280	13.6*
Total cars built:			
Number	138,178	101,243	36.5
Value	$165,071,427	$102,147,396	61.6
Steam:			
Number	135,357	98,471	37.5
Value	$155,029,539	$94,884,287	63.4
Passenger:			
Number	3,558	1,819	95.6
Value	$45,027,083	$15,120,961	197.8
Freight and others:			
Number	131,799	96,652	36.4
Value	$110,002,456	$79,763,326	37.9
Electric:			
Number	2,821	2,772	1.8
Value	$10,041,888	$7,263,109	38.3

*Decrease.

Boston Elevated Exhibit at Technology Dedication

IN connection with the dedication of the new $7,000,000 plant of the Massachusetts Institute of Technology at Cambridge on June 14, the Boston Elevated Railway had an interesting exhibit of transportation progress in the past half century. With electrical and water-power displays, the exhibit was housed in one of the wings of the immense new establishment on the border of the Charles River Basin, and was visited by a vast crowd of appreciative guests. A working model of a rapid transit car was shown, equipped with third-rail shoes and operating automatically on a track provided with complete miniature signals of the automatic illuminated type, governed by a standard installation of track relays. Colored photographs illustrated the evolution of street conveyances from the omnibus of 1856 to the latest type of semi-convertible, prepayment car in use on the system to-day, and other views illustrated the company's methods of track maintenance, subway shelter designs in America and Europe, cross-sections of rapid transit subways, the South Boston generating station of 125,000-kw. ultimate capacity, and the high-tension distribution system of the road. Elevation drawings of the latest subway rolling stock were shown for Boston and other cities, and graphic charts of the company's financial development and of its traffic and transfer growth were exhibited.

BOSTON ELEVATED RAILWAY EXHIBIT

C. E. R. A. A. Holds Mid-Year Meeting

Delegates Consider Subjects of Departmental Expense, Statements, Storeroom Systems and Relation of Accounting Officer to Other Members of Official Family

THE twenty-ninth meeting of the Central Electric Railway Accountants' Association was held in Toledo, Ohio, on June 13 and 14, at the Hotel Secor. The morning session on June 13 was devoted mostly to business and committee reports, while in the afternoon the committee reports were concluded and papers were presented on the relation of the accounting officer to other members of the official family, and also on departmental expense statements. The concluding session was given over to a paper on storeroom systems and to a discussion thereon.

OPENING SESSION

The opening session was called to order at 10 a. m. with President F. T. Loftus, auditor Indianapolis & Cincinnati Traction Company, Rushville, Ind., in the chair. F. R. Coates, president Toledo Railways & Light Company, welcomed the delegates in a few well-chosen words, after which A. L. Neereamer, secretary of the association, read the minutes of the last meeting and also the report of the executive committee. According to the latter three new members had been elected, and a request had been authorized to the Central Electric Railway Association for an additional annual appropriation of $100 (making the annual amount $250) to cover the increased expenses due to the joint secretaryship with the central association instead of a member secretaryship. Moreover, the executive committee announced that the next meeting would be held in Cincinnati on Dec. 8 and 9.

President Loftus presented a set of memorial resolutions drawn up by a special committee for E. J. Davis, formerly auditor Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company. The report of the standing committee on passenger and freight accounting was then read by the chairman, Walter Shroyer, auditor Union Traction Company of Indiana, Anderson, Ind.

The report recommended that the "Decisions and Recommendations" of the association in regard to handling interline accounts be changed so as to provide for the printing of a unit waybill, the sending of waybill corrections direct to the agents interested, and the adoption of junction interchange reports substantially like those used by steam lines. The committee also suggested that as a general proposition a time limit of six months be fixed for the issuing of corrections, except that in isolated cases where the reasonableness of the delay could be established, this rule would not apply. Furthermore, it was recommended that the association adopt the draft plan of settlement of interline balances as the only recognized method on and after Sept. 1, 1916, special attention to be called to this change. Lastly, as a result of the recent elimination of voucher minimums for the settlement of interline freight claims, the committee proposed that settlement be made along the lines of established steam railroad practice, through the use of a standard form of authorization and a standard form of monthly summary of such authorizations, the latter to be the basis of monthly settlement by voucher or preferably by draft. After a discussion of various details the report was accepted as submitted.

In connection with the section of the report dealing with the settlement of interline balances by draft, E. L. Kasemeier, auditor Ohio Electric Railway, Springfield, Ohio, suggested that a clearing house be established for offsetting company balances and reducing the number of drafts needed. B. H. Jacobs, assistant auditor Cleveland (Ohio) Railway, mentioned the fact that one bank in his city had taken up the clearing house method for settling personal accounts, and it was quite likely that some banks might desire to aid the railways along the same line. A. E. Dedrick, auditor Mahoning Valley Railway, Youngstown, Ohio, advanced the idea that each member in a clearing house plan should make a deposit with the bank in order to establish a fund, the interest on which would go to the bank in return for its clerical work, collections and payments. He thought that on this basis some small progressive banks would be glad to get the business. Mr. Kasemeier thought that it would be advisable for the association to do the work and secure the interest instead of a bank, but Mr. Neereamer thought a bank could handle collections more quickly and effectively. At the end of the discussion, however, it was decided that for the present it would be better to adopt only the general draft settlement plan outlined in the committee report, and that the question of establishing a clearing house for drafts could be taken up at the next meeting. It was observed that some people still disfavor drafts, and a campaign of education for some companies along even this line may be necessary.

AFTERNOON SESSION

The first business at the afternoon session on June 13 was the report of the committee on electric light and power accounts. Mr. Dedrick, chairman of the committee, stated that it had no written report to make, but that in its opinion it could not well devise methods of accounting on account of official commission classifications, and its work properly was that of answering questions regarding the apportionment of items, etc., and detailed procedure under commission rulings. President Loftus urged members to send inquiries to the Question Box to be answered by this committee. Mr. Dedrick said that at the recent convention of the National Electric Light Association in Chicago the accountants of eight state commissions expressed themselves as being in favor of the N. E. L. A. classification, either in total or as a standard basis. In his opinion, therefore, if the classification of the state having jurisdiction over a railway company with a lighting and power addition should not be complete, the company could very well adopt the N. E. L. A. classification and use its own account numbers without arousing any objection.

Oren A. Small, auditor Benton Harbor & St. Joseph Railway & Light Company, Benton Harbor, Mich., stated that in Michigan the companies must keep the commission classification, although the commission is lenient in regard to the adaption of the accounts to suit the needs of different properties. Mr. Shroyer observed that the use of the official classification is also mandatory in Indiana, while President Loftus explained that the rules of the Indiana commission had been somewhat vague, and he had made up a pamphlet of rules for his company's use. Mr. Dedrick remarked that a correct division of power on a combined property was a hard problem, but that it was easily solved by the use of meters. In the case of meters for customers, 15 per cent should be added for transformer and transmission loss.

Owing to the absence of all members of the Question Box committee, and the apparent lack of questions, this item of the program was passed over and a paper on "The Relation of the Accounting Officer to Other Members of the Official Family" was then read by R. R. Bruster, associate editor ELECTRIC RAILWAY JOURNAL, New York. This appears elsewhere in abstract form. President Loftus reiterated Mr. Bruster's plea for a wider vision on the part of the accountant, a looking beyond the mere figures to an interpretation of their meaning, as a means of strengthening his position and prestige. According to President Loftus there is still a feeling in some companies that the accounting department is a sort of necessary evil, and it is looked upon as a "knocker" when the reports only show the true conditions in certain departments. C. E. Murray, secretary and treasurer Toledo & Western Railroad, Toledo, Ohio, said that some electric railway accountants undoubtedly do not bring out all the things that they might, for they wait for orders from the men higher up, when by taking the initiative they could better their position.

To Mr. Dedrick's mind one of the most distinguishing marks of present business organization is the increased prestige of the accounting officer. In this connection he noted a statement made before the recent N. E. L. A. convention by John R. Wildman, professor of accounting New York University School of Commerce, Accounts and Finance, to the effect that sixty-three universities and colleges now have high-class courses in accountancy. Besides the advantages that have resulted from this constantly increasing educational work, the accounting profession has received an uplift as a result of commission regulation. Under the regulatory system the operating end of the business has not been greatly changed, but the question of proper accounting has been much raised and the acts of the commissions show that they consider the advancement of utility accounting a matter of prime importance. The electric railway accountant of to-day must look into the future, and the trend of thought is decidedly toward a broader conception of his work and his views.

Mr. Bruster's paper is to be reprinted, with the compliments of the ELECTRIC RAILWAY JOURNAL, for distribution among member companies. Copies may be secured in a short time through Mr. Neereamer.

Owing to the absence of Robert H. Lindsey, who was scheduled to read a paper on "Office Organization," the paper by L. T. Hixson on "Departmental Expense Statements" was advanced from the next session and read by Mr. Neereamer. This will be published later in abstract. In connection with this paper F. K. Young, auditor Scioto Valley Traction Company, Columbus, Ohio, stated that he did not make any departmental charges for general expenses, he being held responsible for the showing made in this group.

In reply to a question regarding the permissible use of loose-leaf journals, it was said that the Interstate Commerce Commission and others do not specify forms or devices, and a loose-leaf journal may be used if desired. It would be advisable, however, to have it bound for permanency at the end of the year. Mention was also made of the usefulness of journal vouchers and the placing of only totals in the general ledger, as well as the advisability of preserving all working papers.

At the conclusion of this session the delegates were taken on a very enjoyable pleasure tour under the guidance of Mr. Murray; A. C. Van Driesen, chief accountant Toledo Railways & Light Company; C. B. Kleinhans, auditor Toledo & Indiana Railway, and E. H. Rechberger, auditor Northwestern Ohio Railway & Power Company. This tour included a trip to Toledo Beach in the special car "Toledo," dinner at the Toledo Club, and a theater party thereafter.

CONCLUDING SESSION

The final session on June 14 was opened at 9.30 a. m. with a vote of thanks to the local officials for the entertainment the preceding day. Then, in the absence of A. Swartz, vice-president Toledo & Western Railroad, Toledo, Ohio, Mr. Van Driesen read the former's paper on "Storeroom Systems," which will be abstracted in a later issue. In commenting upon this paper, Mr.Dedrick said that he was a firm believer in the theory that the stores department should not report to the purchasing department but to the auditor, for the handling of stores was an accounting and not an engineering or purchasing matter. If the auditor did not have control over the stores department, it would be impossible to get good records, and it would also stir up interdepartmental differences. In Mr. Dedrick's company the purchase order and invoice are sent to the storeroom to be checked for the receipt of the goods, and are then returned to the accounting office to be vouchered and paid.

Mr. Dedrick averred that the idea of a perpetual inventory was good, but he pointed out that it was not necessary to average prices. His company charges out articles at the old prices pertaining thereto until the old quantities are exhausted. A new bin tag is used for each new shipment, the old tag being placed on the top. Thus the new prices are not visible until the old supply is used up. In Mr. Dedrick's opinion the bin-tag system is preferable to any other. The bin tag is really a ledger sheet, and the keeping of a stores ledger simply involves superfluous work. By the use of a semi-annual inventory it is possible to check the perpetual inventory and the bin tags, and in actual practice only a very few discrepancies have been found. The check is made according to number, but in the case of small articles a dozen are taken together. For 5000 different sizes and articles it is possible to get an accurate check on all but about twenty-five.

Mr. Jacobs was of the opinion that Mr. Dedrick's bin-tag plan was theoretically good, but in his company's experience the tags became dirty and almost useless. Mr. Dedrick said that he had had no trouble from such a cause. Mr. Van Driesen explained that for his companies the stores department were really under the auditor. The storekeeper makes a requisition on the purchasing agent, who places the order, making four copies. One goes to the dealer and two to the storekeeper, and one is retained by the purchasing agent. When delivery is made the storekeeper O.K.'s one of his copies to the purchasing agent, who attaches the original requisition to this receipt and forwards it to the auditor for payment.

Mr. Young believed in averaging the price of materials, for he figured that it was easier to do this than to attempt to keep the old balances as such on the tags. Moreover, difficulties might arise with requisitions at two prices and in connection with miscounts of stock if the price were not averaged. In regard to returning material to stock, Mr. Young stated that instead of using an ordinary debit entry he makes an entry in red ink on the debit side, thus reducing the issues without increasing the receipts, and allowing the latter to be totaled directly from the black figures.

Mr. Pantel agreed that the storekeeper should be master of the situation in the storeroom, but he emphasized the fact that the $50-a-month store clerk on a small property cannot be made into a bookkeeper. On his property, for example, the books are kept by a clerk in the auditor's office, an annual inventory being made to check the storeroom with the ledger. With storeroom material annually amounting to $300,000 there has not been a discrepancy of more than $50 or $60. Mr. Dedrick maintained, however, that it would be better to have a competent man in the storeroom than a poor one there and another clerk in the accounting office. Furthermore, through the proper establishment of maximum and minimum store limits and other things that a competent store clerk would handle, there would be considerable saving to the company that should be remembered in fixing the store clerk's salary. In general Mr. Dedrick believed that the small companies are the very ones that cannot afford not to have good men in the storerooms. Mr. Young said that he had a $60-a-month clerk to keep the cards and make out a material-issued sheet at the storeroom outside Columbus, the remainder of the work being handled in the auditor's office.

The discussion on taxation was postponed until a later meeting, and the association thereupon adjourned until next December. After the meeting the remaining delegates were taken on an inspection trip through the plant of the Willys-Overland Company.

Relation of Accounting Officer to Other Members of Official Family

BY R. R. BRUSTER
Associate Editor ELECTRIC RAILWAY JOURNAL

The relationship of the electric railway accounting officer to other officers has, since the early days of the industry, been in a state of transition toward one of equality. As far as one can judge from the reported infantile experiences of electric railways, it is evident that the accounting department, though accepted as a necessary separate unit, was looked upon as an appendage of relatively minor importance. The function of the accounting officer, except on the larger railways, was simply that of making the necessary bookkeeping entries for receipts and disbursements and tabulating the results when required to do so by the chief operating officials. In the later years of the industry, however, the opportunities for and benefits of specialized work by the accounting department have become so great that both the actual and the relative importance of this branch of the organization has been undoubtedly increased many fold. As the matter stands now, accounting methods and mechanical aids for accounting have been so perfected that the internal organization of the accounting department has attained a high state of development, but less attention, it seems, has been paid to what might be termed the outside relations of the accounting department to the other departments.

GENERAL ORGANIZATION

For electric railways there are certain grand divisions of organization pertaining to the operation and management of the property—such as roadway and track, equipment, conducting transportation, traffic, legal, accounting, financial and purchasing. These are simply convenient groupings of individual factors that still maintain their relationship to the whole and are thus divided simply that the executive head may be enabled better to understand and more effectively to direct the work of the forces at his command. Under the purely departmental form of management, all these sections of the organization would not meet short of the executive head and the board of directors, there being a responsible head for each section to carry on his share of the work, observing the requirements of fellow officials but not under their jurisdiction. The advisability of this procedure has, especially in the case of steam railroads, invoked extended discussion as to the relative merits of departmental organization, under which the work is divided according to functions, and divisional organization, under which for certain physical divisions of the property operating managers have control over all or most of the functions concerned.

This question of departmental versus divisional organization, however, has never been discussed in a clear-cut wholesale fashion in connection with electric railways, because by the very nature of the operation in this industry the organization in its earliest stages assumed the fundamentals of the divisional form and has tended to persist therein. With the beginning of electric transportation, the general manager as operating head was undoubtedly held responsible for the work of the office as well as the operation of the road, thus exhibiting the divisional type in its pure form for a one-division line. As the size of the company increased, it naturally followed that the manager relieved himself of some of his supervision over details, though still retaining his control over the specialized subdivisions of his former activity. Eventually, however, the divisional powers of the manager came in many cases to concern only the divisions or groups of so-called departments relating to the operation and maintenance of the property, for the accounting department gradually joined the financial or treasury department and sometimes others as a form of specialized work outside the immediate control of the general manager.

The structure of electric railway operation to-day, either for the single company or for those under holding company control, distinctly warrants divisional control over the operating side of the properties, for it is evident that every approach to a general departmental system for most electric railways would seriously weaken the general manager without strengthening the president or executive head. On the other hand, on the non-operating side, it is highly essential that there be a departmental development along functional lines so as to reap the greatest benefit from specialized skill. This particularly refers to the accounting department, and the problem to-day is how to bring the operating manager to a complete forgetfulness of a bygone almost monarchical control over the accounting department and to a full realization of the value of its functions as an independent corporate unit.

ACCOUNTING DEPARTMENT SHOULD BE INDEPENDENT

The best form of organization is that which produces the best results, and best results can be obtained from the accounting department only if it is entirely independent of other sections of the management and under the direct supervision of the president or other chief executive head of the company. That this view is fundamentally correct is shown by the fact that in some progressive companies in other fields, the accounting officer goes even further and reports directly to the chairman of the board of directors or even to the board itself. This independent position is demanded by the very nature of the accounting department, for it touches in a peculiar way the activities of all other units of organization and must act as an impartial recorder of their deeds. Both in theory and in practice, it is the supervisor of the enterprise, standing forth as a representative of the owners charged with the truthful ascertainment of results and the conservation of their interests.

The fact that the accounting officer reports directly to the executive official accomplishes the meritorious end of placing the latter in immediate contact with the accounts and statistics of the company instead of at second hand through other officers, particularly the operating head. Years ago it was said that the first thing about which the general manager wanted to know was the loyalty of the accounting officer and his belief in the policy of operation. This statement, however, involves a big misconception of the function of the accounting officer, for while it is fortunate if the accounting officer is thoroughly in accord with the policy and the acts of the general manager, such agreement cannot justly be demanded by the general manager by virtue of his position, but should come solely as a result of the free and discriminating judgment of the accounting head. The accounting department is the safety check on the enterprise, and when the general manager presumes to attempt to control the records or the presentation of data so as to make special or record showings, a reorganization in the operating and not the accounting side of the business is needed. It should be clearly understood by all that the accounting of a corporation must constitute an impersonal and impartial transcription of results as they actually occur, and only by the separation of the accounting and operating divisions can the responsibility of the former and the faithfulness of the latter be maintained.

RANKING THE ACCOUNTING OFFICER

As a matter of fact, the advisability of relieving the accounting department from all restraint by making it report to the executive officer is quite widely recognized now in theory at least, and the accounting officer in most cases is, along with the secretary, treasurer, general manager and general counsel, under the direct control of the president. This plan is usually followed by the large companies, but in a number of small companies the method of control seems to vary and often the duties of the accounting officer are combined with those of the treasurer or secretary or perhaps both.

The difficulty that arises in this connection is that it seems almost impossible to adopt any set form of organization for all railways, particularly the small ones. With frequent changes in the control of companies and the personnel of the management, there have been numerous changes in the form of the accounting department organization to fit the views of different directors or the qualifications of different men. Too often the position of accounting officer is used simply as a stepping stone to the secretaryship or treasurership, with the result that the new accounting officer may be required to report to the new secretary or treasurer. The accounting officer may even be compelled to report to several officials at once, in spite of the fact that many masters are not at all conducive of good results. The fact is that some executives are careless about their organization, or simply follow their individual tastes without a sufficiently clear conception of the organization theories involved, and of the probability of ultimate disorder unless some consistent plan is followed.

Efficient management must, of course, give careful attention to the human factor and the best utilization of its energies, but in arranging his organization the executive should be guided by the points of permanency and the importance of the functions concerned rather than merely by the present volume of work involved. In other words, the executive of the small company, for he is most concerned in this connection, should in the dividing of the organization see to it that the functions of the accounting officer are not restricted or depreciated by other work placed upon him or by an imprudent or decentralized method of control.

In regard to combining the accounting office and the treasurership, as is frequently done in small companies, the old objection may be recalled that this removes the check against a dishonest treasurer. In the present state of commission regulation over accounting procedure, however, this objection has practically ceased to hold, and the union of the two offices is quite permissible if the size of the company necessitates it. Yet purely from the point of view of functional organization, if only two men are available for the three positions of accounting officer, secretary and treasurer, the best results would in most cases be secured by combining the treasurership and secretaryship and leaving the accounting officer by himself.

One other point in regard to the concentration of supervision over both accounts and cash may be mentioned, *i.e.*, the not extinct belief that the joint officer receives a prestige and power not otherwise obtainable. Perhaps there is still a popular belief that the treasurer is usually a man of larger responsibilities and more power in the corporate world than the accountant. This, however, is nothing but a relic of the moth-eaten idea that the accountant is only a somewhat automatic recorder of figures, without initiative and without general training. An accounting officer of to-day, so equipped by training and experience as to overcome successfully the intricacies of modern utility accounting, is fully the peer of the man in charge of the company's finances, and if the two offices are to be combined it should be solely because of expediency in organization work and not because the position of the accounting officer needs to be strengthened. In a few cases a combination of local circumstances may make it impossible for the accounting officer to cope with the other officers, but in such an event it is very doubtful whether any permanent good will be accomplished unless the accounting officer forsakes a borrowed prestige and inforces respect through his own ability, courage and personality.

But whether the position of the acccunting officer be single, double or otherwise; whether he be called vice-president, treasurer, comptroller, secretary or auditor, it is very essential for the well-being of the organization that his duties and powers be clearly defined for the benefit of all parties. The head accounting official should not only be regarded as an officer of the company but should be such by virtue of method of selection and powers. He should be elected by the board of directors, like the other officers, and not merely appointed by the president with or without the board's consent. Furthermore, his duties and powers should be carefully defined in the by-laws of the company, so as to indicate to all that his actions are circumscribed by real organization rules and not merely by the dictates of custom or by the concessions inforced from other members of the official family. Lastly, he should be made openly responsible for handling all accounts in his department and for maintaining their accuracy, and he should receive all necessary authority to meet this responsibility, whether the showing made be favorable or unfavorable to any particular interests. Naturally, the accounting officer must follow the orders of the directors on moot points like depreciation, etc., but in the daily work he should be so certain of his powers as to be able to keep a homogeneous and thoroughly truthful record of his company's activities.

WORKING WITH THE OPERATING DIVISION

While, as stated before, the accounting department should be placed in a position dependent upon only the executive head of the company, the attainment of such a position does not mean that it is severed from all working relations with the various so-called operating departments or organization units. Indeed, even with all the accounts being kept in the accounting department, a great part of the information used in the office of the accounting officer originates in outside sources and comes from men connected with other sections over which the accounting officer has no control. In large companies the accounting officer can employ his own clerks in the operating sections, but for small railways this is probably not a practicable plan. In such a case, however, the local clerks in the operating division used by the accounting officer should be under the latter's jurisdiction in all matters relating to work for the accounting department. The necessity for this control is readily apparent, for if the accounting officer can obtain desired information only when it is convenient or pleasing to the operating men, the whole systematic procedure of the accounting department in getting out its statements and data is likely to be seriously deranged. The successful accounting officer, it has been said, desires no authority, but this does not well express the point. Such an officer is the very one who needs authority to be successful, but who through the mere known possession of authority is less likely to be called upon to use it often.

The accounting officer, therefore, should have a definite authority to reach directly the sources from which information for the accounts is obtained, and to secure it when and as asked for, but in his relations with the various operating groups there are a few points for both sides to bear in mind. In the first place, the operating men should remember that to a certain degree the accuracy and efficiency of the accounting department's records depend upon the operating reports submitted. For this reason the operating clerks, who are likely to be more familiar with attendant conditions, should exercise more than ordinary care to see that their reports are complete, uncolored by wishes. But, in the second place, the accounting officer owes it to himself and to his company to have a general knowledge concerning the physical operation of the utility's property, so that he will have all proper appreciation of the causes when insistent demands for immediate operating information are met with temporizing replies.

In general, the relationship between the accounting officer and the operating division heads should be one of mutual cordiality and sympathy. Fundamentally, the work of the accounting officer often puts the general manager and the operating heads on the defensive, and unless the matter is handled by the accounting officer with much tact and without a suspicion of superior integrity or efficiency, the operating men are likely to acquire an attitude of indifference or even opposition. The operating men know that their activities are being checked, and the accounting officer should have enough knowledge of human nature to give them the presumption of fairness and industry in their work.

The needs of the accounting officer, expressed even after a proper study of operating conditions, are sometimes disturbing to the operating officials, on account of the seeming increase in their burdens, and a clash, while to be regretted, proves unavoidable. Such instances are rendered less frequent if there are periodical conferences between the accounting officer and the operating chiefs, entered into with the right spirit of mutual helpfulness. When a real clash does occur, however, the only thing to do is to have the dispute adjusted as soon as possible by the executive head. If there is any doubt as to the authority exercised by the accounting officer, it can be removed with more harmonious results by the executive substantiating the authority than by the accounting officer continuing to assert it himself. Inter-departmental and personal jealousies ought to be guarded against by the executive, for none should know better than he that friction prevents a successful organization and none is in a better position than he to bring about amicable settlements on disputed points. Upon him, therefore, really rests the duty of handling the whole organization so as to keep all its parts in a proper understanding of one another's functions and powers and in cordial and reciprocal co-operation.

HELPING THE EXECUTIVE

Once upon a time the accounting officer was probably looked upon as a sort of dilapidated inhuman creature who periodically retired into some hole in the wall and at the end of a certain period announced with loud cacklings the hatching of a new balance sheet. To-day, however, the accounting officer is no longer the joke of the organization, but a vital and serious part of it. To paraphrase a saying by Goethe—if the accounting officers do not rule the railways, they at least show how the railways are governed. This rise in position has been attained not merely by deducing results but by studying methods, not by being hemmed in by figures but by making fearless investigations of unusual showings, not by being bookkeeping clerks but by trying to become real students of engineering, transportation, law, finance and accounting—in other words, the only all-around men besides the executives.

If the future is to bring like improvement, however, the acquisition of a general training must be more nearly completed, and the lesson must also be more thoroughly learned that the value of accounting lies in the application of compiled data to future operation. To ferret out excesses, defects and irregularities is truly the work of the accounting officer, but this work must not be done merely to discover what might have been remedied, but rather to cause actual prevention if possible. Here the accounting officer shows up as the true right hand of the executive. Indeed, the accounting officer's reports, ordinary and otherwise, play a most important part in administrative work when they are properly compiled, compared and analyzed. The accountant and the executive, however, are inclined to look at financial and operating statistics from two widely differing points of view. The accountant, it has been said, primarily wants a bird's-eye view of the status of the corporation at a particular moment, or the general results at the end of a particular period. The mind of the executive, however, works differently, for he wants a "cross-index" of the accountant's information at all points and for all periods, so that he can study the entire or partial history of all or any portion of the corporation's activities. The difference is inclusiveness of vision, and it is only by acquiring as far as possible the executive's breadth of view and the executive's general understanding of the company's problems, that the accountant can intelligently and thoroughly furnish the executive with all of the data required and arrange the figures so that the executive can immediately grasp their significance.

In this connection, it may be said that the mass of statistical work carried on by the operating division in calculating economies would better be handled to a large extent by the accounting department. Aside from the fact that the resulting figures would probably be unbiased and more reliable by virtue of being compiled in a department having no axes to grind, this plan would by actual practice give the accounting department the desired wider view of the executive's problems and his needed information. Similarly, the accounting department should act on its own initiative in ascertaining the data that are required for successful operation as the industry continues to develop, instead of passively awaiting executive instructions. In other words, what the A. E. R. A. committee on passenger-accounting did last year in hunting down old daily reports now valueless to the traffic and schedule offices, the ideal accountant will correspondingly do for all information, old and new, that the executive is using or can use. Instead of being simply a machine for gathering data, therefore, the live accounting officer will study the data from his intelligent knowledge of the property and call to the attention of the executive the interesting and instructive points.

Cost accounting and general statistics are becoming more and more a guidance to those concerned in administrative work, and if the electric railway accounting officer is to be freed from all restraints on his activities and powers, the readiest way of escape is apparent. Gradually he has been drawing closer to the executive officer, until the derogatory name of mere bookkeeper is no longer applicable. If he is, however, to continue his progress, he must develop a broader vision and a greater ease in interpreting his own results, for only in this way can he acquire that unassailable prestige which his position merits.

Master Car Builders' Association

Reports on Draft Gear, Car Wheels and Welding of Cast-Steel Trucks Were Among Those Presented at the Atlantic City Convention

AT the convention of the Master Car Builders' Association, which was held in Atlantic City on June 14-16, several of the reports that were presented by the various committees were of special interest to electric railways, and these are abstracted in the following paragraphs.

The committee on draft gear submitted a preliminary report on the work that it had in hand, stating that it had arrived at a partial solution of the problem of determining the maximum end force that could be put on the underframes of freight cars without overstrain. This had been accomplished through the use of a 15,000-lb. testing hammer of the pendulum type so arranged that it could be raised to any desired height and allowed to drop against a 30,000-lb. car that rolled on a straight, level track. The method of testing was to mount some form of draft gear on the car and to record graphically the movement of the car subsequent to a blow from the hammer. Readings from a strain gage were also taken at ten points on the channels which inclosed the draft gear to determine when permanent set had taken place.

Seven sets of channels, or draft sills, were tested, all being 12 in. deep. Five had a cross-section of 7.35 sq. in. per channel, or 14.7 sq. in. for both members, while the two others had a cross-section of 11.76 sq. in. per channel, or 23.52 sq. in. for each pair. Four different draft gears were used, these being of various capacities. The procedure in testing each set of sills with the different draft gears was to strike successive blows with constantly increasing drop until the gear went solid, then striking two blows at each height until the distortion of the channels was apparent to the eye. Readings were taken only after the gears had gone solid because it was found that until such a height of drop was reached no distortion took place with any of the draft gears. The force applied to the sills was calculated from the acceleration imparted to the known weight of the car.

From the tests it was found that a force of 450,000 lb. caused the lighter channels to be overstrained, and that a force of 600,000 lb. was about the maximum that could be applied, failure taking place in all cases by the bulging of the web behind the lugs supporting the draft gear, and by the bending out of the flange at the tie plate between the two members. On the heavier channels tested, the maximum capacity was not reached, for the lugs sheared off at about 850,000 lb., and if these members had a strength proportional to the lighter ones that were tested, they would withstand about 960,000 lb. However, the point of overstrain for the heavier channels was obtained, this being somewhat beyond 700,000 lb.

In all cases the point of overstrain for the light channels, 450,000 lb., came with a blow 2 in. or 4 in. higher than that which made the draft gear go solid. In other words, if the draft gear goes solid before all the energy is absorbed or transmitted to the next car, the pressure is going to test the strength of the underframe immediately. This is shown in the tests of the heavy channels, in which an increase in the drop of only 6 in. above that required to close the draft gear sent the force up to 700,000 lb., while the pressure before the draft gear went solid was in no case more than 200,000 lb. From this it follows that a draft gear is needed that will absorb enough of the energy to keep the pressure down below the elastic limit of the draft sills.

The report of the committee on car wheels presented results of an exhaustive investigation into the question of the desirability for thicker flanges for cast-iron car wheels, data on wheel failures from a large number of railroads being presented and analyzed. These displayed the fact that failures were by no means confined to wheels having thinner flanges, in practically all cases fractures at flanges, or at the throats of the flanges, approximated the vertical and were not in a horizontal plane. In many instances such fractures, or seams, began at a considerable distance inside of the flange or in the tread of the wheel. Special tests also were cited, the figures indicated that thicker flanges did not improve conditions but rather the reverse. Two railroads which had experimented with thicker flanges reported that in almost every case the backs of the flanges were grooved by contact with guard rails and frogs.

In general, the committee stated that failures of flanges under fair usage, other than those caused by circumferential seams, were almost unknown. The seams frequently reached a length of 24 in., before failure occurs, and the location and direction are such that the addition of metal to the back of the flange, within limits of rail clearances, gives no promise whatever of affording any relief from the so-called flange failures. The committee considered, therefore, that nothing in the way of safety or economy will be gained by adding metal to the flange. Whether the addition of metal to the back of the tread (so as to increase throat thickness) will afford relief is a question on which no opinion can be expressed at this time.

A report on welding cast-steel truck side frames and bolsters was made with a division of opinion in the committee, the majority advocating the practice for truck side frames except where cracks extend more than 1 in. from the edge of any rub or flange, and for bolsters except where cracks are more than 1½ in. deep unless the bolster is reinforced by the addition of plates either welded or riveted at the point of failure. The minority report expressed the opinion that fractures primarily indicated weakness in design, and that welding in no way strengthened the design but rather introduced another chance for failure.

In the report of the committee on couplers, which represented the final result of four consecutive years of work, a single universal standard coupler was recommended for adoption. This was one of the two types of experimental coupler which had been subjected to elaborate static and operating tests during the past year as well as to tests in actual service through orders for about 3000 of each form of coupler which had been placed during the year by various railroads. The contour, it may be said, will remain in two styles for another year pending a final decision as to the better, but this will not involve any changes in parts so that the establishment of a single standard coupler has really been at last accomplished. In brief, the new design weighs approximately 410 lb., of which the knuckle comprises 100 lb. It has a strength of 175,000 lb. within the elastic limit with an ultimate strength of the order of 500,000 lb. A large part of the experimental work, however, was devoted to the development of an operating mechanism of highest reliability, the type of coupler finally selected, for example, having thirteen samples withstand a total of 30,000 cycles in a locking and unlocking, or service test without any failures. It also had four samples that withstood successfully an elaborate lock-creeping test under which three out of four samples of another experimental type of coupler had failed.

THE EXHIBITS

In the exhibits that were made at the convention there was a very definite impression of the increasing use of cast steel for parts subject to heavy service. The cast-steel truck frames that have characterized the last few exhibits were much in evidence, as well as cast-steel draft arms, in which single castings took the place of the built-up housings normally provided for the coupler shank and draft gear. In addition, the coupler exhibits were especially elaborate, all of them tending toward emphasis upon the great increase in strength called for by the ultra-heavy rolling stock of the past year or two. In one of them were displayed knuckles and locks of so-called "Naco" steel, for which pulling tests of 150,000 lb. developed a permanent set of only 0.04 in. in the dimension measured longitudinally between the inside of the knuckle and the face of the coupler body, and a pull of 250,000 lb. increased this set only to 0.12 in., the ultimate strength being 511,000 lb. In strike tests the permanent set for the same dimension was 0.06 in. for three 5-ft. blows from a 1640-lb. tup, and 0.18 in. for three 10-ft. blows, the knuckle withstanding thirty-one blows before fracture developed.

The feature of the truck exhibit was one of the 90-ton, six-wheeled trucks used by the Norfolk & Western Railway in the tidewater coal traffic originating in the electrified zone, as described in past issues of the ELECTRIC RAILWAY JOURNAL. About 900 of these cars are in service, and 1000 more are said to be on order. They are, of course, not used in interchange traffic with other roads, being kept definitely in the service between the Pocahontas coal fields and the docks at Norfolk, Va. A conception of the carloads involved may be well attained by casting back four years when the use of cars of 40 per cent less capacity was viewed with something of amazement. Nevertheless, still another increase in coal-car size appears to be imminent because of the recent construction of several sample cars of no less than 120 tons capacity for the Virginian railway. The latter car has been made possible by the six-wheel truck developed for the Norfolk & Western through its reduction of the load per wheel. Here, in brief, the extra pair of wheels has been introduced by making, in effect, each truck side into two equalizer bars that carry the journal boxes at their ends, while a large central casting with four extended arms rests upon coil springs housed in the truck sides. Since the truck sides are hinged vertically at the middle, or over the middle pair of wheels, ample flexibility is provided in a vertical plane.

CAST-STEEL CAR WHEELS

Another feature of the steel casting exhibits, which is, perhaps, generally new only in so far as it applies to the electric railway field, consists in a cast-steel car wheel. This, undoubtedly, will go far to solve the old, and apparently unanswerable, problem of the relative desirability of the thin-flanged, one-wear, rolled-steel wheel as opposed to the design that has a thick flange so as to provide metal for two or three turnings to renew the contour before the wheel is scrapped. This apparent impossibility has been accomplished by making the wheel with an ultra-hard tread and flange, although the plate and hub are left relatively soft and ductile.

In brief, the procedure in manufacture is to cast the wheel in a rotating mold, and to squirt powdered manganese into the first metal that is poured, stopping the supply of manganese after enough metal to make the tread and flange has entered the mold. Naturally, the rotary motion of the mold sets up a strong centrifugal force, which makes the molten metal seek the extreme outside position so that the first metal to flow forms the wheel tread, and as this contains high manganese, the result is an extraordinarily tough material, which when subjected to a tempering process becomes an extremely hard wearing surface. The hardness, in fact, is said to be so great that flange wear is almost unknown, the wheels in general wearing out only because the flanges become too high to run through frogs, and thus making mileages in interurban service between 175,000 and 200,000. The cost is stated to be approximately the same as that for rolled-steel wheels, while the weight is of the order of 20 per cent less because of the thin tread as well as the thin plate and hub that are permitted by the ductility of the metal in that portion of the wheel.

NEW SLACK ADJUSTER AND OTHER FEATURES

Still another important innovation displayed among the exhibits was a new type of automatic slack adjuster which, by its simplicity and ruggedness, is especially suitable for electric railway cars. In this device the brake-lever coupling bar, or bottom truck connection, between the brake levers on each truck is constructed in two parts, one a plain rod made of knuckle-pin steel and the other a sleeve into which the former slides. The sleeve carries at the end a box, inside of which are a few "dogs," or pieces of flat, hardened steel, in each of which is bored a hole about 1/16 in. larger than the rod. When the dog sets square on the rod the latter slides easily through the hole, but if the dog is held at one side it is canted over and the edges of the hole grip the rod on two sides just as a monkey-wrench does when it is put over a bar and pulled by the handle longitudinally with the bar. In consequence, the dogs are pinned loosely at one side only of the box, and when the brakes are applied the canting of the dogs holds the rod firmly in the box. When the brakes are released the dogs come square against the end of the box and the rod is withdrawn as far as the existing slack at the brake shoes permits, a simple friction device being inserted between the sleeve and the brake lever to which the rod is connected, and thus resisting slightly the withdrawal of the shoes from the wheel. When air is again applied the dogs grip at once in the new position and the slack is taken out. Lost motion amounting to about ¼ in. is provided in the friction device to prevent the shoes from being kept absolutely tight against the wheels when the brakes are released.

Among the other exhibits of special interest in the electric railway field was a belt-lacing machine which makes use of a series of wire hooks or clips instead of the customary rawhide belt lacing. The clips are pressed into the belt and turned over at the ends in a single operation, thus saving materially in time and providing a flush surface at the point where the belt ends are brought together. The device, in fact, makes the time of lacing such a negligible quantity that it is customary normally to introduce a short piece in every belt and to substitute shorter or longer pieces for this when it is desired to shorten or lengthen the belt. Another shop device that was exhibited was a portable electric crane with a capacity of 1000 lb. at the end of a relatively long jib. This gave a radius outboard of about 6 ft., the overhanging weight being counterbalanced by mounting the storage batteries at the opposite end of the truck.

As if opposed to the prevalence of cast-steel devices, the Southern Pine Association had an attractive exhibit consisting in the main of a full-sized half box car, that was sheathed, roofed and floored with pine, the government's statement being quoted that the supply of this wood now standing, instead of being exhausted, amounted to 393,000,000,000 board feet. Wood sheathing, it may be said, also appeared in the case of the only complete box car that was exhibited, this having all-steel framing, including side posts and braces, but a wooden floor and sides. One complete end, however, was of corrugated steel. In a nearby booth, nevertheless, a car roof of all-agasote construction was in evidence.

Among the smaller devices was one designed to keep the brake shoe parallel to the wheel circumference at all times by extensions of the bottom brake rod and the brake-beam strut, so as to make a third point of support for the brake beam and giving it a parallel motion. There was also an automatic die-sinking machine which operated like a cotter drill with a universally-guided head. The cutting tool, in the form of a small milling cutter, is mounted in a head that makes vertical passes of any desired length with a given transverse feed. The head moves in and out from the work, thus changing the depth of cut, in accordance with the in and out movements of a round-nosed guiding tool above it, this guiding tool making vertical passes over a model die, which has been sunk in accordance with any desired mold, and duplicating the outline of the model in the cuts that are taken over the work below it. Still another exceedingly ingenious and valuable device was a new and inexpensive form of optical pyrometer for furnaces or heat treatments of any kind, in which the operation consists in passing a wedge embodying the different shades of color taken on by a heated body over a diffused light. By looking through a lens at the heated object and adjusting the color appearing in the instrument to agree with that of the heated object, the temperature may be read directly from printed figures within the line of vision, and a remarkable degree of accuracy is obtainable.

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

ASSOCIATION NEWS

1916 CONVENTION
ATLANTIC CITY
OCTOBER 9 TO 13

Equipment Committee Devotes Two-Day Session Particularly to Wheel and Axle Design—Power Distribution Committee Discusses Concrete Poles, High-Voltage Lines, Etc.

COMMITTEE ON EQUIPMENT

This committee met in New York on June 6 with the following members in attendance: W. G. Gove, Brooklyn Rapid Transit System, chairman; W. W. Brown, Brooklyn Rapid Transit System; R. H. Dalgleish, Capitol Traction Company; E. W. Holst, Bay State Street Railway; H. A. Johnson, Chicago Elevated Railroads; W. E. Johnson, Brooklyn Rapid Transit System; J. S. McWhirter, Third Avenue Railway, New York. F. W. Sargent, American Brakeshoe & Foundry Company, was also present by invitation.

W. E. Johnson submitted drawings showing proposed designs of brakeshoes, heads and keys for 2½-in. tread wheels 28 in. to 37 in. diameters inclusive, 3 in. to 3½ in. tread wheels 28 in. to 37 in. diameters inclusive, and 2½ in. tread wheels 26 in. and under in diameter. He stated that these drawings were prepared in accordance with the recommendations approved by the committee on equipment at its meeting of Jan. 26, 1916, with minor-exceptions. A letter from F. W. Sargent, chief engineer American Brake Shoe & Foundry Company, criticising the proposed changes, was read and acted upon in detail.

R. H. Dalgleish submitted drawings showing proposed dimensions of rolled-steel wheels with 2½-in. tread, proposed dimensions of rolled-steel wheels with 3-in. and 3½-in. treads, and proposed standard tread and flange-contours. In submitting these drawings, Mr. Dalgleish called attention to the omission of 35-in. and 37-in. diameter wheels from the proposed standards, stating that investigation developed that these sizes are seldom called for and are obtained by increasing rim thickness of 34-in. or 36-in. diameter wheels.

In discussing the steel wheel designs the sub-committee on this subject reported that at a meeting held on June 5 it was decided to include hub diameters in their recommendations as follows: For narrow-tread wheels, 21 in. to 26-in. diameter, hub diameter 7¼ in.; for narrow-tread wheels, 28 in. to 34 in. diameter inclusive, hub diameter 8¼ in.; for broad-tread wheels, 34 in. and 36 in. diameter, hub diameters of 8¼ in., 10¼ in. and 11¼ in. It was also proposed and approved that the length of hub for 21-in., 22-in. and 24-in. diameter wheels be made 4½ in.

The proposed standard tread and flange contours, as submitted by the sub-committee, were considered and minor changes made.

In connection with the proposed steel wheel designs and contours of flange and tread of wheel, Mr. Holst suggested that the committee take into consideration and recommend extension of investigation to include chilled-iron and cast-steel wheels. This matter will be referred to the subjects committee.

W. E. Johnson called attention to certain suggestions and recommendations received from the manufacturers on the subject of steel axle design. A communication from W. S. Adams, J. G. Brill Company, was read wherein he suggested that the diameter of collar and dustguard fit of the 3¼-in. x 6-in. axle be changed from 3¾ in. to 3⅞ in. and this change was approved. Mr. Adams also suggested that the fillet between the journal and the collar be decreased from ¼ in. to ⅛ in., and that the fillet between journal and dust guard seat be decreased ¼ in. to 3/16 in., and called attention to possibility of complication arising from the proposed system of numbering. He suggested that the designations be revised to a simpler form. Such as E-1, E-2, E-3, etc.

A. L. Broomall, Westinghouse Electric & Manufacturing Company, addressed the chairman of the subcommittee recommending that the solid collar, which is to be shrunk on the smaller axles when used with split gears, be shown on the axle design; also that the radius between the motor fit and the gear fit on the small axles be made ⅝ in., as on the larger axles. Both of these recommendations were approved. Mr. Broomall also suggested that in the table accompanying the axle design, the gear pitch and width of face be omitted and that the diameter of gear hub and motor bearing flange for the 3¾-in. x 7-in. axle be decreased from 8 in. to 7 in.

The sub-committee also called attention to the undesirability of retaining the proposed 4-in. motor bearing fit for the 3¾-in. x 7-in. axle.

On the subject of the lighting of electric street cars it was decided that W. W. Brown should review the development in car lighting during the last two years, and amplify the report of the committee on equipment as printed in the Proceedings for 1914, giving a brief outline of the development made since this report was rendered. Mr. Brown will also communicate with L. M. Clark relative to a paper proposed for presentation by the committee on reciprocal relations with other societies of the Illumination Engineering Society.

Regarding standard sizes of carbon brushes for street railway motors, W. W. Brown reported that he found it impossible at this time to bring the electrical equipment companies to any agreement on the standardization of sizes of carbon brushes for street railway motors, in view of which it was deemed inadvisable to take any action. It was believed by some of the members of the committee, however, that a tolerance specification could be adopted that will be satisfactory to the motor manufacturers, and would afford protection to the purchaser in purchasing brushes from carbon brush manufacturers.

As L. M. Clark was not present at the meeting, a communication addressed by him to the chairman, relative to M. C. B. brasses for heavy electric traction was read. In this he referred to blue prints showing journal bearings for the 3¾-in. x 7-in., 4¼-in. x 8-in., 5-in. x 9-in. and 5½-in. x 10-in. journals, and also to prints showing the general application of these bearings each to a standard M. C. B. journal box with standard wedge, hooded wedge, and with standard wedge where the journal and liner is attached to the journal box by means of suitable ledge formation cast integral with the interior of box. It was decided to forward these prints, which had not arrived, to the members for their criticisms and recommendations.

R. H. Dalgleish submitted blue prints showing proposed limit of wear gages for 1-in. and 1 3/16-in. flanges. These were approved with certain minor changes.

E. W. Holst submitted six drawings showing trolley catcher sockets as used by different manufacturers at the present time, also a design combining such manufacturers' standards, as well an adapter to take the majority of the trolley catchers now on the market. It was decided that the committee would recommend one design, providing that this does not contain any patented features.

H. A. Johnson referred to report of sub-committee on painting cars, calling attention to the wide variation in the methods of car painting employed by the various companies and the difficulty of formulating any set specifications that would be generally applicable to the conditions met with or acceptable to the users. Recognizing the inadvisability of recommending practices where the final determination cannot be conscientiously lived up to or advocated by the individual members, it was decided that no specification for painting could be recommended at this time.

J. S. McWhirter submitted a written report with copies to all members, giving the result of the sub-committee's investigation relative to the relation between rail corrugation and the use of rolled steel or forged steel wheels versus chilled cast iron wheels.

In addition to the above the committee considered reports on A.I.I.E. standardization rules, car ventilation, and the U. S. Bureau of Standard's safety rules.

POWER DISTRIBUTION COMMITTEE

At a meeting of the Engineering Association committee on power distribution held in New York on June 12 and 13 detailed technical reports from several subcommittees were discussed. Those present were C. L. Cadle, New York State Railways, chairman; E. J. Blair, Chicago Elevated Railroads; E. S. Gillette, Aurora, Elgin & Chicago Railroad; C. R. Harte, Connecticut Company; C. R. Phenicie, Wisconsin Public Service Company; R. H. Rice, Chicago Board of Supervising Engineers, and C. F. Woods, Arthur D. Little, Inc.

Among the actions taken by the committee the following are given to indicate the status of the year's work. No revision of the specifications for overhead line crossings was attempted in view of the fact that the joint national committee has not completed its revision. A revision of the standard specifications for rubber-covered wire and cable was approved subject to revision to conform with the association's standard form for revising specifications.

A clearance diagram for semaphore signals was approved subject to modification to cover curves as suggested by the heavy traction committee. A report of progress on a standard thread for insulator pins was accepted. The settlement of this matter awaits a final conference with other interested organizations. Certain amendments to the overhead line material specification were approved and a collection of data on steel cross arms was referred to next year's committee with a request that the specification be broadened to include all metal arms. The collection of data on high-voltage catenary line construction was considered on the basis of a preliminary sub-committee report and it was decided to send out a data sheet this summer for the benefit of next year's committee.

An elaborate sub-committee report on tapered concrete poles was discussed and accepted subject to the addition of sample calculations and a description of steel forms for concrete pole construction.

The other conclusions of the power distribution committee related to details of wording, etc., designed to harmonize its findings with the standards of the American Association and of organizations in related fields.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

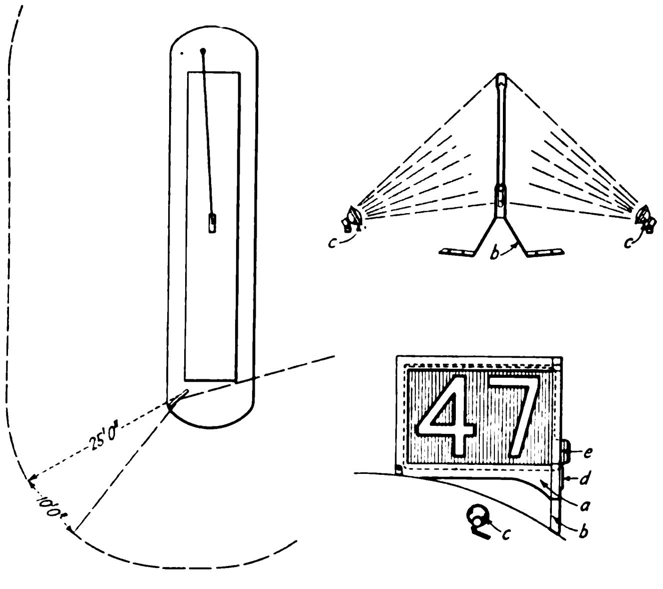
New Route Signs for Denver

The Denver Tramway recently equipped all of its motor passenger cars with route signs, as illustrated in the accompanying sketches and photographs, the type shown being developed in the shops of the company under the direction of W. H. McAloney, superintendent of rolling stock Denver Tramway. After considering the prevailing types of route signs, including transparencies both of glass and of cloth curtain, the opaque sign comprising a double-faced sheet-metal disk with a dark background was selected. Figures 12 in. high are used and the signs are illuminated by "flood lighting," using two parabolic reflectors. Back of the bull's-eye lenses are concentrated-filament, 14-volt to 16-volt lamps. These are connected in series with two series circuits of 23-watt lamps connected in parallel and they receive, therefore, about 0.44 amp.

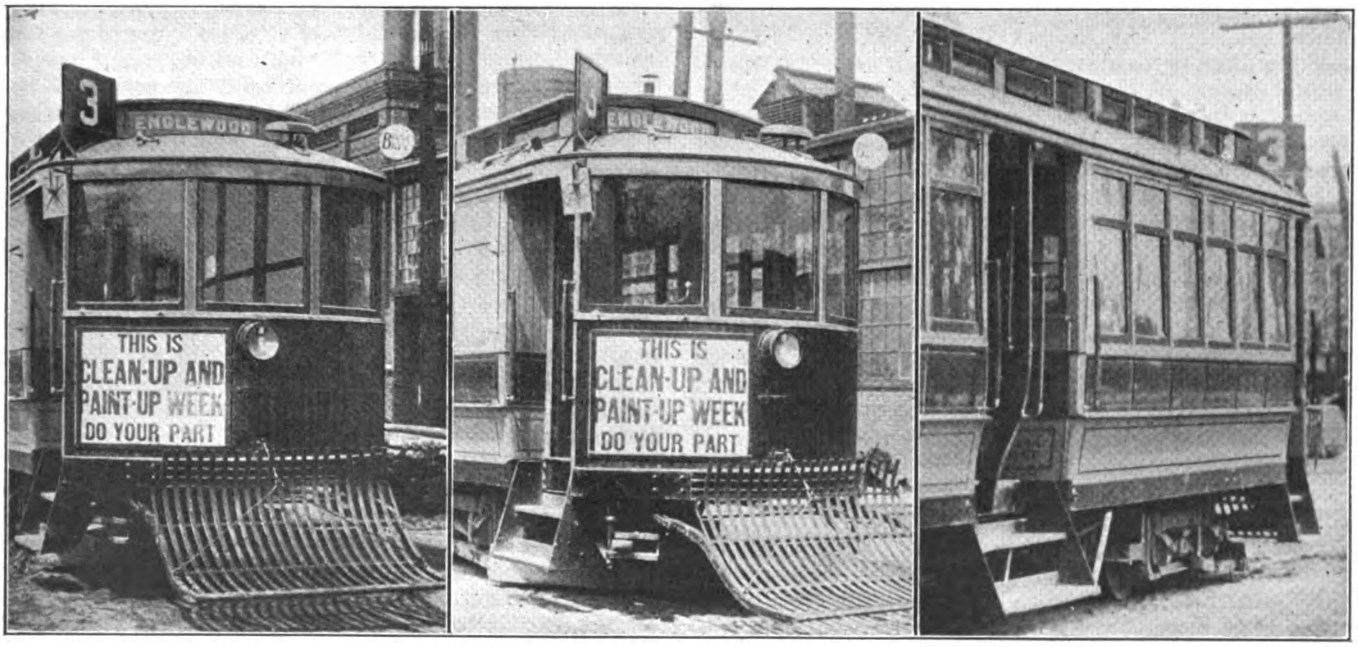
A wooden frame (*a* in an accompanying diagram) with a strap iron end, *b*, forming both supporting legs and a slot for inserting the sign, is mounted at an angle of 48 deg. with the axis of the car on the front right-hand corner of the roof, with a lamp, *c*, mounted on each side. The legs are shaped to fit the average roof contour and are bent cold to fit the specific roof. The sign slides in grooves in the top member and in strap iron inserts in the bottom member, finally dropping back of a catch, *d*, each sign being shaped with a projecting handle *e*.

The sign is visible through two arcs totaling 260 deg., being very plain as the car approaches until nearly opposite a person standing on the curb. It is then hidden through the small angle projected by the frame end, and the side and back are clearly visible to any one approaching the car from the right-hand side or rear. Extra signs are stored in sectional cabinets at the carhouses.

A list of the route number groupings and background color combinations is printed on a card of convenient size for distribution to the public. Its dimensions ar 2⅜ in. x 5¼ in. This explains in detail the routes to the baseball park, the city park, the Union Station, etc. On one side of the card there is a list containing the route numbers corresponding to the street names of the routes. The other side gives the numbers that correspond to certain lines or localities as follows: Routes 1 to 9 all serve the baseball park. Routes ending in 0 serve the city park. Red route signs signify cars which serve Union Station. All Fifteenth Street lines are numbered 1 to 19. Sixteenth Street lines have the 20 to 39 numbers. Seventeenth Street lines have



DIAGRAMS SHOWING VISIBILITY ANGLES AND STRUCTURAL DETAILS OF NEW DENVER TRAMWAY ROUTE SIGN



VIEWS OF NEW DENVER TRAMWAY ROUTE SIGNS FROM THREE ANGLES the 40 numbers. Eighteenth Street lines have the 50 numbers. East and west lines have the 60 numbers. Barnum, Cherokee and Globeville lines have the 70 numbers. Interurban lines have the 80 numbers. Wherever possible the route numbers of such lines as Fourth and Eleventh Avenues have been made the same as at present. Fourth Avenue cars are designated as Route 4; Sixth Avenue cars, Route 6; Eleventh Avenue cars, Route 11; Twenty-eighth Avenue cars, Route 28; West Thirty-eighth Avenue cars, Route 38, etc. Routes Nos. 2 to 15, 29, 37, 38, 62 and 66 go to central loop. Routes Nos. 10, 63, 64, 71, 72, 73, 81, 82, 83 and 84 go past the loop or within one-half block of it.

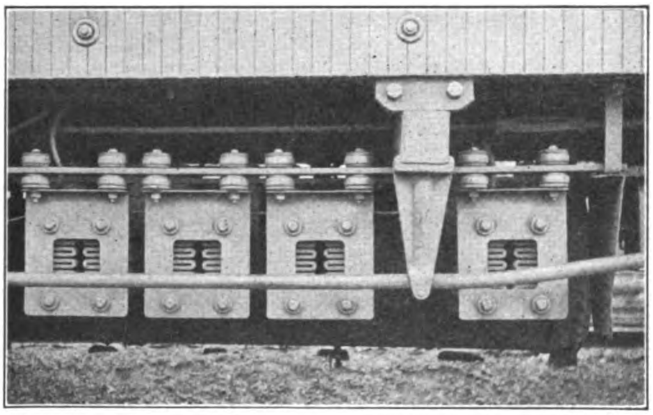
Porcelain Insulators for Grid Suspension

BY JAMES W. BROWN,

Superintendent of Shops Wilkes-Barre & Hazleton Railway and Lehigh Traction Company

In view of the difference of opinion among master mechanics as to the desirability of using porcelain insulators for grid suspension, the practice of the Wilkes-Barre & Hazleton Railway, Hazleton, Pa., may be of interest. This is a typical third-rail, high-speed, interurban road, and was one of the first in this country.

The illustration reproduced herewith shows the mounting of the grids used by this company. The grids are suspended from a frame of rectangular form about 1½ ft. in width and 10 ft. long, made of ¾ in. x 3 in flat iron, and suspended from the car floor by wrought-iron hangers. The holes for the bolts and projections for the steel washers with which the grids are attached are laid out and drilled by use of a master jig. The frames, therefore, are interchangeable.



ARRANGEMENT OF INSULATORS, FRAME AND GRIDS ON W.-B. & H. RAILWAY

Porcelain insulators of the flat, round type are placed above and below the iron frame. The grids are attached to the frame with ½-in. x 9½-in. bolts with standard nuts and lock washers. Each bolt is insulated from the frame by two round porcelain insulators, one above and one below. On both sides of the insulator are thin fiber washers for protection of the porcelain against mechanical injury. Outside of each fiber washer is a protecting washer made of galvanized pressed steel. Of these pressed steel washers, the ones on either side of the steel frame have a projecting collar which is 1¼ in. in diameter and ⅛ in. deep. This collar fits down into a hole in the rectangular frame. As the holes in the insulators are 1 in. in diameter, and there is only 1/32-in. play between the washers and the ½-in. bolt which extends through the insulators, there is no possible chance for the bolt to come in contact with the frame.

These insulators have been in continuous service on six cars of this company for more than five years without a single failure. None of the insulators have been broken, and no parts have been renewed. During this period each car has averaged 61,000 miles per year. No indication of leakage has ever been found and the grid suspension requires very little or no attention, being inspected only at shopping periods, which occur about every 80,000 car-miles. During the above period only three grids have been renewed and these were broken by pieces of flying brakeshoes. This condition was remedied by placing a steel shield in front of the first grid as shown.

Manganese Steel Welding

BY P. A. E. ARMSTRONG

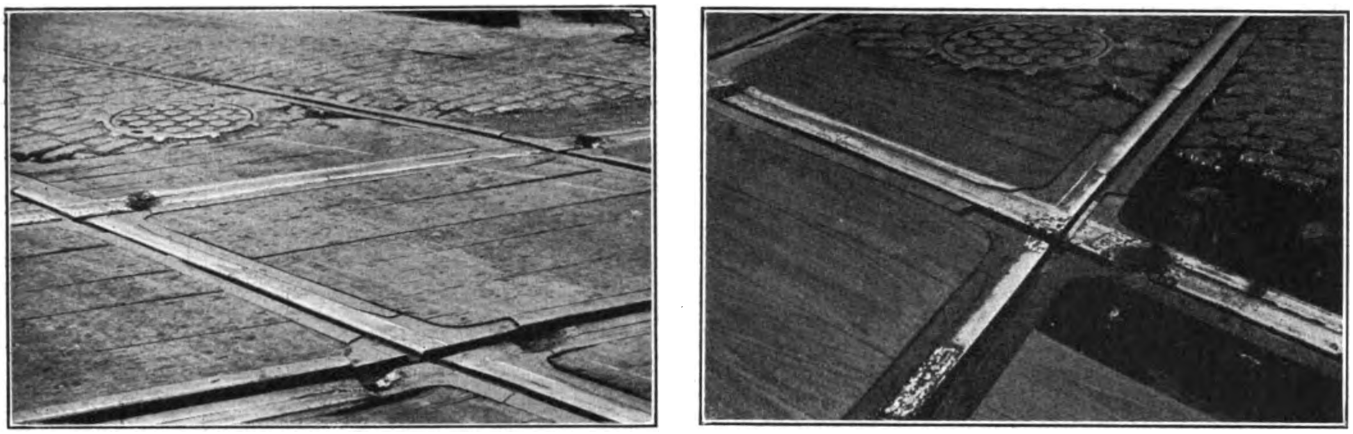
Quasi-Arc Weldtrode Company, New York, N. Y.

The art of welding and reinforcing manganese special work and manganese rails is not in a very satisfactory state, but this is due to the processes employed and not in any way to the possibilities. The general system employed is the electric-arc, bare-wire process, in which high or low-carbon steel is deposited upon the manganese steel. The result is that within a short time the deposit separates from the original manganese steel. The results with oxy-acetylene welding are still more unsatisfactory and need not be considered.

When depositing metal by the means of the bare-wire electrode and using high-carbon steel, a deposit is made with a metal that is totally unlike the surface to which it is to be fused, therefore there is a diffusion of the original metal and the deposit, and both lose their original characteristics. Manganese steel is very readily oxidized, and for that reason it is impossible to maintain the original manganese content when the metal is molten and in contact with the atmosphere. Further, the electric arc is one of the strongest reducing agents known, and has the effect of lowering the percentage of all alloying metals. Any percentage of manganese in steel carries with it the characteristics of that percentage. For example, a manganese content of greater than 2 per cent and less than 5 per cent produces a metal which is extremely brittle and has no strength, either to withstand crushing or tensile loads. The correct percentage to yield these characteristics lies between 8 and 14 per cent.

When an electric arc is produced, with a high-carbon steel wire used as an electrode, the surface of the manganese steel on which this electrode is being deposited is immediately brought to fusion and begins to lose its manganese content. The great reducing action of the arc lowers the carbon content of the electrode and, when the deposit is thus made, there is a partial diffusion of the remaining manganese in the molten bath and the steel deposited thereon. There is formed an interposing layer of a material which is approximately 3 per cent manganese. This is quite useless, as it is hard and brittle, and entirely unable to withstand any form of load without crumbling and fracturing.

The molten manganese steel is extremely fluid, resulting in the fusion penetrating to a depth of at least ⅛ in. The carbon which is present in the steel of the electrode has little effect in reducing the fluidity, even perhaps augmenting it slightly. There is, therefore, a tendency, due to this fluidity, for the edges of the deposit not to be fused, there being a layer of oxide at the edges between the deposit and the work. This is particularly noticeable when the work is not level, and when the angle is very steep it is practically impossible to get the deposit to stay at all. Between successive deposits of this kind there are areas of oxidized and, therefore unwelded, metal. The deposit, if fairly



FIGS. 1 AND 2—TWO VIEWS OF A MANGANESE STEEL CROSSING SHOWING EXCESSIVE CRUMBLING EFFECT

thin, begins immediately to pound out in service. The surface crumbles or, if the deposit is thick enough, its top surface is of low medium carbon having a very small manganese content and this, of course, is subjected to the great rolling action of the trolley car wheels. As indicated in Fig. 5, the deposit is of two classes of metal, a soft layer on top and underneath the portion which is fused to the manganese steel. The latter is hard and brittle, and of approximately 3 per cent manganese content. The soft material, under the action of the wheels, begins to cold-roll over the hard portion of the deposit, crumbling and fracturing the hard material, and producing the well-known peeling action.

Figs. 1 and 2 of the accompanying illustration very clearly show this action fully started, the crossing shown having been repaired in many places with the bare-wire electrodes.

In the event of a low-carbon steel electrode being used there is a greater tendency to produce the soft layer of material on the top, but the 3 per cent manganese area is still present, as previously explained. The results are identical with those produced with the carbon electrode. If a 13 per cent manganese electrode is employed it is found that the same difficulties are present in depositing, and the deposit is then a more uniformly distributed 3 per cent manganese content which, as explained, will stand no form of load.

The application of the above types of electrode to a damaged portion of a manganese rail makes such damage increasingly larger as the welded surface breaks away, carrying with it the area of the reduced manganese content. In depositing the bare wire, as described above, the heat disturbance in the rail is a very serious matter, and where a very large deposit has to be made, such as the photographic illustrations depict, the heat will be sufficient to remove locally the effect of the previous heat treatment and will quickly cause cracks to form in the rails adjacent to the weld. These cracks will begin to open up in direct relation to the expansion of the metal due to the dissipation of such heat.

As manganese steel is cast in the desired shapes, it is obvious that it could be reinforced and repaired if the conditions under which the castings were originally made could be duplicated. The bare-wire method of fusion does not in any way duplicate steel-bath conditions as no steel manufacturer in his sane senses would make his melts when their surfaces were continually exposed to the harmful action of the atmosphere. In fact, the progress of modern metallurgy relative to the manufacture of steel may be summarized as comprising: "The greater knowledge of the art in its application to slags protecting the surface of the metal while molten, and the ability to depend upon the content of the steel containing the alloys desired, the slags being so constituted that these alloys will remain." Most of the so-called modern alloying elements have been known for many years, but the ability to keep them in the melt when once they were placed there has been the result of the improvement in the art.

The electric steel furnace is one of the best methods of manufacturing alloyed steels. In furnaces of the arc-resistance type, *i.e.*, those in which the electrode is immersed in slag and adjacent to the molten metal, the arc is formed between the end of the electrode and the slag, which is thus heated to a very high temperature. The molten metal offers resistance to the current, and thereby adds to the heat generation. If an electrode could be made of the metal to be deposited and a slag covering the metal at all times could be provided, an ideal condition would result. This condition in miniature would be the solution of all welding troubles.

After much research Mr. Strohmenger, a well-known metallurgist of England, has been able to incorporate the ideal steel-bath condition in an electrode suitable for welding. This consists of a steel core containing the alloys desired in the deposit, and the exterior of the core is wrapped with braided acid slag, such slag being an insulator when solid. This new electrode can be kept in actual and physical contact with the work during the entire period of fusion. In welding an inverted crucible-like crater is formed at the end of the fusion electrode, known as a "weldtrode." The weldtrode can be used in either a.c. or d.c. circuits, preferably of 100 volts.

The slag exterior of this weldtrode is brought to a fusing point by the agency of the electric arc, and the slag immediately forms a secondary conductor taking the place of the usual vapor. The arc is maintained by means of the vaporized and highly incandescent slag, and it is quite submerged under the deposited molten

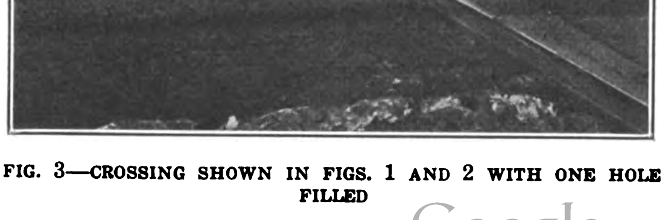
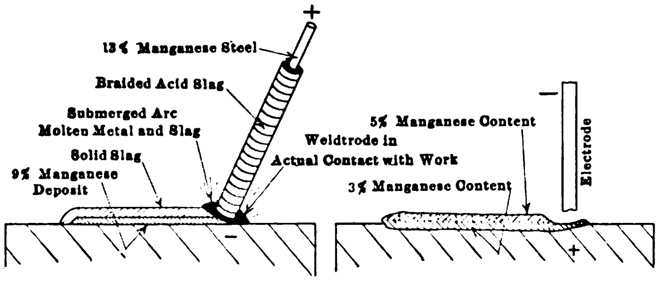


FIG. 3—CROSSING SHOWN IN FIGS. 1 AND 2 WITH ONE HOLE FILLED

slag. As the molten metal core is heavier than the slag, it runs underneath and intimately mixes with the metal on which it is deposited, causing a complete and absolute fusion. The metal thus deposited and the fused original metal are at all times protected from atmospheric influences, and oxidization is to a very large degree prevented.



FIGS. 4 AND 5—DIAGRAMS SHOWING EFFECTS OF USE OF SLAG-COVERED AND BARE-WIRE ELECTRODES

Fig. 4 shows the condition described. As indicated in the illustration, the weldtrode is held in contact with the work and is forced down upon it during the entire period of fusion. The braided acid slag now molten flows from the end of the weldtrode upon the deposit, covering the latter with a thick layer. As this slag melts at a higher temperature than the deposit it must obviously cool earlier and thus effectually prevents any flowing away of the deposit or the original fused metal.

It is possible also to make a deposit upon manganese steel held at any angle, and the manganese steel deposited is of at least 9 per cent content. There is some loss which is due to the reducing effect of the electric arc and to the passing off of the manganese into the slag in form of gas. On cooling the slag readily falls off.

As the fusing core of this weldtrode is kept very close to the work, the slag being in actual contact with the work, an arc voltage of approximately 30 is consistently maintained. This process can, therefore, be used in conjunction with any electric arc system of welding. The crucible-like effect at the fusing end of the weldtrode directs and controls the heating effect of the electric arc localizing it much more than is possible with the bare wire, even if this electrode could be maintained at a distance of, say, 1/16 in.

In practice the heat driven into the work by this weldtrode is so small that the surface of the metal adjacent to the weld is not colored in any way, and when the operation is concluded a deposit one layer thick laid down on the running face of a rail is cool enough for the hand to be placed upon it without fear of unpleasant results. For example, the hole shown in Figs. 1 and 2 was filled up by this process and on completion the temperature in the weld or the surrounding metal was not high enough to cause the ignition of an ordinary match.

There is produced by the fusion of the original manganese steel and the deposited manganese steel a grading effect of, say, 12 to 9 per cent in the manganese content, but this decreasing content does not in any way reach the danger zone, hence the manganese steel deposited is not subjected to disintegration by pounding and the surface does not crumble. In fact, under running conditions a deposit thus made will stand a considerable amount of cold working and will flow slightly, allowing the surface to become very flat and highly burnished, due to the rolling action of the car wheels.

The illustrations depict a triple-T, 90-lb. rail steam and electric crossing. This crossing is in an extremely bad condition, great holes being present in the steam track. This track has been repaired many times by the bare-wire process. The deposits are peeling off or crumbling away. The angle braces have also been welded by the bare-wire process and cracks are present between the under side of the rail head and these braces, showing that the welds have absolutely no strength. The reason is that the manganese content of these deposits, owing to the weld being on manganese steel, is roughly of the order of 3 per cent.

Fig. 2 depicts one of the holes prior to being welded by the new type of weldtrode. To bridge the holes and stop the waste of metal the gap was filled with sand to the bottom of the hole and manganese metal was deposited over this. In this work much difficulty was experienced, due to the freight train and trolley car traffic, which shook down the sand and spoiled the bottom.

Fig. 3 shows the weld complete ready for grinding. The crossing, with the remainder of holes filled, has been in use for some time and is still in good condition, although the deposits by the usual bare-wire welds would sometimes last but a few hours, failure being augmented by the extremely flexible state of the crossing. This job, of course, calls for a new crossing, and is only referred to here as showing what can be done with electric welding.

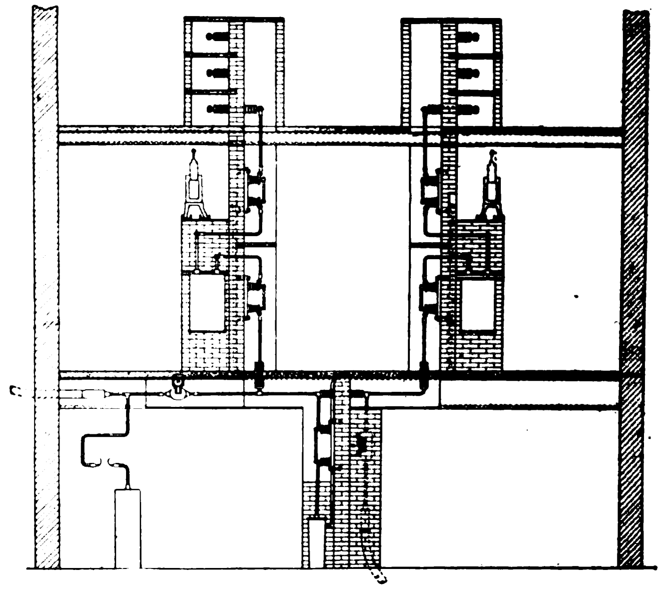
In regard to the repair of carbon rails, it may be stated that this new form of miniature steel-bath welding is entirely adaptable to the reinforcing of carbon rail heads. For that purpose a carbon-steel core is employed in the weldtrode, thus depositing a metal of the same composition as the original carbon rail.

A Recent Railway Substation—II—Switchboard and Distribution Feature

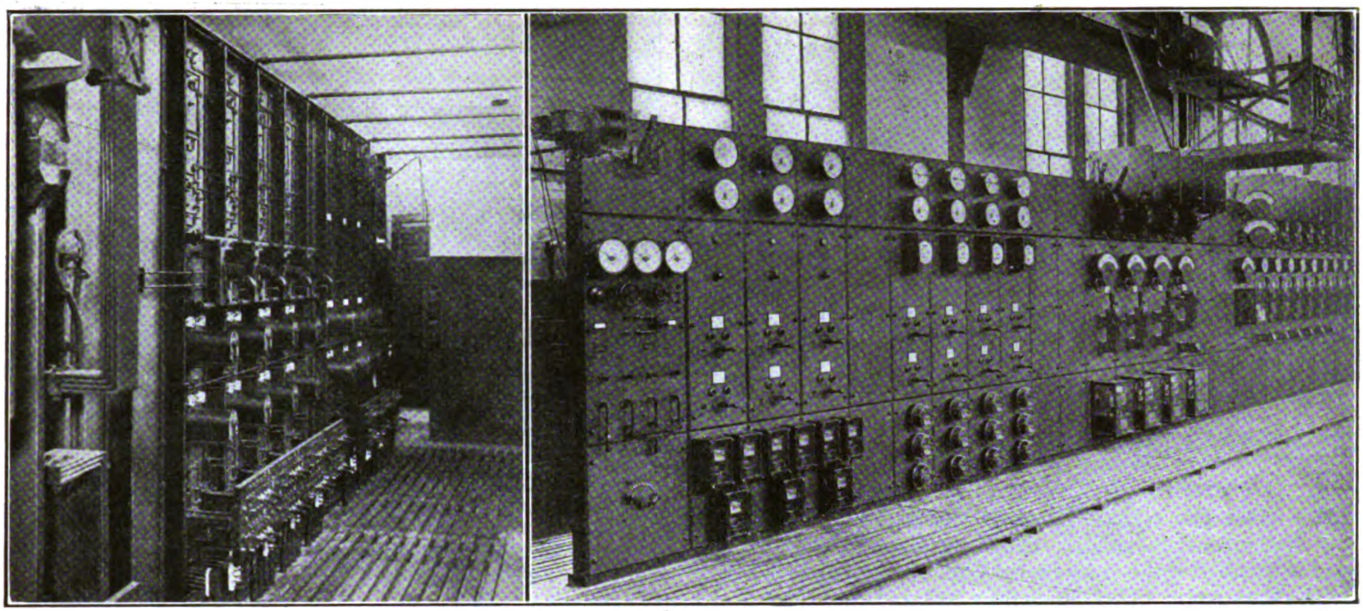
BY C. A. HECKER
Chief Electrician Pittsburgh Railways

In last week's issue of the ELECTRIC RAILWAY JOURNAL the writer described the general layout of the new Taggart Street substation of the Pittsburgh Railways, which is now serving the northeast district, formerly the city of Allegheny. Of particular interest in this as in other substations were the problems connected with switching and protection of apparatus, of which some detail is given in this article and the accompanying illustrations.

The main switchboard consists of thirty-four Monson slate panels with angle-iron frames and a channel-iron base, supported on a treated hardwood baseboard. The switchboard braces are secured to a similar piece



CROSS-SECTION OF HIGH-TENSION STRUCTURE SHOWING SERIES TRANSFORMERS AND ELECTROLYTIC LIGHTNING ARRESTERS



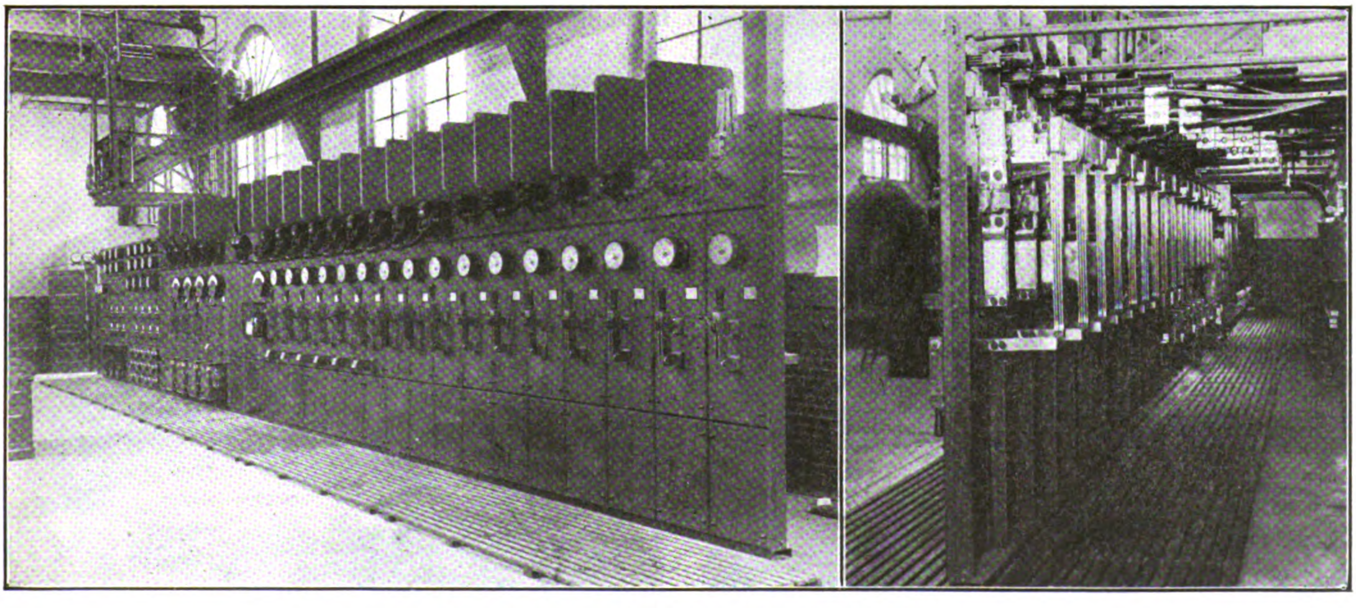
REAR AND FRONT OF A. C. SWITCHBOARD PANELS

of hardwood, mounted on the wall and extending the length of the switchboard, thus entirely insulating the framework from ground. The panels are arranged in the following sequence, from left to right: one battery control panel, four high-tension cable panels, six transformer panels, six converter panels, one station totalizing panel, and sixteen feeder panels. One converter panel and six feeder panels are equipped with an auxiliary bus and double-throw switches, to permit supplying certain feeders at increased voltage, in case of trouble at other stations. All series and potential transformer leads are brought to terminal boards at the rear of the a.c. panels, where switches and testing terminals permit short-circuiting and opening instrument transformer leads and attaching calibrating leads to the instruments. The switchboards as well as the other equipment in the substation were furnished by the Westinghouse Electric & Manufacturing Company.

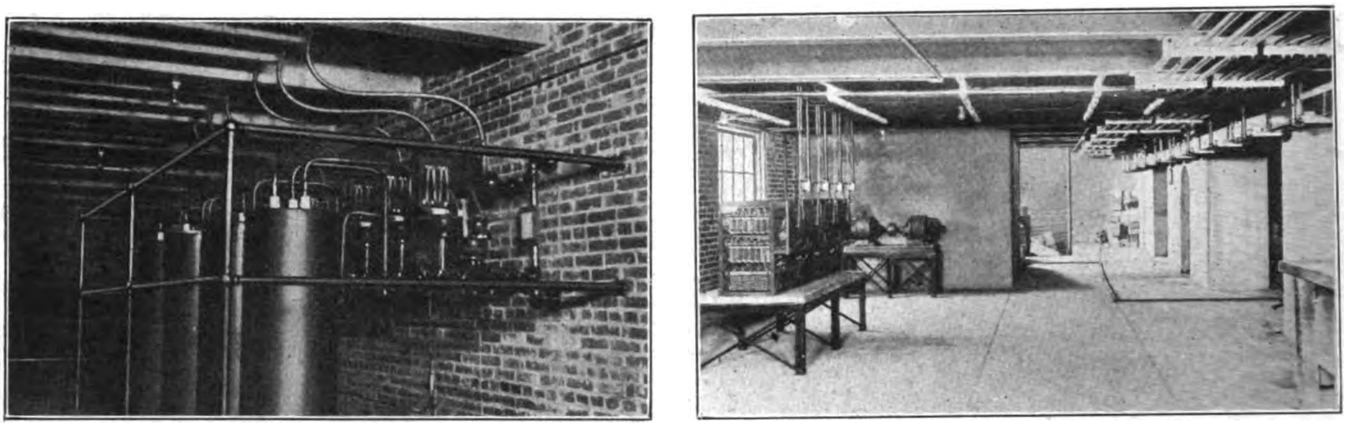
Relays of the reverse-power type only are provided on the incoming cables, as these circuits are equipped with definite time-element overload relays at the generating stations. The control wiring of the circuit breakers on the cables is arranged so that it is necessary to insert a synchronizing plug in a receptacle before the circuit breaker on the panel can be closed. This is done as a reminder to an operator that cables should not be paralleled without synchronizing. Should the synchroscope indicate lack of synchronism in an incoming circuit with reference to a cable already in service, the incoming cable can be operated on a separate bus.

Definite time-element, overload relays and low-voltage relays are installed for the protection of the transformers and to disconnect the converters from the source of supply of alternating current in case of trouble. The tripping circuits of the two circuit breakers on each transformer bank are interlocked, so that the circuit will be opened should a relay operate while load is being transferred from one bus to another, as is often the case.

The d.c. circuit breakers are equipped with shunt tripping coils, which are used in connection with reverse-current relays in the d.c. converter leads, to trip the circuit breakers in case of a reversal of power through the converter. The d.c. circuit breakers and the transformer circuit breakers of each unit are electrically interlocked so that a d.c. breaker will open instantly should a corresponding oil circuit breaker open. The converters are equipped with overspeed devices



FRONT AND REAR OF D. C. SWITCHBOARD PANELS



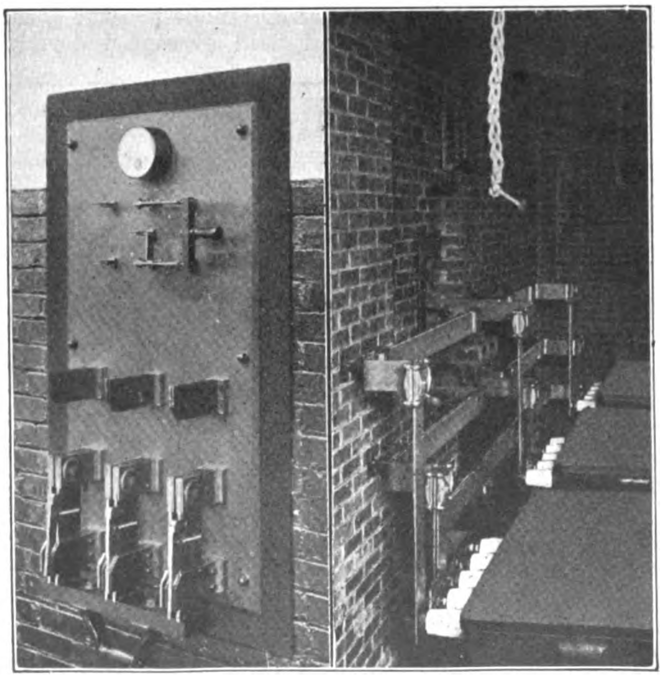
ELECTROLYTIC LIGHTNING ARRESTERS IN OUTGOING D. C. FEEDERS; INCOMING FEEDERS, NEGATIVE BUS, BATTERY ROOM, M.-G. SET AND RHEOSTATS

which close the circuit through the shunt trip coils on the d.c. circuit breakers, thus disconnecting any converter from the d.c. bus in case of overspeed.

The converter field rheostats are mounted on slate panels on the first floor directly under the converter panels. The operating mechanism is thoroughly guarded to prevent accidental contact between the chains and any live parts on the switchboard. Insulating mats of hardwood are placed on the floor in front and rear of the main switchboard and in front of the converter starting panels.

Each outgoing d.c. feeder is equipped with an aluminum cell lightning arrester, and six similar arresters are connected across the d.c. buses. The lightning arrester ground consists of four copper plates, each 4 ft. square, buried in rich, moist earth, and a number of ¾-in. galvanized-iron pipes 8 ft. long, all connected together with No. 0000 copper wire. The steel structure of the building and all piping is connected to the lightning arrester grounds.

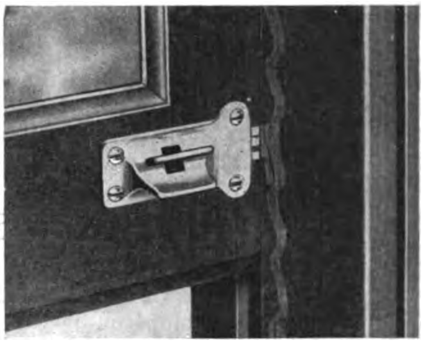
An interesting feature of the distribution system is the use of insulated negative cables, which are distributed over the district in the same manner as the positive feeders. One-half of the negative cables enter the building from Taggart Street and the other half from Brighton Road, each cable connecting to the negative bus through a switchboard-type ammeter shunt. When the distribution system is completed and the entire load transferred to this substation, the resistance of the negative feeders will be adjusted so as to equalize their loads as nearly as possible.



FRONT AND REAR OF ROTARY STARTING PANEL

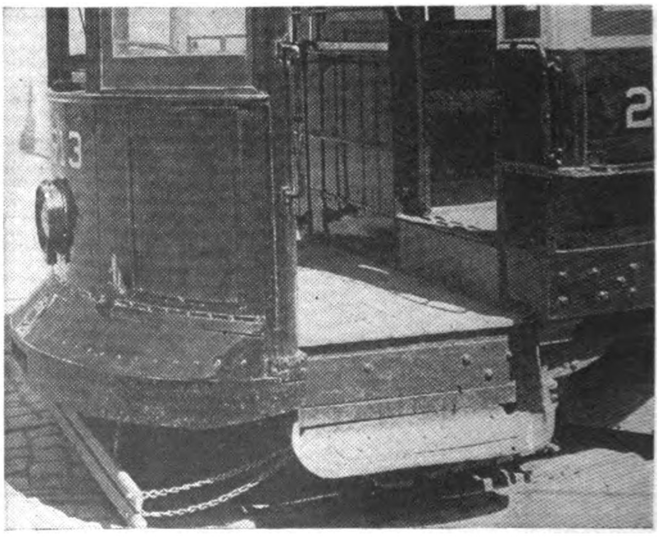
Safety in Brooklyn Rolling Stock

A striking feature of the seventh quarterly report of the safety committee, mechanical department, Brooklyn Rapid Transit System, covering the quarter ended April 1, 1916, is the presentation of a number of pictures showing what accident-making features of car equipment have been removed and what improvements have been installed in their places. A number of illustrations showing some of the safe apparatus adopted are reproduced.

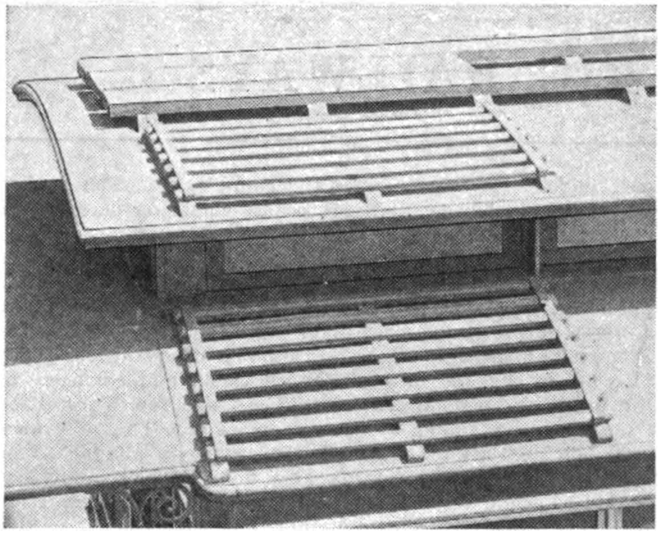


SASH LOCK ALWAYS LATCHED, REGARDLESS OF POSITION

As an example the combination of flat bumper and projecting fender has been replaced by bumpers fitted with oblique shields on which standing is impossible. Again, the dangerous practice of riding on projecting fenders, when folded at the rear, is eliminated by the use of H-B automatic life guards with safety chains.



BUMPER SHIELD, AUTOMATIC WHEEL GUARD AND SAFETY CHAINS



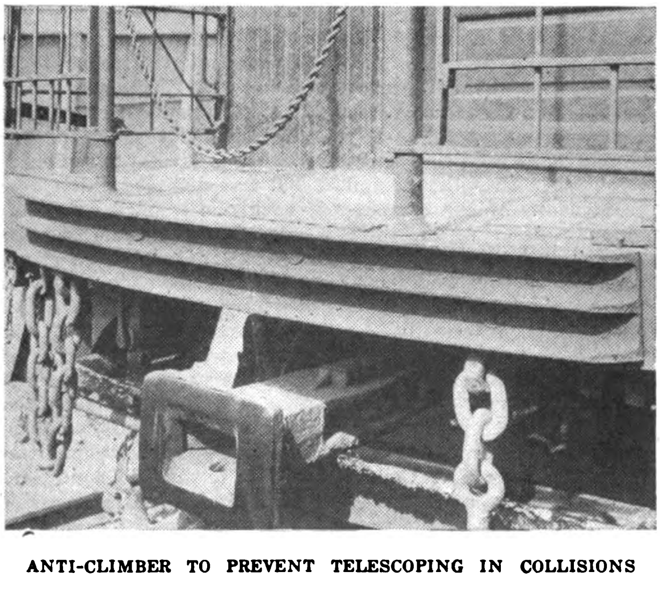
SAFETY STRAPS ON ROOF RACK

A third safety feature is the provision of Rico anti-climbers on all rapid-transit equipment, to prevent the over-riding of platforms in collisions and to assist in distributing any shocks due to impact.

A fourth improvement is in the car roof-rack. Formerly a carman in climbing the roof was liable to injury because each rack had to bear his entire weight in turn. Now these racks are tied together with a metal safety strap so that no one rack takes all of a man's weight.

A fifth safety feature illustrated is the use of O. M. Edwards No. 13 type of sash locks. Unless the sash equipped with the old-style locks was opened fully and the locks properly latched, the sash would jar loose and cause the bruising of arms and fingers and even more serious injuries. The Edwards lock prevents the sash from dropping, regardless of the height to which it may have been raised. This lock is in use on 300 New York Municipal Subway cars in operation, on 200 additional New York Municipal cars on order, and on 324 elevated cars. The report also quotes many other equipment improvements, particularly on the latest center-entrance and subway cars.

Among the data presented on shop safety are such pertinent items as the purchase in April, 1915, of 574 pairs of safety goggles for shop men, followed by 177 more in the first quarter of 1916. It is also stated that a total of $14,179.81 was spent up to April 1, 1916, for various safety measures, many of them suggested by the employees themselves. Each safety measure and its cost is fully described in each issue of these quarterlies, as distributed among the men of the department.



ANTI-CLIMBER TO PREVENT TELESCOPING IN COLLISIONS

The conclusion of this report states that during the last three years the Brooklyn Rapid Transit System has expended about $50,000 for approximately 100,000 special General Electric locking lamp-socket receptacles, not only to avoid fires where improper contact is made by the lamp base but also to prevent the lamp from jarring loose.

Decision of Commission on Dead Man's Button

The Public Service Commission for the Second District of New York has settled the controversy raised by the Brotherhood of Locomotive Firemen and Enginemen over the "dead man's button" on the Erie Railroad's electric trains between Rochester and Avon by ordering the Erie to make changes in operation in the interest of public safety. The order of the commission requires that when electric cars are operated as the motive power for equipment designed for steam passenger use the dead man's button be so arranged by locks, seals, etc., that it cannot be readily put out of use and that when trains are thus operated they must be so made up as to enable the train crew to get from the coaches into the motor cars while the train is in motion. If it is not possible to make up trains in this manner, the commission orders that a spare trainman ride in the motor cars for the sole purpose of assisting the motorman in emergency.

The Brotherhood of Locomotive Firemen and Enginemen, through Thomas E. Ryan, chairman of its legislative board, complained to the commission that the dead man's button was so arranged that the air valve could be removed, thus permitting the motorman to ride without holding the controller, and making the automatic stopping of the train impossible in case anything should happen to the motorman. Mr. Ryan alleged this condition was particularly dangerous when electric cars were coupled onto steam trains, for baggage cars without end doors, or baggage cars so piled with goods that the doors could not be used, were frequently placed between the motor cars and the rest of the train, so that the motorman was all alone in his cab and beyond reach of aid in case anything should happen to him. The order of the commission is designed to meet this condition. It states that the only motorman examined testified that the presence of an extra motorman in the cab with him would be more a source of danger than an aid to safety.

New Electric Railways Proposed for Holland

An electric railway is proposed from Amsterdam to and through the "Zaanstreek," a district traversed by the River Zaan, which flows into the North Sea Canal a few miles northwest of Amsterdam. The Zaan is lined by villages and sawmills, and passes through rich polders (low farm lands drained of water). Fourteen towns will be joined by this new electric road. Its length and other particulars are not yet definitely settled. Another new electric railway is projected in the Provinces of Groningen and Drenthe, extending from the city of Groningen some 20 miles southward and touching several prosperous towns. As at present planned, the project will cost about $500,000. Both freight and passenger cars will be operated.

NEWS OF ELECTRIC RAILWAYS

CITY'S EXPERT REPORTS VALUATION FIGURES

Comparison of Cincinnati Traction Company Valuation Figures as Reported by the Company and Commission and the City's Expert

The value of the property of the Cincinnati (Ohio) Traction Company, according to the report recently filed by Ward Baldwin, employed by the city of Cincinnati, is $11,969,284, as of April 1, 1914. The valuation made by the company's engineers is $35,837,044 and that made by the Public Utilities Commission is $24,333,947. Mr. Baldwin's figures will be used as the basis of the city's objections to the valuation made by the commission at the hearing which will take place on July 20.

In making his valuation Mr. Baldwin omitted the following items entirely: frontage consents, contributions imposed by ordinance, fire insurance, property damage, expense on account of incorrect plans, taxes during construction, interest, discount and hidden costs, horse cars, dummy lines, incline planes, cable lines, track destroyed, paving destroyed, rerouting cars, cost of paving laid by the city and company together. City Solicitor Groom will argue that these are not items to be taken into consideration for rate-making purposes. If the commission holds against him, then he will insist that the allowances are excessive.

The difference in the value of real estate is due to the fact that Mr. Baldwin has not included land owned but not used for transportation purposes and land under lease with or without the privilege of purchase. For rate-making valuations he thought that the latter's annual cost should be included in the operating cost. Mr. Baldwin added that he had included tracks, buildings and equipment not in use in the operation of cars, because of their potential value in case of floods, storms or accidents. In the item on buildings he excluded the building occupied exclusively by the Cincinnati Car Company, while the buildings occupied in common by the car company and the railway were apportioned between them. The report comprises 4039 typewritten pages, exclusive of the index pages, and the work cost the city approximately $23,000.

Below are given the itemized valuations made by the company, the commission and the city's engineer, with the cents eliminated, so arranged that the various items may be compared:

	Company	Commission	City's Expert
Grading	$84,395	$95,991	$3,430,611
Track	5,286,046	5,374,194	
Bridges	53,342	49,242	36,507
Inclines	246,492	229,025	167,791
Paving	595,554	605,311	9,941
Electrical distribution	1,575,984	1,476,643	1,301,075
Rolling stock	3,886,117	3,615,175	3,081,866
Power plant equipment	1,668,372	1,718,622	1,291,974
Substation equipment	243,944	265,758	219,863
Shop equipment	172,859	166,093	109,759
Buildings	1,744,245	1,611,018	1,310,486
Furniture	49,263	44,940	39,410
Stores and tools	628,503	613,924	380,103
Frontage consents	609,609	117,486	......
Real estate	783,179	630,698	313,226
Profits of general contractor	......	989,528	......
Contributions imposed by ordinances	192,876	85,236	......
Administration	533,550	452,050	235,000
Fire insurance, property damage, expense incorrect plans	......	649,569	......
Taxes during construction	288,000	534,224	......
Interest, discount and hidden costs	3,812,481	2,252,775	......
Horse cars, dummy line, incline plane and cable lines	4,781,046	2,000,000	......
Track destroyed, 1901-13	615,365	576,138	......
Paving destroyed, 1901-13	142,404	136,740	......
Rerouting cars	19,262	19,262	......
Cost paving laid in city	1,488,493	......	......
Cost paving laid by city and company	660,421	......	......
Franchise value	5,675,236	......	31,824
Incorporation fees	......	24,309	9,841
Totals	$35,837,044	$24,333,947	$11,969,284

The Cincinnati Traction Company and the Cincinnati Street Railway on June 9 protested to the Ohio Public Utilities Commission against the valuation of their properties as found by the engineers of the commission. The protest of the city had been filed before and a hearing on all three protests will be held on July 20.

The companies, in their protest, give seven reasons for the unjustness of the commission's valuation, which was made public on May 15 and published in the ELECTRIC RAILWAY JOURNAL of May 20, page 470. Chief of these is the inadequacy of the allowances in a number of instances. They also argue that in view of the condition and efficiency of the property no deduction should be made for depreciation from the cost found by the commission. The allowance made on account of superseded property is alleged to be inadequate. The protestants also hold that an allowance should be made for the reproduction of paving construction furnished jointly by the companies and the city. It is also contended that an allowance should have been made for franchises.

RHODE ISLAND TRUSTEES APPEAL TO COUNCIL

Federal Trustees of the Rhode Island Company Reiterate Their Plea for Relief from Franchise Conditions Considered to Be Unduly Burdensome

More than a year ago the trustees who are in charge of the property of the Rhode Island Company, Providence, under the federal decree providing for the disposition of the outside properties of the New York, New Haven & Hartford Railroad presented a plea to the Common Council of Providence for the modification of the franchise agreement under which the Rhode Island Company operates. The company asked relief from the provision of its franchise taxing its gross receipts, for abrogation of the clause covering payment by the company toward the cost of street repairs, for authority to charge a 6-cent fare or install a zone system and for other changes.

The petition came before the committee on railroads of the City Council for action on June 8. The company was represented by Rathbone Gardner, Theodore Francis Green and John P. Farnsworth, three of the five federal trustees. The hearing was designed originally to be a private conference between the railroad committee and the trustees, but the trustees understood that it was to be public and the members of the committee finally acquiesced in this view.

The trustees reiterated the request for relief filed previously with the Council. The principal plea for the company was made by Mr. Gardner. He quoted freely F. W. Doolittle, formerly director of the bureau of fare research of the American Electric Railway Association, in regard to the value of electric railway service and to the part played by the electric railways in the growth and prosperity of a community. The jitney situation was not now so acute in Providence as it had been. There were 149 jitneys in Providence, Pawtucket and Woonsocket and it was estimated that they diverted $435,000 a year from the treasury of the company. In addition there were about 10,000 private automobiles in Providence, and $2,000 was diverted daily from the treasury of the company if each one carried only four persons a day. At the time the contract was made between the city and the company nobody anticipated that a situation such as this would ever exist. Mr. Gardner said that it was unjust to call upon the company to pay 4½ per cent each year on practically $1,000,000 of new street work. The 5 per cent tax on the gross receipts was also a manifest injustice. If the city needed this money then the proper alternative was a 6-cent fare. The cost of other necessities had increased 20 per cent to the consumer, but railway fares remained the same. The trustees requested the committee to report to the City Council that the terms and conditions of the franchise agreement were inequitable and recommend the appointment of the present railroad committee or some other to confer with the trustees to whom the property has been conveyed.

Mr. Farnsworth said that the company had lost about $200,000 a year through giving transfers and allowing illegal rides. He said that the agreement of the company with its employees did not work well. The Public Utilities Commission controlled other activities of the company and he asked why it should not also control the wages of the employees.

Mr. Green said that the real questions were: What was the plant worth? What were the owners entitled to? The present owners, it seemed to him, were not getting more than a fair return on the actual present value of the property.

DECISION IN PORTLAND, ORE., VALUATION CASE

The Railroad Commission of Oregon has set the reproduction cost new of the property of the Portland Railway, Light & Power Company at a total of $45,337,000. Deducting depreciation, the value on the property was placed at slightly less than $41,000,000. Formal hearings on the valuation began on Jan. 25, 1915. Last October the company filed its final brief in the case. In that document the company contended that a just and fair valuation lay somewhere between $61,795,629 and $62,134,542. The former figure was given as the value of the property as determined by its original cost plus subsequent increments. The latter figure was given as the value of the property as determined by the reproduction analysis, considering the going value of the concern.

From the company's original claim of $61,000,000 which included going value, water rights, etc., the commission eliminated about $6,250,000 of property, contending that it was non-operating. Also the commission eliminated the company's claim for going value on the contention that the company did not compute such value correctly. An opportunity, however, will be given to the company later to present additional testimony on going value. On other minor reductions, including the elimination of $700,000 working capital out of the claim for $1,850,000, the commission found the money actually invested by present owners to be more than $50,000,000.

Attention was called by the commission to the depleted earnings of the company caused by the competition offered by the Northwestern Electric Company and by the jitneys.

The brief of the company was referred to in the ELECTRIC RAILWAY JOURNAL of Oct. 30, 1915, page 922. It comprised 347 pages. The valuation of the company's properties involved a cost to the company of something like $100,000.

DALLAS NEGOTIATIONS FAIL

All efforts to reach a compromise in the controversy between the city of Dallas, Tex., and the electric railway and lighting companies, as to valuations, earnings and control of the city over such public utilities as regards rates and betterments, are deadlocked, according to a formal statement just issued from the office of Mayor Henry D. Lindsley. At the municipal election on April 4, the voters of Dallas decided to adopt the valuations for these properties fixed by Edward W. Bemis in his report—$3,600,000 on the light plant of the Dallas Electric Light & Power Company, and $3,500,000 on the various street railway systems—and indorsed model service-at-cost franchises to give the companies a net earning of 7 per cent on these valuations. Since then negotiations have been under way between city officials and the companies owning the properties with a view to reaching a compromise. The utility companies insisted that their valuation figures of $4,400,000 for the electric light plant and $4,100,000 for the street railway properties east of the Trinity River be taken as basis. The valuation figures proved to be the rock on which the negotiations broke.

Immediately following the election, O. D. Young, acting for the United Electric Securities Company of Boston, which owned certain securities of the various utility properties in Dallas, and which, it was announced, had secured an option on these properties from Stone & Webster, entered negotiations with the city of Dallas looking to a reorganization of the various companies so as to meet the requirements of the city. Subsequently J. F. Strickland and C. W. Hobson, Dallas, were brought into the negotiations. It was explained that Mr. Strickland would undertake the organization of an electric light company and Mr. Hobson would undertake to organize a street railway, provided a mutually satisfactory conclusion could be reached on the franchises themselves. The final conference was held on June 3.

In the course of the negotiations that followed the utility companies offered to yield on various points, but remaining steadfast in the announcement that no valuation figures would be accepted other than those fixed by the company, which are $1,400,000 in excess of those fixed by Mr. Bemis. Among the concessions offered by the utility companies were:

Expenditure of $5,000,000 on traction improvements in three years.

Building of two interurban lines in three years, each 30 miles long, to cost at least $2,500,000.

An 8-cent light rate immediately, and a 7-cent light rate one year from Nov. 1.

Promise that light rates would never go higher than at present, even under the service-at-cost system.

Installation of the "London Sliding Scale" of light rates by which the company would receive a percentage of whatever saving might be effected by the introduction of economies.

A 1-cent power rate for factories.

THOMPSON COMMITTEE INVESTIGATION CONTINUES

In an effort to trace the commitments and obligations contracted by the Interborough Rapid Transit Company, New York, and chargeable to the city, the Thompson legislative committee on June 2 called Cornelius Vanderbilt, director of the company, and questioned him regarding the contract for third tracking the elevated lines, which it was proposed originally to award to John F. Stevens and which finally was let to the T. A. Gillespie Company. T. A. Gillespie was also a witness and continued in his refusal to allow the committee to examine the books of his Pittsburgh firm.

August Belmont, chairman of the board of directors of the Interborough Rapid Transit Company, was a witness on June 5 and testified about the purchase of the charters of the City Island and the Pelham Park Railroads by the Interborough Rapid Transit Company. Alfred Craven, chief engineer of the commission, was asked about readvertising the contracts for ballast.

Frank J. Sprague, testified on June 6 that his proposition to build the subway did not receive from the Public Service Commission or the city officials the serious consideration he felt it deserved. He offered to put up a certified check for $100,000 and bond himself for the proper performance of the contract. He also criticised the method of the engineers in building the subway, pointing out that although several outlying sections were completed it would be impossible to use them until the main sections are finished.

Dr. A. F. Webber, chief statistician of the Public Service Commission, and Daniel L. Turner, engineer in charge of subway construction, testified regarding the prior determinations charged to the city by the New York Municipal Railway. Investigation of this subject was continued on June 7 when Leroy T. Harkness, assistant counsel, for the commission, was called. Dr. Webber was again called and questioned in detail regarding items approved by the commission.

On June 8 Col. T. S. Williams, president of the Brooklyn Rapid Transit Company, and Sigfried Cederstrom, a real estate expert of the commission, were the principal witnesses. Public Service Commissioner Travis H. Whitney was called on June 9 and testified regarding the interest the city would have to pay on money it has pledged to contribute to the new subways as co-partner with the transit companies. Mr. Whitney was also questioned regarding the bonuses paid by the Interborough Rapid Transit Company.

On June 12 the Thompson legislative committee started an investigation of the proposed purchase by the city of twenty-nine parcels of land owned by the New York, Westchester & Boston Railroad for the White Plains Avenue extension of the dual subway system. Experts for the city in 1911 appraised the land at $76,000, but the railroad demanded $613,000 for it. After condemnation proceedings, the price was fixed at $404,000. The city disputed the award, however, and the matter was taken to the Supreme Court. Henry W. Mayo, an assistant Corporation Counsel, who was assigned in December, 1913, to bring proceedings to condemn the property, was also a witness.

The Thompson committee returned to the prior determinations account of the New York Municipal Railway on June 13 and questioned Howard Abel, comptroller of the Brooklyn Rapid Transit Company and the New York Municipal Railway.

TRENTON ARBITRATION DEADLOCKED

The arbitration between the officials of the Trenton & Mercer County Traction Corporation, Trenton, N. J., and the Amalgamated Association growing out of the discharge of ten conductors for alleged fare sniping, has been further delayed by the resignation of Harry Morgan, an arbiter appointed by the company. Mr. Morgan expressed the opinion that the third arbiter could not be agreed upon.

After Peter E. Hurley, general manager of the company, and C. Howard Severs made many attempts to select a third man to act with them as arbiter they decided to each name a man and have the two select a third to act with the first two arbiters. The third man was to have been named on the afternoon of June 12 by Luke B. Travers, an organizer of the American Federation of Labor, named by the union, and Mr. Morgan. Messrs. Morgan and Travers submitted a half dozen names as possible arbiters. One was a stockholder in the corporation, but neither man could agree on the selection and Mr. Morgan resigned.

The corporation then announced that it would ask the City Commission to act as a board of arbitration. The commission, at the beginning of the trouble, agreed to try and settle the differences between the company and men, but the union objected.

After the company had refused to accept United States Judge Rellstab, former County Judge F. W. Gnichtel and John A. Campbell, president of the Trenton Potteries Company, the union issued a statement claiming that the corporation was opposed to arbitration by individuals and wanted the City Commission to act. Mr. Severs afterwards sent for National Organizer Shea and he arrived at Trenton on June 14 for a conference with Mr. Hurley and Rankin Johnson, president of the company.

The present arbitration relates only to the reinstatement of the men discharged. The question of working conditions is to be dealt with separately. The men met on June 9 and hinted that another strike would occur before they would accept the open shop and sliding scale proposals submitted by the company. It is now regarded as likely, however, that the working agreement will also be arbitrated.

EXCEPTION TAKEN TO SERVICE ORDER

The Public Service Commission for the First District of New York has been served with a writ of certiorari, calling for a court review of its order of May 18, 1916, directing the New York & Queens County Railway to put on more cars and generally to improve the service on all of its lines. The writ was signed on June 6 by Supreme Court Justice Thomas F. Donnelly, in New York County, on motion of James L. Quackenbush, attorney for the company, who is also general attorney for the Interborough Rapid Transit Company, and is returnable in twenty days. The order of the commission followed hearings held in May, at which representatives of the Flushing Association, who had urged better service in Queens Borough, were present. After service of the order the company asked for a rehearing, stating that the order was unnecessary; that it was confiscatory; that it could not be complied with; that compliance would compel operation of single truck cars, which, it was stated, was inadvisable; that the company did not have sufficient crews to operate the increased service, and could not procure them in time. The petition further stated that the company had been operating under a heavy deficit since 1911, and that the order would compel the expenditure of more than $10,000 a month for additional operating expenses. It also held that the order of the commission made inflexible rules for operation, and therefore deprived it of the operation of its own lines. It was also pointed out that under the new system the company would have to operate 227 cars, when it possessed only 226. The commission, on June 1, denied the company's application for rehearing, and the answer of the company to this denial was the writ of certiorari.

In an effort to get quicker results in these cases, the commission caused to be introduced in the last session of the Legislature a bill amending the public service commissions law, so as to provide that a writ of certiorari shall not be issued to review orders of the commission fixing rates or prescribing additions to or changes in plant, equipment or service. A compromise bill, aiming to hasten court procedure, was also introduced. The first bill was defeated, and the second made little progress during the session.

FULL BUFFALO WAGE SCALE

The new schedule of wages for the employees of the International Railway, Buffalo, N. Y., published in the ELECTRIC RAILWAY JOURNAL for May 27, page 1012, was not complete and moreover was not correct in all its details. The following is the scale of wages for motormen and conductors:

MAY 1, 1916, TO MAY 1, 1918

First year	26 cents an hour
After first year	27 cents an hour
After second year	28 cents an hour
After third year	30 cents an hour
After fourth year	32 cents an hour
Fifth year and thereafter	33 cents an hour

MAY 1, 1918, TO MAY 1, 1919

First year	26 cents an hour
After first year	27 cents an hour
After second year	29 cents an hour
After third year	31 cents an hour
Fourth year and thereafter	34 cents an hour

Shopmen, carhouse men, power house men, bridge and building department men, curve cleaners, switchtenders, receive an increase of 3 cents an hour for three years.

The rates of pay for engineers, conductors and brakemen operating freight service are to be as follows.

MAY 1, 1916, TO MAY 1, 1918

	Engineers	Conductors	Brakemen
First year	31 cents	29 cents	27 cents
Second year	32 cents	30 cents	28 cents
Third year	33 cents	31 cents	29 cents
Fourth year	34 cents	32 cents	30 cents
After four years	35 cents	34 cents	31 cents
MAY 1, 1918, TO MAY 1, 1919			
First year	32 cents	30 cents	28 cents
Second year	33 cents	31 cents	29 cents
Third year	34 cents	32 cents	30 cents
Fourth year	35 cents	33 cents	31 cents
After four years	36 cents	35 cents	32 cents

STORMS DAMAGE RAILWAY PROPERTY IN FOUR STATES

Excessive rains and severe electric storms in Buffalo during the first week of June played havoc with schedules of city and interurban cars of the International Railway. The power generating plants at Niagara Falls were compelled to suspend temporarily several times. Floods in South Buffalo forced several lines to stop operating and in many sections high trailers attached to snow plows were used.

High waters of the Mississippi River are causing trouble to the Tri-City Railway, Davenport, Iowa. For the third time this year the water has rushed over a dam connecting Suburban Island, a pleasure resort, with the Iowa shore. The tracks of the company over the dam have been washed away twice and John G. Huntoon, general manager, expects that considerable reconstruction will be necessary. On June 9 the river was far above normal and traffic had to be abandoned. The river will probably not recede for at least a week, and it will be necessary to rebuild a part of the dam and replace the tracks washed away.

A heavy rainstorm tied up the Peoples' Railway and the Ohio Electric Railway for some time on June 2. The storm did considerable damage near Dayton and Xenia.

Nearly a mile of track of the Toledo Beach line of the Toledo Railways & Light Company was washed out by the heavy rollers of Lake Erie during a storm there on June 7.

Although the recent tornado in Arkansas caused considerable damage in Hot Springs, service on the Hot Springs Street Railway was interrupted for but three or four hours. The only damage done was to the power house stacks and the end of the boiler house roof.

Strike on Western Ohio Railway Averted.—Through the mediation of the Lima Chamber of Commerce and the Wapakoneta Business Men's Club, the threatened strike on the Western Ohio Railway was averted on June 10. The company has entered into a contract giving the men a wage advance of 10 per cent. They will now be paid on a basis of 22 cents an hour for the first year, 24 cents for the second, 26 cents for the third and 30 cents for the fourth and thereafter.

Iowa Electrification Plans Delayed.—In a statement made on June 9, E. H. Ryan, president of the Muscatine North & South Railway, a steam line between Muscatine and Burlington, Iowa, explains that the delay in the reorganization of the road has been due to the inability of the company to perfect arrangements to finance the proposed plan. The company will reorganize and convert the road into an electric line. A meeting of the directors had been called for June 1, but lack of developments resulted in the postponement of the meeting.

New Wage Agreement in Tri-Cities.—The Tri-City Railway has closed a new three year contract with its men in Davenport, Rock Island, Moline and Muscatine. More than 600 men are affected. An increase of 2 cents an hour in wages is granted. The new maximum for the first year of the agreement is 31 cents an hour for men in the service three years or over, 28 cents for the men in the service two years and 26 cents for beginners. The second year the range is 32 cents, 29 cents nad 27 cents. The third year it will be 33 cents, 30 cents and 28 cents.

Norfolk Franchise Ready for Councils.—The committee of ten and the officials of the Virginia Railway & Power Company, Norfolk, Va., who have been considering the new franchise for the company have held several conferences and have changed the wording of some of the provisions of the tentative grant. A question arose in regard to the term "physical connection" in the provisions covering transfers between various lines. An agreement was reached on this and the franchise is now ready for action by the Councils. No date has been set for a meeting.

Preparedness in New England.—At the last meeting of the New England Railroad Club a committee of five was appointed to see what could be done to assist in solving the problem of mobilizing troops, equipment and supplies in that section of the country. The committee is authorized to confer with the railway operating associations and railroad clubs, with the General Staff of the War Department and such other organizations as may be deemed advisable. The results of the committee's work are to be placed in the hands of the executive committee of the club not later than the October meeting.

Municipal Railway Employees Seek Increase in Pay.—An increase of 5 cents an hour in pay has been asked by the platform men employed on the San Francisco (Cal.) Municipal Railway. The pay of the men at present is 37½ cents an hour and they are permitted to work only eight hours a day. While the exposition was open and business was heavy the men worked seven days a week. When the exposition closed and some of the cars were taken off the runs the men were reduced to six days a week work. The charter provides that city employees cannot be paid more than the limit of wages for like employment elsewhere.

Effort to Attack Kansas City Franchise Fails.—The Supreme Court of Missouri has denied the application of certain citizens of Kansas City, Mo., for a mandamus to compel Judge Slate of the Cole County Circuit Court to take up their appeal from the ruling of the Public Service Commission in respect to the Kansas City Railways. The commission had issued a certificate of necessity for the steps under the reorganization plan, and had in effect approved the franchise. The petitioners hoped through the court proceedings to secure a finding adverse to the franchise. The action of the Supreme Court eliminated the only remaining effort to cloud the franchise.

Annual Banquet Washington Stone & Webster Club.—The Stone & Webster Club of Washington held its annual banquet at the Hotel Washington Annex, in Seattle, on May 17. Frederick S. Pratt, chairman of the board of directors of the Puget Sound Traction, Light & Power Company, and vice-president of the Stone & Webster Management Association, was a special guest. The principal speaker of the evening was C. W. Howard of Bellingham. The following officers were elected by the club: G. A. Richardson, superintendent of the Seattle railway department of the Puget Sound Traction, Light & Power Company, president; Leslie Coffin, Bellingham manager; E. G. Barnes, Everett manager; L. H. Bean, Tacoma manager, and A. L. Kempster, Seattle manager of the Puget Sound Traction, Light & Power Company, vice-presidents; E. A. Batwell, re-elected secretary, and F. O. Straight, re-elected treasurer.

Removal of Receiver Urged in Strike Action.—A stockholders' action to remove Nathan A. Bundy as receiver of the Buffalo (N. Y.) Southern Railway is threatened by Charles M. Gaffney, as attorney for Henry Lein, a stockholder in the company. Mr. Lein and other stockholders who appeared before the special committee of the Board of Supervisors to inquire into the strike of platform men for union recognition and a wage increase, declared they had no objections to union recognition and urged the supervisors to force the receiver to concede certain demands of the men. It is costing the county $200 a day to patrol the 27 miles of track between the Buffalo city line and Hamburg, Orchard Park and Ebenezer. A few cars have been operated by experienced crews willing to work at the old scale of wages.

Worcester & Warren Difficulties Settled.—The controversy on the Worcester & Warren Street Railway, Worcester, Mass., over wages has been settled, and a new schedule of pay dating from June 4 has been adopted. The local union at first asked for a sliding scale which ranged from 25 cents an hour for first-year men to 30 cents for men of five years or greater service. In reply to the original demands the company offered a schedule of approximately 10 per cent increases. Conductors, motormen, track oilers and carhouse employees will receive a 10 per cent increase. Motormen and conductors of more than two years' service will receive 25 cents an hour, 23.5 cents being granted to men between one and two years' service and 22.5 cents to first-year men. The officials of the union representing the men have stated that they are satisfied with the increase.

PROGRAM OF ASSOCIATION MEETING

Central Electric Railway Association

The full program for the summer meeting of the Central Electric Railway Association has been sent to members. As stated previously, the meeting will be held on the steamer South American, sailing from Toledo, Ohio, at 11 a. m. on June 27 and returning on June 30. The program committee has invited a number of notable and prominent electric railway officials from various sections of the United States to join the association for the meeting. Nearly all have accepted and will address the association at such times as will be arranged on board the steamer. Announcement will be made on the bulletin board. Subjects for addresses have not been requested or assigned. Entertainments will be provided by the supply men's committee. Arrangements have been made for the movement of two special cars from Indianapolis to Toledo. These cars will be at St. Joseph to take care of the party on the return trip after their arrival at Benton Harbor, Mich., at 11.30 a. m., June 30, and will probably leave St. Joseph after lunch, about 1.30 p. m., arriving at South Bend at 3 p. m., Goshen at 4.25 p. m., Peru at 7.10 p. m. The Ohio Electric Railway will have a car at Peru to meet these specials and take the Ohio people home via Fort Wayne, Lima and Springfield. It may be that the Union Traction Company of Indiana's car will return to Anderson via Tipton and Alexandria instead of coming through to Indianapolis. The Terre Haute, Indianapolis & Eastern Traction Company's car will return to Indianapolis. Arrangements have been made with the Western Union Telegraph Company for a representative to accompany the party to look after the telegraphic needs of those who take the trip.

Charles L. Henry, president of the American Electric Railway Association and past-president of the Central Electric Railway Association; Britton I. Budd, president of the Chicago Elevated Railroads; W. Kesley Schoepf, president of the Ohio Electric Railway, and Hugh M. Wilson, vice-president of the McGraw Publishing Company, Inc., publisher of the ELECTRIC RAILWAY JOURNAL, are a few of the men prominent in the industry who expect to participate in this trip.

Financial and Corporate

ANNUAL REPORTS

Havana Electric Railway, Light & Power Company

The comparative income statement of the Havana Electric Railway, Light & Power Company, Havana, Cuba, for the calendar years 1914 and 1915 follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Gross earnings	$5,541,302	100.00	$5,396,713	100.00
Operating expenses and taxes	2,337,506	42.18	2,595,321	48.09
Net income	$3,203,796	57.82	$2,801,392	51.91
Other income	147,874	2.66	102,119	1.89
Gross income	$3,351,672	60.48	$2,903,511	53.80
Fixed charges	1,115,414	20.13	1,094,140	20.27
Surplus after charges	$2,236,258	40.35	$1,809,371	33.53

A summary of the operations of the various departments of the company also follows:

Department	Gross Earnings from Operation	Operating Expenses and Taxes	Per Cent of Gross Earnings	Net Earnings from Operation	Per Cent of Gross Earnings
Electric railway	$2,907,143	$1,299,216	44.69	$1,607,926	55.31
Electric light	1,856,131	457,331	24.64	1,398,799	75.36
Gas	512,756	330,160	64.38	182,596	35.62
Stage lines	265,271	250,796	94.54	14,474	5.46
Total	$5,541,302	$2,337,506	42.18	$3,203,796	57.82

For the railway there was a decrease of 2.84 per cent in passenger earnings and 0.27 per cent in total earnings. Operating expenses decreased 8.11 per cent and net earnings from operation increased 6.72 per cent. More than 6 miles of new track were laid during the year, and ten new standard passenger cars and two double-truck freight locomotives were finished in the shops. The earnings of the stage lines decreased 17 per cent because of the deprssion in tobacco manufacture and the exclusion of Spanish money from circulation. Trials of electric storage-battery vehicles are now being made, and the introduction of the new equipment is awaiting the results. The electric light and power output increased more than 12 per cent, as compared with 1914. Earnings increased 15.5 per cent, while operating expenses decreased 11.55 per cent, and net earnings from operation showed an increase of 26.8 per cent. In the gas department the net earnings were 10.6 per cent greater than in 1914, although the total earnings from operation showed only a small increase. The total expenditure for new construction during the year was $1,258,091, consisting mainly in the continuation and completion of projects and work laid out in 1914.

Comparative statistics of operation for the railway department show the following results:

	1915	1914	Per Cent Change
Total number of passengers carried	54,304,079	55,893,367	—2.84
Passenger car-miles	11,000,775	10,778,706	+2.06
Passenger earnings	$2,715,203	$2,794,668	—2.84
Passenger earnings per car-mile	$0.2472	$0.2594	—4.70
Total earnings from operation	$2,907,143	$2,915,032	—0.27
Total operating expenses	$1,262,393	$1,373,937	—8.11
Total operating expenses per car-mile	$0.1147	$0.1275	—10.00
Operating ratio	43.42%	47.13%	—7.87
Net earnings from operation	$1,644,750	$1,541,094	+6.72

In spite of all efforts to develop traffic, it is again necessary to report a small decrease of railway earnings, the second time in the history of the company. The operating expenses, however, were decreased in greater proportion, so that the ratio between them was materially improved and the net earnings from operation increased 6.72 per cent. The deleterious effects of the European war appeared most clearly in this department, as the tobacco trades were greatly depressed by it and a very large number of the tobacco workers, who were regular patrons of the street cars, were without employment after August, 1914.

Another depressing influence was the appearance of some 1600 cheap automobiles, mostly Ford, which carried two passengers from place to place within the central district, an area about 1½ miles square (2.5 km. square), for 20 cents, and additional passengers and for greater distances at fixed rates based upon a zone system. These vehicles forced most of the cabs out of business, while those which were left had to reduce their fare to 10 cents. This is the form in which the jitney reached Havana. It was really the cheap automobile taxicab common to European cities, and while it was undoubtedly a serious competition, especially in rainy weather, it was less destructive than the irresponsible 5-cent jitney buses in the United States.

In Havana gasoline, in less than barrel lots, has not sold below 33 cents per gallon during the last five years and now costs 38 cents. Lubricating oil pays 100 per cent duty, and repair parts and tires cost 50 per cent more than in the United States, while the automobile cabs pay a license of $12.50 per year each and are subject to stringent police regulation. It seems probable that there are as many automobile taxicabs in service as can make a bare living, and any adverse changes in business affecting the patrons will leave a number without means of subsistence.

General business, other than tobacco, grew in prosperity as the year advanced, and the railway receipts reflected this, as may be judged by the record of passenger earnings in 1914 and 1915 by months, a decrease of $10,062 in January having gradually grown into an increase of $11,470 in December. The freight equipment had less work to do than in previous years, the locomtive-hours at 20,933 being a decrease of 29.4 per cent and the trailer-hours at 36,945, a decrease of 17.6 per cent, the ratio of the first total to the second being 56.5 per cent, as compared to 65.9 per cent in 1914.

Oakland, Antioch & Eastern Railway

The gross income of the Oakland, Antioch & Eastern Railway, Oakland, Cal., for the twelve months ended Dec. 31, 1915, amounted to $607,951. The total operating expenses were $416,765, being 68.8 per cent of the total operating revenue as compared to 73.3 per cent for 1914. The net operating revenue was $188,651, and the gross income less operating expenses totaled $191,186, or about 60 per cent of all interest charges. The details of these earnings are as follows: Passenger revenue, $506,986; revenue freight, $64,126; express and milk revenue, $20,870, and revenue from all other sources, $15,966. The number of passengers carried was 710,908, while the tons of freight amounted to 104,598 and the car mileage to 1,855,253.

In the preceding year the passenger revenue amounted to only $391,523, and milk and express revenue to only $10,196, these items in 1915 showing large increases of $115,463 and $10,674 respectively. During 1915 there were no construction projects along the line on account of conditions existing, and real estate development was almost at a standstill. The freight earnings showed a decrease of $3,602 in 1915 over 1914. Included in the 1914 earnings, however, there was an amount of $21,469, which covered the freight earnings on construction material shipped to the Sacramento Valley Electric Railroad.

It is said that the future freight of the company must necessarily depend mainly on standard shipments to the growing population along the line and of the farm products raised by them. The planting of sugar beets was experimented on in the neighborhood of Chipps Island with success, and the indications are that this industry will be a large freight producer. A considerable acreage will be planted this year between Sacramento and Chipps Island, and will bring a steady increase of freight. The company can also look forward to quite a substantial revenue from the rice industry, the development of which is starting.

During 1915 the Panama-Pacific International Exposition was held in San Francisco and considerable passenger business was derived from visitors. How much this benefited the road is largely problematical, as both the week-end and suburban business of the company showed a decrease over the previous year, although the number of people settling along the line is steadily increasing. This the company believes is explained by the fact that the largest tributary population of the line is in the Bay Cities, population of approximately 750,000 people. This population during the summer of 1915 did little traveling, spending time and money at the fair. The heavy increase in passenger earnings came from the northern and distant points.

REPORT OF MAINE COMMISSION

The Public Utilities Commission of Maine has just issued its first annual report for the period from Nov. 1, 1914, to Oct. 31, 1915. Besides a general description of the preliminary work accomplished by the commission during the year and the detailed policies to be pursued along certain lines, the report contains statistics for steam and electric railways for the year ended June 30, 1915, the data for other utilities being omitted for the reason that they did not begin their real year under commission rule until July 1, 1915.

The mileage of the electric railways at present operating in Maine amounts to 518.63 miles, involving a property investment of $30,089,138. This total represents an increase of $5,269,317 over the property investment as of June 30, 1914. In 1915 the companies paid in dividends $402,797 on $16,105,486 of capital stock, the rate, therefore, being 2.50 per cent, while in 1914 they paid dividends of $341,599 upon $14,105,686 of capital stock at a rate of 2.42 per cent.

For the sixteen reporting companies the total operating revenues for the fiscal year ended June 30, 1915, amounted to $3,066,923, of which $2,754,456 came from passenger traffic and $228,934 from express and freight traffic. The total operating expenses were $1,945,917, divided as follows: Way and structures, $292,069; equipment, $242,000; power, $321,039; conducting transportation, $749,069; traffic, $41,176; general and miscellaneous, $303,951, and transportation for investment (cr.), $3,389. The net revenue from railway operations amounted to $1,121,006, and the addition of net revenue from auxiliary operations brought the total to $2,030,085. Taxes amounted to $85,205, non-operating income to $98,730 and deductions from income to $1,414,161, so that the net income for the year was $629,448.

COMPARATIVE STATISTICS FOR MAINE ELECTRIC RAILWAYS FOR YEARS ENDED JUNE 30, 1914 AND 1915

Companies	Miles of Road Operated		Earnings from Operation Per Mile		Expenses of Operation Per Mile		Net Earnings from Operation Per Mile		Per Cent of Operating Expenses to Earnings	
	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914
Androscoggin Electric Company	29.80	....	$2,839	....	$1,537	....	$1,301	....	54.00	....
Aroostook Valley Railroad	31.99	31.99	2,765	$2,791	1,835	$1,636	930	$1,154	66.35	58.62
Atlantic Shore Line Railway	90.40	90.41	3,977	4,012	3,261	3,145	715	866	82.00	78.40
Bangor Railway & Electric Company	57.10	57.72	6,488	6,363	3,652	3,485	2,835	2,878	56.00	54.76
Benton & Fairfield Railway	4.12	4.12	3,228	3,982	3,094	3,751	133	230	95.86	94.20
Biddeford & Saco Railroad	7.61	7.61	9,049	9,058	6,817	6,251	2,232	2,806	75.00	69.00
Calais Street Railway	7.00	7.00	5,641	5,400	4,356	4,006	1,284	1,394	77.20	74.00
Cumberland County Power & Light Company	82.86	82.86	12,593	12,631	7,200	8,505	5,393	4,125	57.20	67.30
Fairfield & Shawmut Railway	3.10	3.10	2,077	2,604	1,534	1,696	542	908	73.86	65.00
Lewiston, Augusta & Waterville Street Railway	152.90	155.14	4,554	4,286	2,887	2,833	1,667	1,452	63.40	66.12
Norway & Paris Street Railway	2.13	2.13	4,648	5,087	3,449	3,191	1,198	1,895	74.21	51.74
Portland-Lewiston Interurban Railroad	29.80	....	1,558	....	667	....	890	....	42.82	....
Rockland, South Thomaston & Camden Street Railway	5.72	5.32	1,644	1,674	1,486	1,643	158	31	90.38	98.14
Rockland, Thomaston & Camden Street Railway	21.47	21.17	5,425	5,525	3,918	3,952	1,506	1,573	72.23	71.53
Somerset Traction Company	12.20	12.20	1,991	2,022	1,582	1,387	409	634	79.45	68.00
Waterville, Fairfield & Oakland Railway	10.24	10.50	8,717	9,630	5,936	5,551	2,781	4,078	68.09	57.64

The accompanying table gives the mileage, gross earnings from operation per mile of road, operating expenses per mile, operating ratio and net earnings from operation per mile for the years ended June 30, 1914 and 1915, for all the electric railways in Maine. It will be observed from the table that of the fourteen railways reporting for both 1914 and 1915, only three showed higher gross earnings from operation per mile in 1915 than in 1914 and only three showed higher net earnings per mile. Moreover, only three companies reported a better operating ratio in the last fiscal year. In general, the best showing seems to have been made by the Cumberland County Power & Light Company and the Lewiston, Augusta & Waterville Street Railway.

Alabama Traction, Light & Power Company, Ltd., New York, N. Y.—The total operating revenues of the Alabama Traction, Light & Power Company, Ltd., for the year ended Dec. 31, 1915, were $1,014,345, of which $86,349 came from the railway department. The operating expenses totaled $402,908 for all departments and $71,675 for the railway department. After deducting miscellaneous charges, the gross income before bond interest and depreciation amounted to $650,360.

American Railways, Philadelphia, Pa.—The operating revenues of the American Railways subsidiaries for the year ended Dec. 31, 1915, totaled $5,438,247, with operating expenses and depreciation of $3,209,763, leaving net revenue of $2,228,483. Taxes amounted to $285,705 and non-operating income to $53,441, so that the gross income was $1,996,219. After the deduction of $922,641 for interest, rentals and other charges, the net income totaled $1,073,577. The business depression was reflected in the earnings of the subsidiaries for several months beginning with April, but conditions improved materially in the last few months of the year.

Cape Town Consolidated Tramways & Land Company, Ltd., Cape Town, S. A.—The profit and loss account of the Cape Town Consolidated Tramways & Land Company, Ltd., showed a debt balance of £816 for 1915, as compared to £1,894 for 1914. The operation of the tramways during the year resulted in a profit of £1.486, as compared to £1,521 in the previous year. The number of passengers carried increased 54,605 and the receipts £1,270, but the heavier cost of operation made the profit somewhat less than in 1914.

Chicago & Milwaukee Electric Railroad, Highwood, Ill.—The Chicago, North Shore & Milwaukee Railroad has been incorporated in Illinois with a preliminary capital of $100,000 as the successor to the Chicago & Milwaukee Electric Railroad, recently sold at auction to the reorganization committee. The incorporators and first board of directors are: Archie F. Hopper, John Moran and Frank Stava, and E. L. White, Chicago; W. D. Johnston, Evanston; and Keith Richardson, La Grange.

Eastern Texas Electric Company, Beaumont, Tex.—The Eastern Texas Electric Company has declared an initial dividend of $2 per share on the common stock, payable on July 1 to stock of record of June 16. The directors have also declared a semi-annual dividend of $3 on the preferred stock, payable on July 1.

Helena Light & Railway Company, Helena, Mont.—The Helena Light & Railway Company is asking for tenders until July 6 through the Columbia Trust Company, New York, N. Y., for as many of its first mortgage 5 per cent bonds as will exhaust $18,768 now available for the sinking fund.

International Traction Company, Buffalo, N. Y.—The International Traction Company, Buffalo, which suspended dividend payments on its 4 per cent cumulative preferred stock in June, 1910, has voted the payment of all of the 42 per cent back dividends due on its preferred stock. A large part of the $5,000,000 preferred stock outstanding was recently exchanged for new 7 per cent preferred, which carries the accrued dividends with it. The payment of the remaining back dividends was made possible through the sale last April of $1,050,000 6 per cent serial notes. The directors also voted an initial dividend of 1¾ per cent on the common stock and the regular dividend of 1¾ per cent on the first preferred stock and 1 per cent on the outstanding 4 per cent preferred stock. The dividends are payable on July 1.

Kansas City (Mo.) Railways.—The temporary bonds of the Kansas City Railways have been taken up and new bonds signed and issued. Practically every detail of the reorganization is now completed. Frank Hagerman, who has so large a part in the reorganization, has severed all connections with the company, and is no longer acting even in an advisory capacity. He may, it is said, retire soon from active practice.

Lisbon (Portugal) Electric Tramways, Ltd.—The result of the operations of the Lisbon Electric Tramways, Ltd., for 1915 was a profit of £59,917. During the year the tramways carried 67,101,249 passengers, as compared to 63,758,037 in 1914. Owing to the prevailing conditions, however, the abnormally high price of coal and other supplies, as well as the cost of labor, caused a considerable increase in expenses. The company also suffered from the heavy depreciation in exchange.

Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va.—Allen & Peck, Inc., Syracuse, N. Y., have made an offer of $30 a share to the syndicate which holds $1,109,700 of the common stock of the Newport News & Hampton Railway, Gas & Electric Company. Allen & Peck have been operating the property for the owners for some years, and are also among the managers of the syndicate which holds the stock. Other syndicate managers are Alexander Brown & Son, Baltimore, and Brown Brothers & Company, New York. Participants have the option of taking the stock or accepting the offer. A voting trust for five years will be formed.

Northern Electric Railway, Chico, Cal.—The reorganization plan for the Northern Electric Railway was to come up for hearing before the California Railroad Commission on June 13. The plan was described in the ELECTRIC RAILWAY JOURNAL of Oct. 23, 1915. Signatures to the plan have been obtained from the holders of 80 per cent of the bonds, thus making it binding. John P. Coghlan, receiver of the company, has filed with the commission separate valuations for the Northern Electric Railway, Sacramento & Woodland Railroad, the Northern Electric Railway (Marysville & Colusa branch), the Sacramento Terminal Company and the Northern Realty Company. This report fixes the original cost of all the properties at $11,999,640, and states that it would cost $10,327,434 to reproduce the properties new. The present value, after depreciation, is fixed at $9,238,917. The engineers of the commission are also at work on a valuation of the properties.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The pamphlet report of the Oakland, Antioch & Eastern Railway for the year ended Dec. 31, 1915, contained the following reference to the reorganization plan: "The financial plan suggested by the management and amended by the bondholders' committee in January, 1915, has been approved by the Railroad Commission with some slight modifications, and in so far as it applies to the bondholders has been declared operative. It is the desire of the company to have the plan regarding the stockholders' loan of $3 a share made operative, as by this means it is expected that the necessity for any future assessments will be avoided. The present assessment of $1.50 a share, which has been paid by a large majority of the stockholders, will be rescinded when the plan regarding stockholders' loan has been declared operative and the money so paid applied on account of the loan, but it cannot be rescinded until a very large percentage of the stockholders have agreed to the plan. The company has at this time issued a call for a payment by the stockholders of 50 cents a share, making $2 in all, and the balance of $1 will not be called for at this time. In accordance with the plan the stockholder receives notes for the money loaned, secured by bonds at 80, which is preferable to paying an assessment, where he receives no security whatever. The amount of money realized from this call of 50 cents has been very satisfactory, but before the directors take action on the rescinding of the assessment, it is necessary that more money be paid, and for this reason the stockholders who have signed the agreement and not paid the amount to the Union Trust Company are urged to do so, particularly those who have already paid the assessment of $1.50, as by paying the 50 cents per share asked for they are put in the position of a secured creditor. With a proper response made to this request the assessment can be rescinded shortly and the plan will be declared operative, leaving the management at that time in a position to devote all its time and energy to increasing the business of the road for the benefit of all concerned."

Philadelphia (Pa.) Rapid Transit Company.—James G. Balfour has been elected a director of the Union Traction Company, succeeding George W. Elkins, resigned. John C. Gilpin has been elected a director, succeeding Jacob S. Disston, resigned.

Rhode Island Company, Providence, R. I.—The Industrial Trust Company, the Providence Banking Company and Bodell & Company, Providence, are offering for subscription at 98½ and accrued interest, yielding 5.35 per cent, the unsold balance of $1,000,000 of a total of $1,662,000 of Rhode Island Company's 5 per cent five-year secured gold notes. The notes are dated March 1, 1916, are due on March 1, 1921, and are callable at 101 and interest. They are coupon notes in the denomination of $1,000 and the interest is payable on March 1 and Sept. 1 at the office of the Industrial Trust Company, Providence, or the Old Colony Trust Company, Boston, Mass. The Industrial Trust Company is trustee of the issue. The notes are secured by the deposit of $2,078,300 par value of stock of the United Traction & Electric Company, which is operated under lease by the Rhode Island Company.

Rome Railway & Light Company, Rome, Ga.—Spencer Trask & Company, New York, N. Y., are offering for subscription $850,000 of first mortgage 5 per cent gold bonds of the Rome Railway & Light Company. The former first and consolidated mortgages of the company have been canceled and the new issue is a direct first mortgage. The new bonds are dated April 1, 1916, and will mature on April 1, 1946. Interest is payable in April and October at the office of the Fidelity & Columbia Trust Company, Louisville, Ky., trustee, and at the office of Spencer Trask & Company. The bonds are in the denomination of $500 and $1,000. The issue is redeemable in whole or in part at 105 and interest on any interest date on sixty days' notice. The authorized issue is $3,000,000, of which $2,150,000 are reserved to be issued for not exceeding 80 per cent of net cash cost of additional property or equipment.

Seattle, Renton & Southern Railway, Seattle, Wash.—Judge A. W. Frater, of the King County Superior Court, has entered an order confirming the sale of the Seattle, Renton & Southern Railway to the bondholders' committee, represented by John C. Higgins. He set June 10 as the last day for the receivers to file their final account, and June 19 for the final hearing on all matters pertaining to the receivership. W. R. Crawford, former president of the company, and attorneys for certain creditors, renewed objections to signing the order.

South Carolina Light, Power & Railways Company, Spartanburg, S. C.—The gross earnings of the South Carolina Light, Power & Railways Company for 1915 were $444,563, including inter-company departmental items amounting to $40,744, while the operating expenses and taxes, including a like amount, totaled $211,101. Interest on funded debt amounted to $150,000, and dividends of $42,000 were paid on the preferred stock, leaving a surplus of $41,462. The company expended $84,616 for additions and betterments during the year.

Toledo Railways & Light Company, Toledo, Ohio.—The original plan of reorganization of the Toledo Railways & Light Company, underwritten by Henry L. Doherty & Company in 1912, provided that until Dec. 7, 1912, the owners of the capital stock of the Toledo Railways & Light Company might exchange their holdings for stock of the new company, namely, the Toledo Traction, Light & Power Company, without payment of any assessment. Most of the stockholders exchanged for the new securities, and for some time past there have been no privileges of exchange available to the original minority interests. On account of the numerous requests for this exchange, the company has again made available the original privilege for a limited time. Thirteen per cent of the original stock still remains to be converted under the plans.

United Railroads, San Francisco, Cal.—The San Francisco *Examiner* recently quoted Jesse W. Lilienthal, president of the United Railroads, as follows in regard to the proposed readjustment of the finances of the company: "Out of courtesy to the Railroad Commission nothing will be given out until the application is formally filed. Further than to say that the underlying bondholders are fully protected by the plan, I cannot yet discuss their status."

DIVIDENDS DECLARED

California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred.

Duluth-Superior Traction Company, Duluth, Minn., quarterly, 1 per cent, preferred.

Eastern Power & Light Corporation, New York, N. Y., quarterly, 1¾ per cent, preferred.

El Paso (Tex.) Electric Company, 3 per cent, preferred; 2½ per cent, common.

Illinois Traction Company, Peoria, Ill., quarterly, 1½ per cent, preferred.

International Traction Company, Buffalo, N. Y., quarterly, 1¾ per cent, 7 per cent first preferred, quarterly, 1 per cent, 4 per cent second preferred; 42 per cent on account of accumulated dividends on the 4 per cent second preferred; 1¾ per cent, common.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1½ per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

Springfield Railway & Light Company, Springfield, Mo., quarterly, 1¾ per cent, preferred.

Tri-City Railway & Light Company, Davenport, Iowa, quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Union Traction Company, Philadelphia, Pa., $1.50.

United Light & Railways, Grand Rapids, Mich., quarterly, 1½ per cent, first preferred.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

West End Street Railway, Boston, Mass., $2, preferred.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL						
1m., April,	'16	$154,830	$100,685	$54,145	$42,112	$12,033
1 “ “	'15	142,011	96,837	45,174	40,039	5,135
10 “ “	'16	1,618,791	1,037,988	580,803	407,831	172,972
10 “ “	'15	1,653,820	1,061,363	592,457	398,809	193,648
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO						
1m., Apr.,	'16	$34,436	*$20,223	$14,213	$11,463	$2,750
1 “ “	'15	30,151	*18,266	11,885	10,961	924
4 “ “	'16	127,792	*76,992	50,800	44,621	6,179
4 “ “	'15	113,037	*69,126	43,911	43,779	132
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.						
1m., Apr.,	'16	$211,944	*$134,794	$77,150	$66,287	$10,863
1 “ “	'15	186,786	*111,821	74,965	70,403	4,562
12 “ “	'16	2,717,239	*1,591,665	1,125,574	798,254	327,320
12 “ “	'15	2,543,812	*1,437,484	1,106,328	762,960	343,368
HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.						
1m., Apr.,	'16	$503,689	*$209,981	$293,708	$214,117	$79,592
1 “ “	'15	465,488	*190,929	274,559	211,748	62,811
4 “ “	'16	1,981,711	*857,506	1,124,205	853,982	270,223
4 “ “	'15	1,861,907	*777,400	1,084,507	844,852	239,655
INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.						
1m., May,	'16	$3,231,007	$1,227,271	$2,003,736	$1,191,140	‡$873,561
1 “ “	'15	2,904,773	1,009,935	1,804,838	1,092,041	‡786,463
11 “ “	'16	32,933,751	12,832,558	20,101,193	12,561,738	‡8,067,913
11 “ “	'15	30,744,299	11,881,198	18,863,101	11,958,814	‡7,470,966
NASHVILLE (TENN.) RAILWAY & LIGHT COMPANY						
1m., Apr.,	'16	$193,641	*$113,361	$80,280	$42,815	$37,465
1 “ “	'15	176,040	*103,949	72,091	41,992	30,099
12 “ “	'16	2,207,502	*1,358,923	848,579	514,503	334,076
12 “ “	'15	2,216,599	*1,294,976	921,623	491,119	430,504
NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.						
1m., Apr.,	'16	$27,135	*$24,098	$3,037	$7,979	†‡$4,903
1 “ “	'15	25,507	*23,246	2,261	7,975	†‡5,691
10 “ “	'16	308,865	*251,796	57,069	79,939	†‡22,361
10 “ “	'15	308,567	*255,950	52,617	79,060	†‡26,070
NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO						
1m., Apr.,	'16	$399,830	$238,484	$161,346	$49,696	$111,650
1 “ “	'15	279,281	183,538	95,743	51,423	44,320
4 “ “	'16	1,518,582	908,372	610,210	207,333	402,877
4 “ “	'15	1,101,351	709,451	391,900	204,438	187,462
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.						
1m., Apr.,	'16	$447,967	*$250,968	$196,999	$181,537	$15,462
1 “ “	'15	442,526	*248,634	193,892	182,985	10,907
12 “ “	'16	5,458,798	*3,065,985	2,392,813	2,203,132	189,681
12 “ “	'15	5,886,595	*3,182,996	2,703,599	2,202,489	501,110
VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA.						
1m., April,	'16	$475,699	$222,973	$252,726	$147,578	‡$113,092
1 “ “	'15	410,943	201,145	209,798	136,903	‡80,404
10 “ “	'16	4,682,348	2,190,971	2,491,377	1,449,335	‡1,121,486
10 “ “	'15	4,271,726	2,060,011	2,211,715	1,362,487	‡916,558

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

ALBANY BUS PETITION DENIED

Commission Denies Petition That Would Permit Direct Competition with Electric Railway

The application of Chauncey L. Butler and George W. Gallien, Jr., for a certificate for the operation of a motor bus line from the railroad station in Albany, N. Y., to West Albany via Washington Avenue and Allen Street was denied by the Public Service Commission for the Second District of New York, on June 9. The commission decided that while public convenience might, to some extent, be served by the line, no proof of the necessity of it had been presented. The order of the commission recites that while the primary purpose of the line is to serve the people of the village of West Albany, it is admitted that it cannot be operated profitably unless it is permitted to take passengers through Albany, where by its franchise such business is limited to the part of the route west of the intersection of Central and Washington Avenues. The order shows that in the territory to which the line is restricted by franchise in Albany, it would be only 150 ft. from Central Avenue at Northern Boulevard, 450 ft. at Lexington Avenue, 500 ft. at Robin Street, 700 ft. at North Lake Avenue, and about 1000 ft. for the rest of the distance up Washington Avenue, while throughout this latter stretch the line would run through vacant lots. The only built up territory where the line would not be close to existing electric railway facilities, according to the order, is that part of Allen Street immediately about the corner of Washington Avenue. The order then says:

"The interested parties agree that the bus line could not live if it were restricted to the West Albany traffic and to the carrying of passengers to and from the section bounded by North Allen Street, Lincoln Avenue, Kent Street, Ontario Street, and Lancaster Street. Every passenger that it would obtain outside of these limits would be taken directly away from the lines of the United Traction Company beyond question.

"All of the evidence shows that the bus line would be a convenience but that it is not an actual necessity because people along the route which it would traverse can reach the lines of the United Traction Company with some slight inconvenience, and that inconvenience only exists to a notable degree in the section along Allen Street, between Lincoln Avenue and Allen Street.

"From the facts and the evidence presented to the commission it is apparent that public convenience and necessity do not require the granting of this application because the public along the proposed route of the bus line is now served by the United Traction Company fairly well. To grant this application would be to deprive the existing carrier, upon which the public depends, of the traffic which it is now enjoying, a substantial portion of which it would be necessary for the competing carrier to obtain in order to earn a sufficient revenue to pay its operating expenses.

"The result of granting such a certificate might be to deprive the public of the service which it is now getting from the United Traction Company lines in this section of the city, which would surely happen if its revenues should fall off to the point where it would be necessary to reduce the service. That this would not meet with the approval of the public goes without saying, as it expects service regularly each and every day in the year under all conditions. It has been repeatedly demonstrated that the way to accomplish better service from public utilities is not by introducing competitors into the field, as sooner or later one or the other is forced out of business, and the public always pays all the expenses incident to any such experiment."

The protest of the United Traction Company against the application for bus rights in this instance was referred to previously in the ELECTRIC RAILWAY JOURNAL of June 3, page 1064.

COLLISION ON NEW YORK ELEVATED

Company Spending $1,400,000 for Signals—Review of Negotiations With Commission Over Signal Protection

One man was killed and eleven persons were seriously injured as a result of a rear-end collision on the afternoon of June 8, between two southbound elevated trains on the Third Avenue line of the Interborough Rapid Transit company, New York, N. Y., just north of the 149th Street Station. About thirty other passengers were slightly injured. Following the accident the Coroner's office in the Bronx ordered an investigation.

Frank Hedley, vice-president and general manager of the company, after making a preliminary examination issued a statement in which he said:

"There were no defects in the equipment and the conditions surrounding operation at that point were precisely as they have been for a great many years. The trains on the Third Avenue line are not controlled by automatic block signals at present and the signal which separated the train which was run into from the following train was a signal which is never used except to hold Third Avenue trains when a train from the West Farms branch is coming in on the Third Avenue line. It should be stated that the directors of the company some five or six months ago authorized the installation of automatic block signals and automatic stops on all curves on the elevated railroad, and that these signals and stops are being put in place as rapidly as possible. To install automatic block signals and stops on all the straight line, as well as curves, of the elevated structures would reduce its carrying capacity 20 to 25 per cent. We have always felt, therefore, that the most satisfactory method of operation was to choose competent motormen and rely upon their judgment in keeping sufficient headway between themselves and the train preceding."

On June 9, Theodore P. Shonts, president of the Interborough Rapid Transit Company, authorized a statement in part as follows:

"Comment upon the unfortunate accident on the Third Avenue Elevated Railroad indicates a widespread opinion that automatic signals and train-stopping devices should be installed on all the tracks of the elevated railroad, so as to make such an accident absolutely impossible.

"Local trains on the elevated are being operated in precisely the same manner as locals in the subway. There are no signals, except on curves on local tracks in the subway, and the dependence is solely upon the care and judgment of motormen. These men are carefully picked and trained, and they have the supreme motive of their own safety to intensify their sense of responsibility. Express tracks in the subway are equipped with automatic block signals and train-stopping devices.

"We are now spending $1,400,000 in adapting to the use of the elevated lines automatic signals and train-stopping devices on the express tracks, at all switch points, and on curves on local tracks where the motorman cannot for a safe distance obtain a clear view of the track ahead of him.

"It would be possible, of course, to install automatic signals and train control devices on all tracks. The expense involved does not seriously concern us. We are prepared to go to any expense to insure the safety of the people who travel on the elevated and subway

"The fact is, however, that the art of train control has not yet developed any automatic system which would make possible the expeditious operation of the number of trains necessary to handle the crowds on such lines as the local tracks of the Third Avenue Elevated.

"If any automatic train-stopping device now known were to be installed the inevitable result would be the cutting down of the capacity of the elevated by fully 25 per cent. If anybody can develop a signal system which will promote safer conditions than those under which we are now operating, we will spend all the money necessary to install it. But such a signal system must be one under the operation of which we can perform the transportation service which the people of New York demand."

The Public Service Commission as long ago as April of last year directed the Interborough Company to equip its elevated lines with "a system of signals capable of preventing collisions, the system to be so designed as to permit the operation of their tracks to their maximum capacity." A trial installation was to be made by Oct. 1, 1915, and the results submitted to the commission by June 1 of this year. Hearings were held by the commission and many reports were received supporting the company's contention that the signal art had not yet perfected a system which would meet the requirements of the commission. As a result the original order was modified to provide for a signal system which should "afford protection against collisions and at the same time reduce the capacity of the lines as little as possible." Tests were ordered made on these lines and a report submitted by March 1 next. At a hearing on April 24 Mr. Hedley testified that he believed it was unwise to decrease the present factor of safety by experiments. He said the company was spending $1,000,000 to equip the elevated third track and all tracks at curves and interlocking points with the signal system employed in the subway. The commission took the matter under advisement then, but has taken no new action since the receipt, on May 4, of a formal notice from the company that it had begun the installation of the system advocated by Mr. Hedley.

NEW SERVICE ORDER IN MILWAUKEE

Will Be Temporary and Will Be Based on Headway and Not on Number of Passengers

On June 13 the Railroad Commission of Wisconsin handed down a decision in regard to the application of The Milwaukee Electric Railway & Light Company for an interpretation and modification of the general service order issued on Nov. 25, 1913. The commission states that it will issue a new service order based on a definite number of seats on each line passing a specified point or points in each direction instead of requiring a certain number of seats per 100 passengers. As the increase in service which the city desires to secure will depend in a measure upon the valuation of the property which is now in progress under the direction of the commission, the new order will be temporary only. While the new order will specify a definite number of seats, the number of seats required on any line will be determined by applying the standard for rush hour and non-rush-hour service specified in the original order of Nov. 25, 1913, to traffic checks which will be made from time to time under the direction of the commission. These standards specify sixty-seven seats for 100 passengers in the maximum half-hour of each rush period and 133 seats for 100 passengers in the non-rush-hour periods, with a gradual transition in the number of seats for 100 passengers from the maximum half-hour of the rush period to the normal non-rush ratio. A seat requirement will be determined separately for week days for Saturdays and Sundays.

The order of Nov. 25, 1913, defined a standard of service for half-hour periods. Instead of the half-hour period being used in this trial order, either one-fourth, one-half, three-fourths or one-hour period will be specified as best suits the requirements for any particular line and for any part of the day.

RECORD-BREAKING TRAFFIC ON BOSTON ELEVATED RAILWAY

Without a single accident to an individual on either the surface or rapid transit lines, the Boston Elevated Railway handled the heaviest volume of traffic in its history on May 27, the day of the Boston preparedness parade. The passenger revenue was $68,559, and the greater portion of the traffic was handled between noon and midnight, as the parade did not start until 1 p. m. Nearly 1,000,000 passengers were handled by the Washington Street tunnel alone, another 250,000 being carried on the Cambridge subway and Atlantic Avenue elevated trains. A headway of one and a half minutes was maintained all day long in the Washington Street tunnel. At the Park Street subway station 35,000 persons were accommodated between 2 p. m. and 7 p. m., and 22,000 were handled at Scollay Square. More than 500,000 passengers patronized the stations in the Boylston Street, East Boston and Tremont Street subways. The parade was somewhat shortened from its estimated length, and this threw an enormous burden of travel upon the company before the peak load of the early evening was expected; but by 8 p. m., about two hours after the parade ended, the streets of the downtown section presented their normal appearance. The underground lines proved of the greatest convenience to persons wishing to cross the route of the parade, and many paid fares simply to accomplish this more speedily than was possible on the surface. The downtown surface car service was withdrawn from many of its usual channels for about five hours. Two slight derailments were reported during the day on the surface lines. About 150 per cent of normal traffic was handled by the steam railroads entering Boston.

Jitney Zone Prescribed in Tulsa.—The City Commission of Tulsa, Okla., has enacted an ordinance barring jitneys from Main Street, the principal thoroughfare of the city. The ordinance was regarded as imperative owing to the congestion on Main Street caused by so many jitneys and other automobiles.

Reports Required on Turn Backs.—The Public Service Commission for the First District of New York has ordered that every street railway within its jurisdiction report daily the number of cars which are turned back before reaching the point indicated on destination signs carried by the car. The order will take effect on June 28.

Interurban Cars Run Express in Buffalo.—Interurban cars on the Buffalo & Niagara Falls division of the International Railway, Buffalo, N. Y., are being operated inside the Buffalo city limits express service. No stops are made to discharge local passengers outgoing, but stops are made to collect passengers bound for points north of the city line. A similar order was made effective on the Buffalo & Lockport division some time ago.

Another Railway Publication.—The British Columbia Electric Railway, Ltd., Vancouver, B. C., has begun the publication of a four-page paper of railway chat intended for circulation among the public. The paper is 4 in. wide by 7 in. high. It is still unnamed. Three prizes, $15, $10 and $5, respectively, are offered for the most suitable suggestions for the baby. The first issue appeared on Friday, June 2. Nearly 25,000 copies were picked up by patrons by the night of June 3.

Seattle Committee Acts on One-Man Cars.—The franchise committee of the City Council of Seattle, Wash., by unanimous vote has recommended the passage of an ordinance which will permit the Puget Sound Traction, Light & Power Company to operate a one-man car on the Summit Avenue and the Twelfth Avenue lines, as an experiment. The committee, however, deferred action on the request of the Western Washington Power Company to operate one-man cars over the Greenwood lines of its system.

Preparations Made for Chautauquans.—Additional service has been put into effect from Westfield, N. Y., to points on Chautauqua Lake and southwestern New York by the Chautauqua Traction Company and the Jamestown, Westfield & Northwestern Railway. The latter company will shortly receive four new all-steel interurban cars which will be operated in express service from Westfield to Jamestown and other Chautauqua Lake points. Twenty-five Chicago-New York trains over steam lines will make daily stops at Westfield this season to connect with the electric railways to Chautauqua County summer resorts. An extensive advertising campaign is being carried on by the electric railways.

Wilkes-Barre Jitney Case Heard.—The Public Service Commission of Pennsylvania on June 13 sat in Wilkes-Barre, Pa., to hear the complaint of the Wilkes-Barre Railway against 500 jitneymen operating in the Wyoming Valley. The company alleged that the jitneys were competing illegally against a public service that was fully adequate as prescribed by law. The jitneymen's attorneys contended that the jitneys were not competitors of the electric railway because they used gasoline. William D. B. Ainey, chairman of the commission, announced that a ruling would be made on the points of necessity and competition. In June two dozen other complaints were filed with the Public Service Commission against jitneys operating in various parts of Pennsylvania without certificates of convenience from the commission, and they have been listed for action in conjunction with others from Scranton, Pittsburgh, New Castle and other places.

Service Standards Fixed for Baltimore.—The Public Service Commission of Maryland decided on June 13 to modify the tentative rules regarding standards of service for the United Railways & Electric Company, Baltimore. The original rules provided that the cars outside the down-town zone provide on Saturdays, Sundays and holidays after 1 p. m. an average of a seat per passenger during half hour periods. Under the amended rules the cars will be permitted to carry enough passengers to fill all seats and one for every 3 sq. ft. of unobstructed floor space. The commission refused to cancel the rule providing that when a car is filled to its capacity as set by the commission the loaded car must bear a "Full Car" sign. The question as to whether the sign should be placed on the front of the car was left to be settled by officials of the company and Bruce W. Duer, the commission's transportation expert. The company asked for the modification of the rule covering crowded cars on Saturday and Sunday afternoons and on holidays, because of the excursion crowds which must be handled. Mr. Duer considered the request a reasonable one and so told the commission. Because of the time required to have the "Full Car" signs made the commission fixed July 15 as the date for the rule to become effective.

Handling Berries at Louisville.—As a result of good work done by R. H. Wyatt, general freight agent of the Louisville & Interurban Railroad, Louisville, Ky., all berries shipped out of the berry-growing section centering at Middletown will be sold f.o.b the cars of the Louisville & Interurban Railroad at Middletown. Heretofore all sales have been made f.o.b. Louisville, although the bulk of the fruit had been transported from Middletown to the city by the Louisville & Interurban Railroad. One result was to establish two buying centers for the same concentrated growing section, one in Louisville and the other at Middletown, about 14 miles out. Some growers hauled their produce by wagon to Louisville. Records kept of the prices and the manner in which the quality of the fruit was affected and displayed by Mr. Wyatt to the growers showed them conclusively that they could profit better by selling at the Middletown station. Both road and growers are best served that way. The usual plan is to load non-iced express cars of the electric line about 3 or 4 o'clock in the afternoon, and transfer to the iced refrigerator express cars of the steam roads in town. An hour serves to make the trip and transfer and the berries arrive in Chicago next morning "with the dew on." The annual crop in this instance does not amount to more than about fifty cars, but the idea would work as well with many times the quantity.

Protest Against Jitneys in Allegheny.—The Public Service Commission of Pennsylvania has under consideration the petition of the Allegheny Valley Street Railway, Tarentum, against forty jitney bus operators. The company claims that the buses have virtually become common carriers without the sanction of the commission, and that many of the jitneys are operating along the lines of the company, although the company is able to render adequate and convenient service. The jitney operators assert that the company has not maintained full schedule since the strike of its employees, declared last August. At a recent hearing O. P. Hess, superintendent of transportation of the company, described the topography of the district, the streets where both the cars and the jitneys operate, and testified as to the car schedules. J. C. Watt exhibited a number of photographs of jitneys with patrons standing on the running boards and sitting on the mud guards. H. S. Swift, treasurer of the company, declared that the deficit of the company was $15,784 in 1914 and $83,157 in 1915. The company then closed its case. A jitney operator who was formerly a conductor of the company said that following the strike the schedules became very irregular. He admitted that the buses and cars operated on the same routes in some places, but said that the jitneys took patrons wherever they cared to go. He hauled between 150 and 175 passengers daily.

Personal Mention

Mr. J. C. Donald has resigned as general superintendent of the Asheville Power & Light Company, Asheville, N. C.

Mr. James Hullett has been appointed general foreman at the shops of the Kentucky Traction & Terminal Company, Lexington, Ky., succeeding Mr. E. M. Carr, resigned.

Mr. George Carson, formerly claim agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has been appointed claim agent of the Fifth Avenue Coach Company, operating buses on Fifth Avenue, New York, and controlled by the New York Transportation Company.

Mr. John Dickson has been appointed superintendent of motive power of the Spokane, Portland & Seattle Railway, Oregon Trunk Railway, Pacific & Eastern Railway, Oregon Electric Railway, United Railways and Spokane & Inland Empire Railroad, with headquarters at Portland, Ore., the position of general master mechanic being abolished.

Mr. Rufus Moses, formerly freight agent of the Mahoning & Shenango Railway & Light Company at Sharon, Pa., has joined the main office force of the company as traffic agent, a new position in which he will have immediate jurisdiction over the freight department and other traffic matters. Mr. Moses has been with the company for several years.

Mr. John D. Sallee, for the last twenty-six years connected with the Kentucky Traction & Terminal Company, Lexington, Ky., and its allied interests, much of the time as general freight agent, has resigned, to leave active business life. Mr. Sallee is succeeded by Mr. J. J. Bonfoeld, who for twelve years has been local freight agent of the company.

Mr. W. F. Heinemann, for the last three years superintendent of overhead and block signals of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., has also been placed in charge of the power department. This department has been under Mr. J. N. Spellman, master mechanic, whose duties have been increased with the growth of the road and of business. Mr. Heinemann was formerly connected with the Des Moines (Iowa) City Railway.

Mr. C. H. Kretz, who has been elected president of the Gas, Electric & Street Railway Association of Oklahoma, is general manager of the Okmulgee Ice & Light Company. Mr. Kretz is a native of Louisiana and was educated at his State university and at Cornell. Upon graduation at the latter institution he was commissioned an engineering officer in the United States Navy with the rank of ensign, and served during the Spanish-American war. In 1899 he was appointed assistant professor of mechanical engineering at Louisiana State University and served the institution for seven years as a member of its faculty. The next four years were spent as the manager of Baton Rouge Electric & Gas Company, Baton Rouge, La. Later he was appointed manager of the Beaumont (Tex.) Traction Company.

Mr. Walter M. Brown, whose appointment to the Seattle, Renton & Southern Railway, Seattle, Wash., was noted in the ELECTRIC RAILWAY JOURNAL of June 3, will probably be made general manager of that company. Mr. Brown entered railway work with the St. Louis division of the Cleveland, Cincinnati, Chicago & St. Louis Railway in September, 1899. He served as freight and passenger brakeman and later was promoted to freight conductor, which position he held until September, 1904, when he resigned to enter business for himself. In February, 1907, Mr. Brown accepted employment in the train service of the St. Louis division of the Illinois Traction System. He was later appointed dispatcher and chief dispatcher, resigning on March 1, 1909, to accept a position as superintendent of railways with the Central Illinois Public Service Company and the Central Illinois Traction Company with headquarters at Mattoon, Ill. On Feb. 1, 1915, his jurisdiction was extended to cover the electric, gas, water and heat departments at Mattoon. It was from this position that he resigned on May 22 to assist in the management of the reorganized Seattle, Renton & Southern Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.**—Incorporated at Springfield to purchase and operate the Chicago & Milwaukee Electric Railroad, recently sold at auction to the reorganization committee. Capital stock, $100,000. Incorporators and first board of directors: Archie F. Hopper, John Moran, Frank Stava and E. L. White, Chicago; W. D. Johnston, Evanston, and Keith Richardson, La Grange.

Oil Fields Short Line Electric Railway, Oklahoma City, Okla.—Incorporated to construct a line from Peckham on the St. Louis & San Francisco Railway to Braman on the Santa Fé System, 16 miles. Plans are being considered to electrify the line. Capital stock, $200,000. Incorporators: J. A. Frates, Sr., J. A. Frates, Jr., Roy Snyder, W. Mathews and J. H. Grant.

Carolina Rapid Transit Company, Clinton, S. C.—Incorporated to construct a line from Spartanburg to Clinton. Capital stock, $50,000 minimum and $3,500,000 maximum. Among the incorporators are: J. F. Jacobs, Clinton; W. C. Gray, Laurens; W. H. Gray, Woodruff W. P. Patton, Cross Anchor, and R. P. Morgan, Union.

FRANCHISES

Martinez, Cal.—The Martinez & Concord Interurban Railroad has received a franchise from the City Council to construct the first unit of its main line to connect Martinez and Concord. [May 27, '16.]

Chicago, Ill.—The Chicago Surface Lines have received a franchise from the Council to construct lines on Canal Street from Kinzie Street to Archer Avenue and on Lake Park Avenue from Forty-seventh to Fifty-ninth Street.

Baltimore, Md.—The United Railways & Electric Company has asked the Council for a franchise to construct double tracks on Liberty Heights Avenue from Berwyn Avenue, Forest Park, to the Resterstown road.

Hamburg, N. Y.—The Buffalo Southern Railway has asked the Council for permission to extend its line through additional streets in Hamburg so as to accommodate the southerly section of the town.

Dayton, Ohio.—The Ohio Electric Railway has received a franchise from the Council to construct 1 mile of single track on Fourth Street from Main to Jefferson Street.

***East Cleveland, Ohio.**—J. L. Free Land Company, 1004 Prospect Avenue, S. E., Cleveland, has received a franchise from the City Council of East Cleveland to construct and operate an electric railway on Noble Road.

Spokane, Wash.—The Spokane & Inland Empire Railway has received a franchise from the Council for the construction of an extension of its line on Grand Boulevard South from Thirty-third Avenue to the Palouse Highway.

TRACK AND ROADWAY

Birmingham Interurban Development Company, Birmingham, Ala.—Surveys have been completed of this company's line from the Warrior River at Nichols Fishtrap to Jasper, via Dora, Cordova and Flat Creek, about 28 miles. The company proposes to construct a line from Birmingham to Jasper, about 50 miles. W. W. Shortridge, Birmingham, secretary. [April 29, '16.]

Fort Smith Light & Traction Company, Fort Smith, Ark.—At a recent meeting of the City Council and a committee of the Chamber of Commerce, H. C. Hoagland, general manager of the Fort Smith Light & Traction Company, submitted and discussed a proposition made by the company for the extension of its carline to the Arkansas Zinc Smelting Company's plant now nearing completion. The offer made by the company was that the city of Van Buren should pay for the grading and cost of constructing a roadbed, estimated at approximately $2,500, and that the Fort Smith Light & Traction Company would charge a 5-cent fare from the city to the smelter, and vice versa. The proposed extension would be about one mile.

Pacific Electric Railway, Los Angeles, Cal.—Engineers for the Pacific Electric Railway have estimated the cost of constructing a loop in the business district of Pasadena to relieve congestion on Colorado Street at about $35,000. Surveys will soon be made by the company for its proposed extension from Brea to Fullerton.

Municipal Railways of San Francisco, San Francisco, Cal.—The Board of Supervisors on June 5 upheld the Mayor's veto of the resolution providing for a car line across Golden Gate Park. In place of the cars the city may operate a line of automobile buses between the Richmond district and the Sunset section to be run in connection with the Municipal Railway.

Atlanta & Anderson Electric Railway, Atlanta, Ga.—Arrangements have been completed for financing this company's proposed line from Atlanta to Anderson, S. C., and it is expected that construction will be begun by Sept. 1. J. L. Murphy, Atlanta, is interested. [April 29, '16.]

Washington & Lincolnton Railroad, Washington, Ga.—A contract has been awarded to H. B. Hoppenbeitcel Company, Macon, for grading 3 miles of this company's proposed line. The company proposes to construct a railway from Washington to Lincolnton. J. R. Dyson, Washington, president.

Rapid Transit Company of Illinois, Murphysboro, Ill.—A contract has been let by this company to William Martin, St. Louis, for the construction of this company's line from East St. Louis to Mount Vernon, via Chester and a spur from Steeleville to Murphysboro. The company is also contemplating the extension of the line from Mount Vernon to Vincennes. D. P. Roberts, East St. Louis, Ill., is interested. [March 4, '16.]

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind.—This company reports that block signals are being installed on its interurban line between Terre Haute and Brazil. The contract has been let to the General Railway Signal Company.

Arkansas Valley Interurban Railway, Wichita, Kan.—It is reported that the Arkansas Valley Interurban Railway is negotiating for the purchase of the Southwestern Interurban Railway. With the acquisition of this line, a connecting line will be built between Wichita and Winfield, and when that is completed through cars will be operated from Hutchinson to Wichita, Winfield and Arkansas City. It is also proposed to construct an extension north to McPherson and Salina.

Wichita Railroad & Light Company, Wichita, Kan.—This company has announced that it may postpone indefinitely the erection of a permanent bridge over the Arkansas River, because of the difficulty in getting contractors to bid on it, in view of the uncertain quotations on steel.

Cincinnati, Newport & Covington Railway, Covington, Ky.—It is reported that this company contemplates the construction of several suburban extensions in the vicinity of Newport.

Worcester (Mass.) Consolidated Street Railway.—Plans have been practically completed for the construction of the $3,500 concrete bridge on Elm Street, Millbury. The new bridge is to be of slab concrete construction and will replace the wooden bridge now across the Blackstone Canal. Work has been begun by the Worcester Consolidated Street Railway repairing the bridge on Providence Street over which the Blackstone Valley cars pass. The bridge is of wood and the underpinning and the street part of the bridge will be made stronger.

Electric Short Line Railway, Minneapolis, Minn.—It has been announced that the complete right-of-way has been obtained and grading begun on a 70-mile extension of this company's line from Hutchinson to Montevideo, via Clara City. H. F. Balch & Company, Minneapolis, has the contract for the grading. It is estimated that the extension will cost about $1,000,000, and it is expected that the line will be completed within a year.

United Traction Company, Albany, N. Y.—Work will be begun at once by this company on the reconstruction of its tracks from Hoosick Street to First Street, Lansingburgh, with 14-lb. rails. The line is to be ballasted with rock.

New York Municipal Railway Corporation, Brooklyn, N. Y.—Bids will be received by the New York Municipal Railway Corporation until June 19 for furnishing and installing ducts and manholes. For further information apply to the chief engineer, W. S. Menden, 85 Clinton Street, Brooklyn.

International Railway, Buffalo, N. Y.—The Ontario Railway Board has asked the International Railway to reconstruct its tracks from Queen Street to the river dock in Queenston, and to supply additional safety switches and improve the grades and curves.

Little Falls & Johnstown Railroad, Little Falls, N. Y.—This company reports that franchises and rights-of-way have been secured for its proposed line from Little Falls to Johnstown, with branch to Fort Plain and Canajoharie, but construction has been postponed to avoid the high construction cost at the present time. J. Ledlie Hees, Forty-second Street Building, New York, president. [Dec. 28, '12.]

Interborough Rapid Transit Company, New York, N. Y.—Proposals have been invited for the construction of the 180th Street yard of Route No. 18, a part of the White Plains Road elevated extension of the Lenox Avenue branch of the first subway. The yard is to be located on city property. The general plan of construction calls for an elevated railroad yard, consisting of an embankment, the embankment being confined on the westerly, southerly and part of the easterly sides by retaining walls. The yard will have a capacity for about 275 cars. The work must be completed within twelve months from the delivery of the contract. The Public Service Commission for the First District of New York will open these bids on June 26. The commission has rescinded its action in awarding the contract for the construction of Route 31, the Livonia Avenue elevated extension of the Eastern Parkway subway in Brooklyn to Dennis Conners at $1,376,122, and decided to reject all bids taken on this contract. The reason for the action of the commission was the effort to save money for the city in the purchase of structural steel.

Piedmont & Northern Railway, Charlotte, N. C.—Surveys have been begun by this company for the extension proposed to be constructed from Gastonia to Spartanburg, S. C., about 50 miles.

Ardmore (Okla.) Railway.—This company, which has recently been organized to take over the property of the Ardmore Electric Railway, will soon place the line in operation. The property will be put in first-class condition. Citizens of the Fourth Ward, southeast Ardmore, have offered a substantial bonus for an extension of the line to that section, and it is said the proposition is being considered by the company.

***Tulsa, Okla.**—The Tulsa Chamber of Commerce has under consideration a proposition submitted by promoters of an electric interurban line from Columbus, Kan., to Tulsa, Okla. John R. Ross, president of the company promoting the proposed interurban, conferred with officials of the Chamber of Commerce, asking a cash bonus of $100,000, 10 acres as a site for terminals, a site for a downtown office and right-of-way from Tulsa to Collinsville. Under the proposition submitted, the company would erect a magnificent interurban terminal station at Tulsa, in which city shops and general offices of the line would also be maintained.

Ottawa (Ont.) Electric Railway.—This company plans to build a bridge at Rockliffe Park, to be of concrete and steel construction. The cost is estimated at $6,000.

Toronto (Ont.) Suburban Railway.—The City Council of Toronto has decided to request the Toronto Suburban Railway to construct a line on Davenport Road east of Bathurst Street.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—This company reports that it will reconstruct about one-half mile of single track with double track on London Street between the Michigan Central Railway and Bridge Avenue, Windsor.

Portland Railway, Light & Power Company, Portland, Ore.—Under a plan adopted by the City Council, the Portland Railway, Light & Power Company will be compelled to stand 8 per cent of the cost of eliminating grade crossings along the line of the Oregon-Washington Railroad & Navigation Company's tracks, from the head of Sullivan's Gulch to the city limits, amounting to $48,000.

***Hershey, Pa.**—It is reported that a new electric line to begin at Manheim, Pa., extending through the country district of Lebanon County, touching at Union Square, Mastersonville, Mount Gretna, Colebrook, Lawn and Bachmansville, is to be built in the near future. The M. S. Hershey Chocolate Company interests are among the backers of the project, which was first suggested by citizens from Manheim and Bachmansville. The Manheim people have agreed to build a line of about 16 miles if the Hershey interests will build a line from near Deodate, a distance of 2½ miles. A survey of the proposed route is now being made. The proposed line would connect near Deodate with a line extending from Hershey to Elizabethtown. The entire road will be operated when completed by the Hershey interests.

Port Jervis & Delaware Valley Railroad, Matomoras, Pa.—This company has been organized to construct a line from Matamoras to Milford. The stockholders authorized a bond issue of $500,000, $125,000 of which is to be used in the construction of the new road, the balance to be held in reserve for future extensions and development. The following officers were elected. J. A. Vandegrift, president; Alfred Marvin, Matomoras, vice-president; W. A. Cullen, secretary, and W. E. Soden, treasurer. E. E. Mandeville, president of the Port Jervis Light & Power Company, James S. Holden and J. H. Van Etten were also included in the board of directors. [March 25, '16.]

West Penn Traction Company, Pittsburgh, Pa.—It is reported that this company is contemplating the construction of an extension to Dunbar, via South Connellsville, bridging the Yough River at Fayette.

Rhode Island Company, Providence, R. I.—This company is relocating its tracks from the south side to the center of the County road at Hampton Meadows, Barrington.

Saskatoon (Sask.) Municipal Railway.—The City Council of Saskatoon plans to construct about 1200 ft. of double track to cost approximately $8,600.

Carolina Rapid Transit Company, Clinton, S. C.—A report from this company states that plans are being made to begin construction within six to twelve months on its proposed line to connect Spartanburg, Woodruff, Union, Laurens, Clinton and Cross Anchor. A meeting will be held by the board of corporators on June 20 for the purpose of considering bids for the preliminary survey of the various routes suggested. J. F. Jacobs, Clinton, president. [May 6, '16.]

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company is reconstructing its double tracks along Oak Street, Chattanooga.

Beaumont (Tex.) Traction Company.—Approximately $100,000 will be spent by the Beaumont Traction Company within the next few months for improvements to its lines in Beaumont. The reconstruction and paving of 1½ miles of track on Magnolia Avenue will cost about $68,000, and the reconstruction and paving of tracks on Emmett Avenue about $11,000. The 1½-mile extension to the Magnolia refinery will cost about $20,000. Work on these improvements will be begun immediately.

Corpus Christi (Tex.) Traction Company.—Work has been begun on the construction of this company's line from Corpus Christi to Ward Island, a distance of 12 miles, the track paralleling the shores of Corpus Christi Bay and penetrating a rich vegetable and grain producing section. The second line, upon which construction will be begun within twelve months, will extend west for a distance of 15 miles, its ultimate destination being Bishop. Electric cars will be operated for the passenger traffic and gasoline cars for the freight service. It is stated that an arrangement will be made with the Corpus Christi Railway & Light Company for the use of its lines within the city limits. At Ward Island the Corpus Christi Traction Company owns 2800 acres of land, surrounded on two sides by Corpus Christi Bay and on the other sides by the Oso Arroyo, which will be converted into a summer amusement park. J. H. Caswell, Corpus Christi, general manager. [April 1, '16.]

Houston, Richmond & Western Traction Company, Houston, Tex.—Contracts are being placed by the Houston, Richmond & Western Traction Company for material for the construction of its proposed electric interurban railway between Houston and San Antonio. C. C. Godman, Kansas City, president. [May 13, '16.]

Seattle, Renton & Southern Railway, Seattle, Wash.—About $225,000 will be expended on improvements to the Seattle, Renton & Southern Railway, which has recently been purchased by bondholders, represented by Peabody, Houghteling & Company, Chicago.

SHOPS AND BUILDINGS

Waterbury & Milldale Tramway Company, Waterbury, Conn.—This company reports that contracts have been let for the construction of its new carhouse at Meriden and Frost Roads, Waterbury.

Springfield (Mass.) Street Railway.—This company is building a new operating house at Westfield to be used for storage and to take the place of its two old carhouses, which will be turned into repair shops. New machinery and equipment will be added.

Salem & Pennsgrove Traction Company, Salem, N. J.—This company, which is building a line between Salem and Pennsgrove, has prepared plans for the construction of a new carhouse. Stern & Silverman, Philadelphia, are engineers.

Waverly, Sayre & Athens Traction Company, Waverly, N. Y.—A report from this company states that it is now placing concrete floors and inclosed pits in its carhouse and is installing an electric car hoist purchased from the Columbia Machine Works & Malleable Iron.

Northern Ohio Traction & Light Company, Akron, Ohio. This company has awarded contracts for the steel work of its new terminal building on North Main Street to the McClintic-Marshall Company of Pittsburgh for about $100,000. Contracts for the foundation and brick work will be awarded soon.

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—It is reported that this company plans to construct an interurban station.

POWER HOUSES AND SUBSTATIONS

Morris County Traction Company, Morristown, N. J.—Plans are being made by this company to erect a new transformer station in the vicinity of Kenvil, with a new pole line to connect with the Dover transmission system.

Salem & Pennsgrove Traction Company, Salem, N. J.—Plans have been prepared by this company for the construction of a new brick and concrete power station. Stern & Silverman, Philadelphia, are engineers.

Columbus Railway, Power & Light Company, Columbus, Ohio.—On June 12 the City Council defeated the ordinance granting the company permission to build a power house on its property on the Scioto River bank, just north of West Broad Street. The Council took the ground that it should prevent the erection of permanent structures on the immediate river banks until the conservancy commission has established and promulgated definite flood prevention plans.

Cleburne (Tex.) Street Railway—Superintendent Daniel DeWitt of the Cleburne Street Railway reports that the work of installing the rotary converter and building a feed line east of the Santa Fé tracks is going forward satisfactorily. The Texas Light & Power Company expects to cut the power in as soon as the converter is installed and the feed line built, which will enable the Cleburne Street Railway to operate its cars. This is expected to be done before July 1.

Houston, Richmond & Western Traction Company, Houston, Tex.—It is reported that a contract will soon be let by this company for the construction of a power station in connection with its proposed line between Houston and San Antonio. C. C. Godman, Kansas City, president.

Manufactures and Supplies

MAINTENANCE DEPARTMENTS BUSY ON REPAIR WORK

Although the demand for electric railway shop and carhouse tools and machinery has been small during the past year compared with the tremendous flood of orders for machinery and machine tools from other manufacturing fields, particularly that of munitions, yet there has been considerable activity in this field. Indeed, according to the statements made by the manufacturers as a result of a large number of personal interviews and mail inquiries, the sales to electric railway companies have been at least as large as last year and in several instances there has been a marked increase. The cause is ascribed to the general industrial activity which means that the railways are doing a larger business, thus subjecting their equipment to severer service conditions. Consequently there has been an increase in the amount of maintenance work and machinery required to repair defective mechanical and electrical rolling-stock apparatus.

One company which manufactures both car hoists and jacks reports a relatively stronger demand for the former tool, the explanation being that the railways are becoming more impressed with the advantages of greater quickness and safety in making car repairs by lifting the car body off the truck by means of the car hoist rather than making use of the jacking-up process. There has also been an increased call for various types of apparatus used in repairing motors and rewinding motor coils. Such machinery as portable electric drills and grinders, certain resistance-type electric welding outfits and oil burners are finding a good market for track as well as for repair shop purposes. For indoor work, portable electric drills are said to be more in demand by carbuilding plants than by the shops of the railways themselves. A maker of oxy-acetylene apparatus for welding and cutting metals reports a steadily growing business in the Eastern railway field, with a prospect of continued growth during the next six months.

Owing to the high prices and difficulty of obtaining raw materials and also because of the overcrowding of factories with orders in general, 10 per cent advances in prices have been made by some of the larger electrical manufacturers who sell small motors for use with grinding wheels, small drill presses and air compressors, motor-generator welding sets, resistance grids and portable electric tools for use in electric railway repair shops. Prices of lathes, wheel presses and boring machines have also risen from 10 to 15 per cent within about a year. Some of the makers of welding and burner outfits have not yet raised their prices but are uncertain of their future ability to stand pat on account of the uncertain raw material situation. One of the chief manufacturers of electric drills and grinders has not changed, and does not contemplate any changes in, its prices on 500 to 600-volt machines, such as are customarily used in repair shops. On the other hand, another company, which makes similar tools for only 110 to 220 volts, is about to make an advance of 20 per cent in prices.

Deliveries of repair shop machinery, which are being much retarded at present by the difficulty in obtaining raw materials, seem to be suffering a great delay among the larger manufacturers of miscellaneous electrical apparatus. For example, small motors are taking eight to nine weeks to deliver and various kind of motor repair machinery about one month. The deliveries on 500, 550, and 600-volt drills and grinders for repair shops are taking from about one to three weeks; certain types of repair-shop lathes about one month. Wheel presses can be secured immediately from stock. The condition of deliveries on some of the larger forms of shop machinery are subject to great variation according to the present demand from other industries for the different types. On some grades reasonable shipments are possible while others which are popular with the general industrial fields cannot be obtained sooner than from two to six months. Deliveries on complete welding apparatus, although varying a great deal in length of time, in some cases can be made from stock in a week or less. Prompt deliveries, although frequently non-obtainable, have lately been particularly urgent, owing to the fact that requisitions for new machinery made out by the railway maintenance departments are often being held up for some time before the expenditure is authorized, at the end of which time the need for the repair machinery has become extra pressing.

ROLLING STOCK

Sioux Falls (S. D.) Traction System has just purchased a new car.

Johnstown (Pa.) Traction Company recently lost one of its cars by fire.

Union Street Railway, New Bedford, Mass., expects to purchase twelve closed car bodies.

Des Moines (Ia.) City Railway has ordered two 1½-ton automobile trucks from the White Company.

Vicksburg Light & Traction Company, Vicksburg, Miss., has purchased one single-truck, double-end car, complete with equipment.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, has ordered six 50-ft. interurban cars from the Cincinnati Car Company.

New York Central Railroad, New York, N. Y., will convert nineteen of its standard trail cars into motor cars, with field control motors, for the electric suburban service. This re-equipment will be made in addition to the purchase of twelve new 70-ft. motor cars which this company will order, as previously noted.

Toronto (Ont.) Civic Railway, noted in the ELECTRIC RAILWAY JOURNAL as having recommended the purchase of thirteen new cars from the Preston Car & Coach Company at a cost of $4,907 per body, has had this recommendation accepted by the City Council, including also the following contracts for accessory equipment: trucks, Dawson & Company, price per set $828.50; electrical equipment, Canadian Westinghouse Company, price, each, $1,866; wire and cable, Eugene F. Phillips Electrical Works, Ltd., Montreal, per car $123.17; fare boxes, Coleman Fare Box Company, each $51.10.

New York State Railways-Rochester Lines are rebuilding forty double-truck cars for prepayment service. These cars are of the company "600" type. They are being lengthened from 46 ft. to 47 ft. 2 in., the additional length being due to the extension of the rear platform. The front platform has been altered by inclosing one side and adding a two-leaf, clear-glass folding door at the exit side. The rear platform has been equipped with a pair of two-leaf folding doors of the same type. The doors at both ends of the car are manually operated in connection with folding steps. The rear platform has no dividing rail. The cars will also be changed from double-end to single-end operation.

Kansas City (Mo.) Railways, noted in the ELECTRIC RAILWAY JOURNAL of May 13 as having ordered seventy-five closed prepayment cars from the St. Louis Car Company, has specified the following details for this equipment:

Seating capacity	48
Total weight of car	37,700 lb.
Bolster centers, length	19 ft. 7 in.
Length over body	29 ft. 10 in.
Length over vestibule	43 ft. 10 in.
Width over sills	8 ft. 6 in.
Width over all	8 ft. 8 in.
Height, rails to sills	31 in.
Sill to trolley base	8 ft. 10¾ in.
Body	Semi-steel
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Underframe	Steel
Air brakes	G.E.
Axles	Jones & Laughlin cold rolled
Control	K.35-G 2
Couplers	Railway Std.
Curtain fixtures	Forsythe short tip, closed
Window fixtures	Groove fixture
Curtain material	Pantasote
Destination signs	Hunter
Door-operating mechanism	St. Louis
Hand brakes	Peacock
Heaters	Consol.
Headlights	Golden Glow
Motors	4 G. E. 247, form D, inside hung
Registers	International R-7
Seats	St. Louis stationary, rattan
Step treads	Universal anti-slip
Trolley catchers	Earll
Trolley base	U. S. 13
Varnish	Murphy
Ventilators	St. Louis Special
Wheels	Griffin, 30 in., cast iron

The general type of these new cars will be the same as the last order of fifty cars placed with the American Car Company, except that bulkheads on the cars now ordered will be of steel construction instead of wood, as in the previous order.

Reading Transit & Light Company, Reading, Pa., noted in the ELECTRIC RAILWAY JOURNAL of April 15 as having ordered fifteen semi-convertible motor cars from The J. G. Brill Company, has specified the following details for this equipment:

Seating capacity	52
Length of carbody over corner posts	33 ft. 10 in.
Length of each vestibule from end of car body to outside vestibule sheathing	5 ft. 6 in.
Length of car body over vestibules	44 ft. 10 in.
Length of car body over bumpers	46 ft. 1 in.
Width of car body over sills and sheathing.	8 ft. 5 in.
Extreme width not to exceed,	8 ft. 7 in.
Height from rail to top of floor,	3 ft. 5⅞ in.
Center to center of side posts,	2 ft. 5 in.
Height from rail to top of trolley board	11 ft. 10¾ in.
Radius of sharpest curve	35 ft.
Platforms,	Round-end; sheathed outside and inside with sheet steel
Doors,	Four-part folding; upper panels glazed
Underframe	Composite
Bolsters	Truss; wrought iron
Flooring,	Yellow pine; maple mat strips in aisle and on platform
Roof,	Brill plain arch; poplar covered with duck; concealed steel rafters
Ventilators	Railway utility
Brakes,	Peacock; Brill patented ratchet handles of bronze
Bumpers	Hedley anti-climbers
Drawbars	Brill radial
Gongs	Brill "Dedenda"
Bells	Brill bronze
Trimmings	Bronze
Inside finish	Cherry, stained dull
Seats and backs	Brill "Winner"
Heaters	Peter Smith
Headlights	Crouse-Hinds
Curtains	Pantasote
Sand boxes	Brill "Dumpit"
Body frame,	Ash and yellow pine
Posts	Ash
Steps,	Folding; Mason safety tread
Retrievers	Ohio Brass
Registers	International
Life guards	H-B
Signs	Hunter
Push buttons,	Consol.; Farraday buzzer in vestibule
Window arrangement,	Brill semi-convertible tandem sash
Motors	GE-247-D
Fixtures	Safety Car H. & L. Co.
Air brakes	G. E.
Trucks,	27 M.C.B. 1 trucks, double; 6 ft. wheelbase; Brill half-ball brake hangers; Brill journal boxes

TRADE NOTES

White & Kemble, New York, N. Y., have removed their office from 56 Pine Street to the Liberty Tower, 55 Liberty Street.

American Spray Company, Boston, Mass., has issued Bulletins Nos. 42 and 61 describing its spray air cooling and washing system for air entering generators and other machinery.

Scofield Engineering Company, Philadelphia, Pa., is preparing plans with DeArmond, Ashmead & Bickley, engineers and architects, for a new twelve-story office building and separate power house building for the Franklin Trust Company. Specifications for this undertaking will be ready about June 20.

F. R. Blair, formerly secretary, treasurer and sales manager of the S. K. F. Ball Bearing Company, has resigned to become president of the F. R. Blair & Company, Inc., with offices at 50 Church Street, New York. Mr. Blair is engaged in developing motor efficiency devices for use with automobiles.

G. C. Kuhlman Car Company, Cleveland, Ohio, on June 12 filed plans with the building commissioner at Cleveland, Ohio, for an extension to its plant on 140th street. It will be 442 ft. long and 81 ft. wide, and will contain 35,863 sq. ft. of floor space. The construction will be brick and steel and will cost about $100,000.

Holden & White, Chicago, Ill., general sales agents in the United States for the Wasson Engineering & Supply Company, have received an order from the Des Moines City Railway for forty-one Wasson air retrieving trolley bases. These bases will be used on the new cars now being built for Des Moines by the McGuire-Cummings Manufacturing Company.

Roller-Smith Company, New York, N. Y., maker of electrical instruments and circuit breakers, has established another sales agency, namely, the Electrical Material Company, 589 Howard Street, San Francisco. The latter company will handle the Roller-Smith products in part of the States of California, Oregon and Idaho and the entire State of Nevada.

Graphite Lubricating Company, Bound Brook, N. J., has changed its name to the Bound Brook Oil-less Bearing Company. The change in name was made owing to the many misinterpretations as to the exact nature of this company's products. No change in organization has been made. The company manufactures Bound Brook graphite and bronze oil-less bearings and Nigrum-treated wood oil-less bearings, exclusively.

Union Switch & Signal Company, Swissvale, Pa., has put on the market a form of soldering paste known as "Union Soldering Paste" which is strictly non-acid and therefore free from ingredients which cause corrosion. This paste is particularly designed for making joints in signal wires. Its constituent parts are pure neutral salts in a solution held strictly to government specifications, and a pure high-grade hydrocarbon conveyor.

General Electric Company, Schenectady, N. Y., has received an order from the New York Central Railroad for twelve two-motor equipments of the GE-260 type, the motors having a rating of approximately 200 hp. P. C. control will be used with these equipments. This company has also received an order from the Connecticut company for thirty double-motor equipments and air brakes. The motors will be used with K control.

ADVERTISING LITERATURE

Norton Company, Worcester, Mass., has issued a catalog describing and illustrating the many and varied types of its grinding wheels and accessory machinery.

Roller-Smith Company, New York, N. Y., has issued Bulletin No. 200, which describes its portable direct-reading bond testers for testing the conductivity of rail bonds.

American Taximeter Company, New York, N. Y., has issued a booklet describing and illustrating its various types of "Superior" recording instruments for automobiles and trucks.

Alexander Milburn Company, Baltimore, Md., has issued a catalog describing and illustrating its oxy-acetylene welding and cutting apparatus, including welding torch, regulators, cutting torch and oxy-acetylene plants.

C. W. Hunt Company, West New Brighton, N. Y., has issued Catalog No. 15-3, which contains illustrations and complete descriptions of its standard types of gates or valves for controlling the flow of bulk materials. The dimensions are given on those which are more frequently used in power house and storage pocket design.

Hensley Trolley & Manufacturing Company, Detroit, Mich., has issued a forty-page catalog illustrating its facilities for manufacturing trolley wheels, harps, contact springs and washers, and setting forth the advantages of these Hensley products. This company advises that since the beginning of 1914, it has more than trebled the sale of its trolley wheels which necessitated quadrupling its plant floor space.

TRANSPORTATION PLANK IN REPUBLICAN PLATFORM

Planks from the Republican platform of interest to the electric railway transportation industry follow:

"Interstate and intrastate transportation has become so interwoven that the attempt to apply two, and often several, sets of laws to its regulation has produced conflicts of authority, embarrassment in operation and inconvenience and expense to the public. The entire transportation system of the country has become essentially national. We, therefore, favor such action by legislation, or, if necessary, through an amendment to the Constitution of the United States as will result in placing it under exclusive federal control.

"We believe in a careful husbandry of all the natural resources of the nation—a husbandry which means development without waste, use without abuse.

"We pledge the Republican party to the faithful enforcement of all federal laws passed for the protection of labor. We favor vocational education, the enactment and rigid enforcement of a federal child-labor law, the enactment of a generous and comprehensive workmen's compensation law, within the commerce power of Congress, and an accident compensation law covering all government employees. We favor the collection and collation under the direction of the Department of Labor of complete data relating to industrial hazards for the information of Congress, to the end that such legislation may be adopted as may be calculated to secure the safety, conservation and protection of labor from the dangers incident to industry and transportation."

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"MANUFACTURERS AND OTHERS" Language is made up of words coined to meet the exigencies of the times. One such exigency is created by the new group of company members of the American Electric Railway Association, the "manufacturers and others," especially the others. Of course, there are no distinctions drawn by the association among the company members, but it is and will be often convenient to refer to the non-railway-operating element in the company membership, and a word would be very convenient. The term "manufacturer," for example, is not appropriate for a firm of consulting engineers or for a publishing company, both of which are eligible as members under the present constitution. Who will suggest the proper word?

AN EXAMPLE IN STANDARDIZATION The practical conclusion of the work of the Master Car Builders' committee for developing a single standard coupler, as reported last week, offers an example that may well be taken to heart by the electric railway industry. When this committee began its work, the need for a single standard design of coupler was quite comparable to that which exists in many items of electric railway equipment. Operation was perfectly feasible under the old plan of having a score or more of slightly different designs in service, because all of them coupled together. Where conditions were bad, however, lay in the fact that a great number of repair parts had to be carried in stock to provide for the various makes, and at the same time these makes displayed a wide variation in reliability and strength. Naturally, the development of a single standard design offered a definite remedy. But opposed to this was the fact that a number of railroads had standardized on certain couplers, and, of course, each manufacturer considered his own particular design was the best and that he could prove it. Clearly enough, if the master car builders had had a weak organization which received only half-hearted co-operation from the railroads, it is inconceivable that such obstacles to the introduction of a single standard coupler could have been overcome. As a matter of fact, however, the organization has been able to bring all of the roads into line by what may be termed direct compulsion, and has even succeeded in having the manufacturers agree to discard their old patterns in favor of the standard super-design that has resulted from the coupler committee's four years' work. Is there any real reason why the electric railways cannot do as much with their own association standards?

1916 CONVENTION PROSPECTS The conventions of the Master Car Builders and American Railway Master Mechanics' Associations just closed showed that Atlantic City has lost none of its popularity as a place for large national conventions and exhibitions. The official figures on registration were not available when this paragraph went to press, but the square feet of exhibit space had increased from 70,412 in 1915 to 76,512 in 1916, and the number of exhibits from 222 to 260, and undoubtedly the attendance of railway men, manufacturers and guests was larger than last year. The meetings were also well attended, the discussion was active and spirited and the manufacturers reported that more than the usual attention was given to the exhibits of the railway men in attendance. One reason for this undoubtedly is that the business of the steam roads during the last year has been larger than for a long time and they have done more buying. These facts undoubtedly gave a zest to both the proceedings and exhibits. All of this is interesting in connection with the electric railway convention next October. The last six months have also witnessed large increases in the traffic of the electric roads as well as in the orders placed by them, and these increases should be reflected in the attendance at the October convention, and in the size and number of the exhibits. Another reason why manufacturers should exhibit this year is because there was no exhibit last year. It is the logical year for a good convention and a good exhibit.

TRAIN DETENTION RECORDS The Master Mechanics' committee on electric rolling stock brought up again this year the subject of train delay records for electrified divisions of steam railroads, and the recommendation to standardize the form for such statistics is decidedly pertinent. At the present time when electrifications are relatively few in number the opportunity for setting up standard records is excellent, and once that such a form is agreed on even by a few companies its permanent establishment is assured. The obvious reason is that as other railroads enter the field of electric operation it is easier for them to adopt a method that is already in general use than to work out something different for themselves. Delay statistics for electric rolling stock offer too many features of importance to be deprived of the ready aid in connection with comparisons that is afforded by a single standard basis, and the recommendations of the committee, repeated from last year's report, provide for the simplest and most readily understandable form that appears to be available. This is that, for the maintenance department, train detentions for any period should be totaled in the basis of miles per detention, and not on the basis of miles per minute of detention, because the extent of any delay is largely a matter of luck. Reliability is reflected in having a small number of delays and not in having a possibly large number of delays that all happen to be short. The recommended classification of causes of detention as mechanical, electrical and man failures is also important, and electrified divisions would do well to adopt it at once in their maintenance records as well as the use of the basic unit of mileage per detention.

EDUCATIONAL OPPORTUNITY FOR MANUFACTURERS Recent meetings of sectional electric railway associations illustrate splendidly a fact to which attention has been directed before, but which is worthy of consideration by all who are responsible for convention program making. This is that the manufacturers are in a position to present for consideration the latest specialized data in their respective fields. By the nature of their work they are bound to have in their employ technical talent capable of "sizing up" the requirements which they aim to meet. Within limits this talent is available in the preparation of convention papers. Approximately one-third of every local program might profitably be occupied in the presentation and discussion of papers by manufacturers. These papers should be of high quality, in every way on a par with those prepared by railway men. They should be prepared to advance the whole industry and not primarily to promote the commercial interests of the authors or the companies they represent. They should contain accurate data of reference value selected to answer the question, "What does the railway man want to know on this subject?" rather than "What does the manufacturer want to say?" They should be presented in person by officials qualified and authorized to answer any legitimate question raised in discussion. Obviously, such men will be sure of their ground before consenting to present papers of the kind desired, for if they have facts which they wish to conceal a wide-awake meeting is no place for them. The technical press gives wide publicity to meritorious papers presented before the company sections and sectional associations. The manufacturer who speaks well before them thus addresses in effect the entire industry. He has here an exceptional educational opportunity to impart desired information, an opportunity which is worthy of his best effort.

MUNICIPAL OWNERSHIP FIASCO The response of Superintendent Valentine to the request of the Seattle Council for some real information about the local municipal lines ought to be interesting reading to citizens of the city if they are desirous of finding out exactly where their insane desire for municipal ownership has led them. As our abstract shows, Mr. Valentine believes that Division "A" as now operated will not earn its operating expenses and interest prior to 1936, and Division "C" will not earn its operating expenses prior to 1926. Moreover, even with an extension to Ballard, Division "A" will not become a paying utility for twenty-three years, to say nothing of the time required to wipe out the total deficit of $668,000 that will have accrued by the end of this period. This is a showing at which the city might well be disturbed, but it would be much worse if all proper charges were figured in so as to permit a just comparison with privately-owned utilities. For example, the State Bureau of Accountancy calculates depreciation for 1915 at $8,233, but this is not covered by a reserve but by a deduction from the investment so as to lessen the taxable value. Moreover, comparative taxes, though calculated for 1915, are evidently not considered in determining future results, while charges for accounting, supervision, legal advice and financial work done by other city departments are not mentioned. Nor is any more attention being paid to reserves for injuries and damages, insurance, etc. Were all these to be fully considered in estimating the prospects of the municipal lines, we imagine that Mr. Valentine's time limits would be found highly conservative. It is undoubtedly true, as he says, that the electric railway business is far from satisfactory from the point of view of the operator, but poor results in Seattle have been brought about far less by general railway conditions than by the inevitable attributes of municipal ownership. The folly of municipal ownership is well shown by the Seattle figures, and the lesson to be derived therefrom should be apparent to all.

PREPAREDNESS FOR PEACE CONDITIONS

The business situation at the end of the war has worried electric railway operators just as it has the owners of other industries. When the war was declared, all sorts of predictions were made as to the effect upon business in this country. For some six months the New York Stock Exchange was closed for fear that American securities held abroad would be sold at low prices here and thus disarrange the security market. The forecasts made at that time included those of high interest rates because of the demand for capital abroad and low interest rates because our principal customers could not take our manufactured products. About the only prediction upon which most forecasters agreed was that the war could not last long because the finances of the several countries could not stand it. Nevertheless, it has been going on for nearly two years at a cost of nearly $100,000,000 a day, and none of the countries yet has shown signs of being obliged to stop simply because of lack of funds.

One of the most illuminating discussions on the general business situation which we have seen is an address presented by George E. Roberts of the National City Bank on June 13 before the Michigan Bankers Association at Flint, Mich. While guarded as to definite predictions of the situation after the war, Mr. Roberts corrects some popular misconceptions as to existing conditions and so furnishes an outline of what may be expected at the close of the war.

The first point made is that the amount of productive property already destroyed, as compared with the total amount of property in existence, is comparatively small, even in the countries at war. Most of the destruction has been in equipment and supplies of current production, such as munitions and other war supplies, but production in these lines has been greatly stimulated, and higher prices have acted as a restraint upon the consumption of supplies of other kinds. Another point made is that the capital of the future is not being consumed because it cannot be. Enormous debts are being contracted by the nations involved, but this represents a redistribution of wealth, not an expenditure of capital before it is created, although, of course, the waste which is now going on is an economic loss. The critical period will be at the end of the war when the armies are dissolved and millions of men must find their places in civil life. The problem will then be to integrate the industries, not only at home but throughout the world and get them on a mutually supporting basis, so that those at work can purchase the products of others.

As regards the United States, when the war is over we shall owe less abroad, but we shall be in an abnormal condition as regards wages, prices and industrial conditions to which we must become adjusted. This can be done only by realizing now that the present situation is temporary and that the need of the hour in preparing for the close of the war is higher efficiency in organization, in management and at the work bench so that the disturbance of industrial conditions at the close of the war will be as small as possible. If this is done, it will still be possible to pay higher wages here than are paid in other countries and yet sell goods abroad if we can lead the world in methods of production. This, then, is the lesson to electric railways. They should so improve their fundamental conditions that when the time for adjustment comes they will be able to take care of the situation as it is then presented.

PROFITABLE ENERGY SAVING

It requires on the average about 125 watt-hours per ton-mile to operate a car in city service. Translated into a more comprehensible unit, this is 166 foot-tons. That is, the same amount of energy is required to move the car 1 mile on the level as would raise it vertically 166 ft. All of this energy goes into heat, part of the loss being preventable, the balance otherwise.

So desirous of cutting down expenses is the present-day railway manager that he is willing to entertain any promising proposition in that direction. This explains the growing popularity of devices designed to save energy and increase service capacity of equipment. The questions to be answered in considering equipment charges are: Will they pay? and, Is this the best way in which the required capital can be invested? Correct affirmative or negative answers to these questions are necessary to the permanent good of the manufacturer as well as to the railway. In arriving at correct answers it is helpful first to visualize the present energy losses and then to consider the possibilities in the way of saving.

There are several elements in a car equipment the purpose of which is to produce or induce energy saving. Field control apparatus, anti-friction bearings, meters, coasting-time recorders, etc., are of this nature. These affect directly the rheostatic losses, car friction losses and brakeshoe friction losses, respectively, and produce indirect savings as well. That equipment is most profitable from the present viewpoint in which the investment in energy saving extras produces the largest net profit, everything considered.

Electrical engineers have evolved a formula which they have named Kelvin's law. This they sometimes use in calculating the size of wire for transmission lines. Divested of its attendant complications this formula states essentially that "The most economical size of wire is that for which the annual cost of energy wasted is equal to the interest on that portion of the investment which is proportional to the weight of copper used." A commonsense way of putting a principle of wide application, we must admit, a principle also that is sometimes overlooked. It can be applied in connection with the many plans which are being offered for saving energy in car operation, not mathematically, perhaps, but at least in a general way. The conclusion of the preceding paragraph is essentially a rewording of Kelvin's law for the more complicated case in hand.

At first glance it would appear that if we had a frictionless car to which the air offered no resistance we should be able to move it between two points on a level track without expenditure of energy. This would be the case if a uniform velocity could be maintained during the run. But if the car is to be brought up to speed from rest, energy must be stored due to the mass of the car, and this energy must be dissipated if the car is stopped. Hence, there would be a waste of energy even with a frictionless car. In ordinary city service the frictionless car would require at the wheel tread a third, more or less, of the usual actual energy. This "inertia" loss, which must be charged to the necessity for starting, will always be with us. It is dissipated in brakeshoe friction, and is less as the speed at the point of brakeshoe application is lower. Coasting conduces to saving in this direction. Another third of the energy consumption of the car goes into friction loss, in motors, gears, car journals and wheel flanges. From a third to a half of this is preventable by the use of bearings practically frictionless.

The remaining third of the energy consumption is in rheostatic resistance, motor core and copper losses, brush friction, air resistance, etc. It would not be far amiss to say that one-half of this third is lost in the starting grids, about a third in the motor items mentioned, and the remaining sixth in everything else. The principal chance to save here is in the first item, the magnitude of which may be reduced one-half or more by field control.

Of the three main schemes for saving energy the following may be said. They are all inherently good. In general they can all produce energy savings. Whether any or all are applicable in a given case is a matter for careful calculation.

A New Low-Floor, End-Entrance Car

The Wilmington & Philadelphia Traction Company Has Placed in Service a Number of Small-Wheel, Low-Floor Cars with Drop Platforms at the Ends—The Scale Weight Fully Equipped Is 30,540 Lb.

An order for thirty-one low-floor, end-entrance prepayment cars has recently been completed for the Wilmington & Philadelphia Traction Company, Wilmington, Del., in which the features of design are 26-in. wheels, 25-hp. motors, and an unusually light weight of 30,540 lb. The new cars have been placed in city and suburban operation in Wilmington, Del., and Chester, Pa., and in both cities they met with instantaneous and universal approval of the public and received complimentary descriptions in articles published in the local newspapers. The general dimensions are as follows:

Length over vestibules	40 ft.	Height, rail to sills	26½ in.
Length over body	29 ft.	Height, sill to trolley base,	9 ft. 1¾ in.
Width over sills	8 ft. 2 in.		
Width over all	8 ft. 6 in.	Bolster centers	17 ft. 4 in.

The principal points which the company had in mind in designing the new equipments were as follows: (1) Lightness; (2) suitability for use on both city and suburban lines; (3) convenience of passengers while boarding and alighting; (4) semi-convertible feature for all-year operation. The actual weight of the car, complete with motors, trucks, air brakes and all other accessories, is only 30,540 lb. This is apportioned among the parts of the car approximately as follows, the figures being estimated but checked against the actual total scale weight.

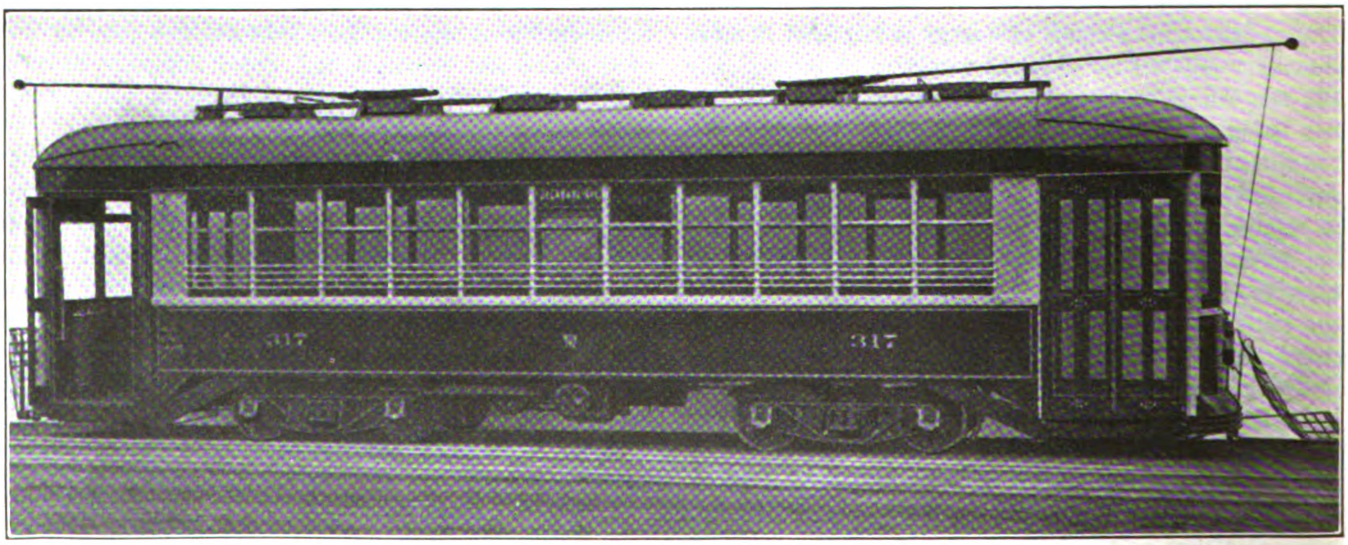
Car body	15,250 lb.	Trucks	9,557 lb.
Electrical equipment, excluding motors	1,220 lb.	Motors	3,497 lb.
Air brake equipment	1,016 lb.	Known weight of car complete	30,540 lb.

The unusually low total weight for a unit of this size, was made possible by adopting the Baldwin class 62/18/C arch bar type of truck with 26-in. wheels and a 5-ft., 2-in. wheelbase, and by installing a new type of General Electric motor, No. 258, which is of the ventilated type, and has a rated capacity of 25 hp. Four motors are used, one on each axle, thus securing the maximum possible adhesion which is necessary on account of heavy grades and rapid rates of acceleration.

The car body is made of light, all-steel construction. The length of the platforms, 5 ft. 6 in., was selected so as to reduce the length of the car and still provide sufficient room for the pay-within system of fare collection. The length of the body was also kept down by the adoption of a side-post spacing and seat centers of only 29 in. The light weight of the cars has already effected a gratifying economy of power, and in this connection it may be said that the company is now engaged in making a test to ascertain how much power the new cars take under various operating conditions. From the preliminary results obtained the electrical department estimates that the energy consumption will be low enough to effect a material saving.

The use of 26-in. wheels, which is an innovation in both Wilmington and Chester, has met with universal approval by the railway officials and the public. Advantage of the small wheel diameter has been taken in this case by the omission of one step, the passengers stepping directly from the street to the platform, a height of 15 in. By ramping the platform 1½ in. transversely at the end of the car-body floor and by ramping the car-body floor 3 3/16 in. longitudinally, it was possible to reduce the height of the step leading into the car itself to 12 in. This height is between 2 in. and 4 in. less than the second step on the company's old equipment, and is sufficiently low to allow the passengers to move with ease into the car body. Although a 9-in. step from the platform into the car is usual on high level cars, this difference in height is more than compensated for by the fact that every passenger on the new cars saves one step and about 12 in. over the usual type of car, which has a lift of 15½ in. from the ground to the first step, 14½ in. from the first step to the platform and 9 in. from the platform into the car, making a total of 39 in. Of course, these measurements vary, but the figures given are the heights on the new type of car with 33-in. wheels which this railway purchased in 1912. In addition, the low center of gravity has made the riding smooth and easy, and at the same time the coasting has been found to be remarkably good.

Passengers enter the cars at the rear platform and



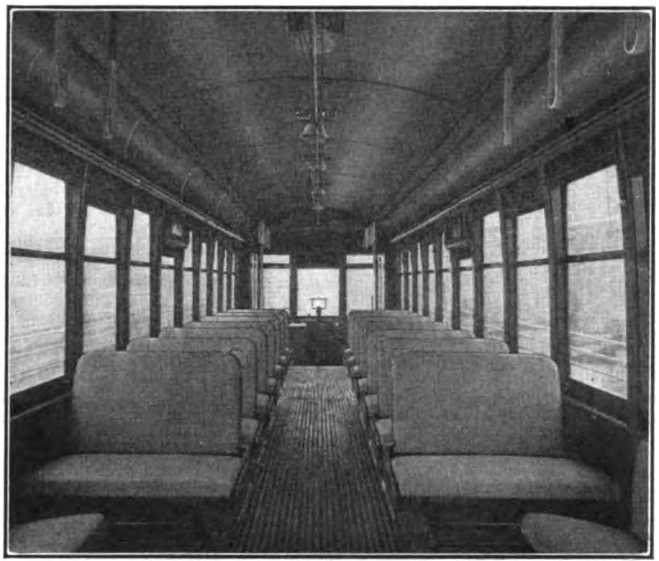
WILMINGTON CARS—SIDE VIEW SHOWING STEPLESS PLATFORMS leave by the front platform. However, in cases where the car is crowded, making it difficult for persons in the rear to get through the aisle in order to leave by the front platform, they are permitted to leave by the rear platform. The public instantly adapted itself to this rear-entrance and front-exit plan of operation, and the low-level platforms have greatly facilitated the loading and unloading of the cars. Nearly all of the passengers move off the platform when alighting as if stepping from the sidewalk into the street, without taking hold of the handles. The prepayment method of fare collection, which is new on the system, is simplified by the use of folding doors and the omission of a bulkhead between the platform and the interior of the car. Instead of bulkheads, vertical enameled grab posts are placed on each side of the car at this position. Fare boxes are not used for fare collection, but International registers are employed.

The wheel diameter of 26 in. was adopted instead of the more usual one of 24 in. for several reasons, the principal one being that sufficient clearance between the top of the rail and the under side of the front of the platform, also underneath the car body could not be obtained with 24-in. wheels, as there are a number of sharp vertical curves on the system, where the grade changes from level track to steep ascents. Also, cast-iron wheels were adopted, because the weight of the car, speed and operating conditions did not warrant the use of steel wheels, which would have cost more than twice as much as those that were used, and in addition, it was almost impossible, at the time when the cars were purchased, to get deliveries on rolled steel wheels.

INTERIOR ARRANGEMENT AND CONSTRUCTION

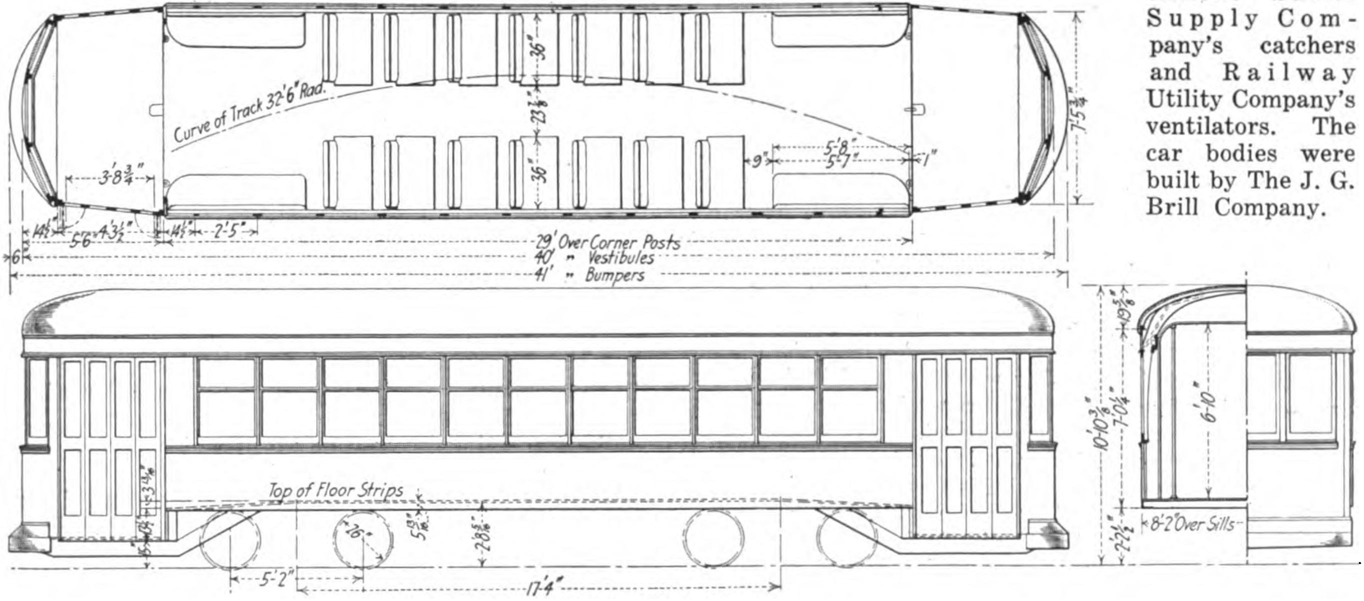
The interior of the car is neatly finished in Agasote, as a necessary adjunct to the Brill semi-convertible arrangement by which the upper and lower sash raise into the arch roof. The ceilings are painted in straw color while the interior trimmings of the car are finished in mahogany and bronze. The seats are of the reversible type, covered with rattan, and they provide a seating capacity of forty-four persons. Outside the cars are painted green, trimmed with cream, according to the standard of the traction company. Striping and numbering and the monogram of the company are in gold.

Steel underframing is used, the side sills being made of 5-in. x 3½-in. x 5/16-in. angles with the long leg horizontal. At the bolster this side sill is reinforced with a 6-in. x 3½-in. x 5/16-in. angle about 3 ft. long to relieve the strain on the horizontal leg of the sill angle. The end sills are of 3/16-in. pressed steel, the crossings being of ⅛-in. pressed steel riveted to the side sills. Bolted to the side sills are cast-steel bolsters, and the outside platform knees are of 7-in. x 3½-in. x ⅜-in. angle reinforced with 2-in. x 2-in. x ⅜-in. angles under the end sill. These outside platform knees are suspended from the pressed-steel end sill, the knee bearing directly under the side sill at the rear end. The center platform knees are of 4-in., 5.25-lb. channel, extending from end sill to bumper.


WILMINGTON CARS—INTERIOR VIEW

In the body framing of the car the side posts are of 2-in. x 2-in. x ¼-in. tees extending from the side sills to the top rails. The corner posts are of 3/32-in. steel, and the side sheathing is of the same thickness, being made in three sections. The plain-arch roof runs the full length of the car, supported on U-shaped, pressed-steel rafters.

Other specialties of car equipment includes Curtain Supply Company's curtain fixtures, Fabrikoid curtain material, Keystone destination signs, Parmenter fenders, Brill Dedenda gongs, Peacock staffless hand brakes, Peter Smith electric heaters, Golden Glow headlights, Electric Service Supply Company's catchers and Railway Utility Company's ventilators. The car bodies were built by The J. G. Brill Company.



WILMINGTON CARS—PLAN AND ELEVATION SHOWING GENERAL ARRANGEMENT

Power Generation for Electric Railways*

The Author Considers the Relative Merits of Small, Distributed Power Plants and Large Central Ones, and of Purchased versus Home-Made Power

By HENRY G. STOTT
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THE subject of power generation is a very broad one which must be studied from both the financial and economic viewpoints. A proposition can be perfectly successful from an engineering point of view, but be quite foolish from an economic one.

The first question which arises in any power generation problem is the cost of power, which is made up of two main items, fixed charges and operating charges. These in many cases are very nearly equal for steam plants. Fixed charges comprise interest on capital, amortization of capital, functional depreciation, taxes and a portion of administration expenses or running expenses. Operation and maintenance costs include all costs involved in operating the plant and in maintaining it at original efficiency. Unfortunately the element of fixed charges is often neglected or ignored in computing and comparing the cost of power.

The first item to be determined in fixed charges is what the money will cost, considering interest and providing for the return of the money to the owners. The latter is called an amortization charge and is usually included in with interest, resulting in a total cost for the money of about 6 per cent. Taxes form a larger percentage of the total cost of power than is often realized, amounting to 3.5 per cent on the total investment on the average, and varying between 2 per cent and 5 per cent. When all of the items in fixed charges are included the total cost of the money invested will be found to be not less than 10 per cent and probably 12 per cent or more.

In hydraulic plants the operating charges are so small as to be negligible while the fixed charges are very high.

SOME POWER-COST GRAPHICS

The diagrams reproduced herewith illustrate many points regarding the cost of power. Fig. 7 shows typical railway load curves, the lower one being the summer curve and the upper one the winter curve. Due to the heating load and the heavier schedule run, the winter load goes up to about 100,000 kw., and down, with a corresponding peak in the summer, to about 55,000 kw. The heating load in this particular case is about 20 per cent of the schedule load.

Fig. 1 is based upon Fig. 7, and illustrates the varying cost of power during twenty-four hours, and with varying amounts of power, supplied from a hydraulic plant, and a steam plant respectively. The total load is divided between the hydraulic plant and the steam plant, as indicated by the scales.

Figs. 2 and 3 show the costs with different sources of power. In all cases the cost of power during the small hours of the morning when the load is light, goes up to a high figure. The difference between the cost at 3 a. m. and 9 a. m. is very marked.

The first curve, *A*, is for hydroelectric power only. It shows how the cost is prohibitive at light loads. Curve *B* is for 75 per cent hydroelectric power and 25 per cent steam power, curve *C* is for half of each, and curve *D* is for all steam power. A combination of steam and hydroelectric power for certain load curves almost invariably provides a lower cost of power for railway work than power from either a straight steam or hydroelectric plant.

Fig. 4 shows the variation of cost of power with load factor, in a plant costing $60 per kilowatt. The lower curve plotted below the zero line shows the operating and maintenance costs, and the first curve above the zero line shows the fixed charges or investment costs. The latter curve indicates how important these charges become at light load. As the load factor increases the fixed charges become less, and there is also a decrease in operation and maintenance cost. At any load factor the total cost of power can be obtained by adding the two ordinates, as is done in the upper curve above the zero line. This curve indicates the importance of building up the load factor in any plant. Fig. 5 gives similar data for a plant costing $80 per kilowatt. Referring to the upper curve it will be seen that at 50 per cent load factor the total cost of power is about one-half of what it is at 20 per cent load factor.

In Fig. 6 the curves of Figs. 4 and 5 are superimposed to emphasize the difference in cost of plants *A* and *B* (see Fig. 8) when operating at 45 per cent and 25 per cent load factors.

DIVERSITY FACTOR OR TIME DIFFERENTIAL

Fig. 8 shows a typical load curve with a load curve of a small plant added for purposes of comparison. Let us assume that a small d.c. station is shut down and that its load is added to that of another plant which already had a fairly large load. This introduces another factor, which is sometimes called the "diversity factor." I do not think that this name describes the factor very well. "Time differential" is a better description. It simply means that if one can find a load to add on to his other load, in which the peak load or high point does not come at the same time as it does in the other load, then the second load can be carried with advantage without adding much to the capacity of the plant. In other words, the fixed charges will not be increased by adding the load in the valleys shown in Fig. 8, as long as it is not added also to the higher peak. The difference between the broken line and combined curve at the peak in this figure represents the time differential, and 5000 kw. in the total capacity of the plant would be saved by having this small load added.

The question of disposing of small plants and installing a new central plant is purely an economic problem. The question arises as to the money borrowed for the old plants, and whether it has been written off in the shape of depreciated capital. It is very important that the new plant with high-tension transmission should make up in higher efficiency for any loss in capital and at the same time show a net gain and superior operation over the previous installation.

In all probability the service from the central plant with long-distance high-tension transmission will not be as reliable as that from the small plant on account of lightning disturbances, which break the insulators and disrupt the transformers. That is, the "reliability factor" will not be as great. However, this objection is at

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*Abstract of an address delivered before the Connecticut Company section of the American Electric Railway Association on May 2, 1916.

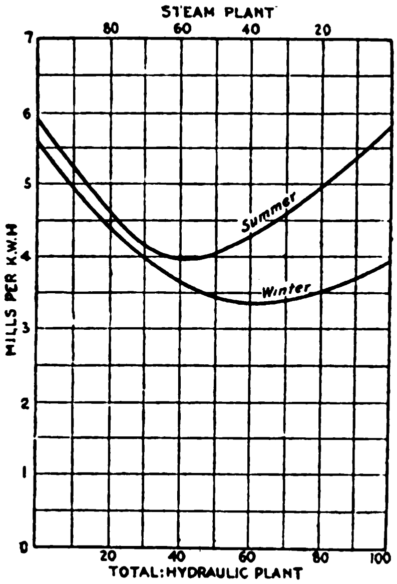


Fig. 1

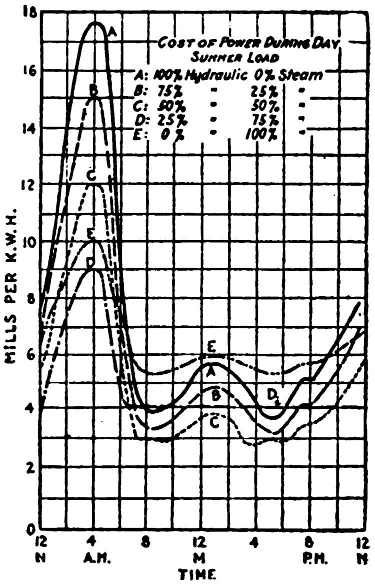


Fig. 2

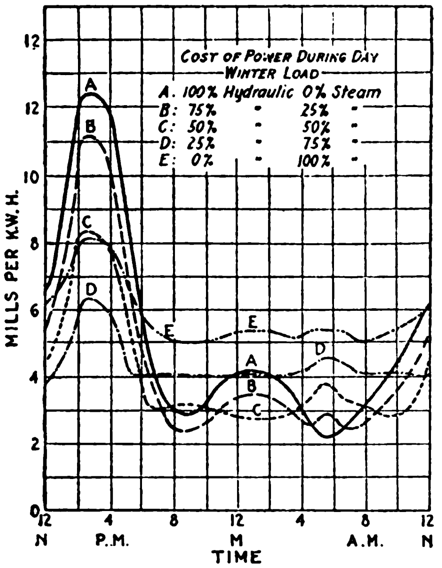


Fig. 3

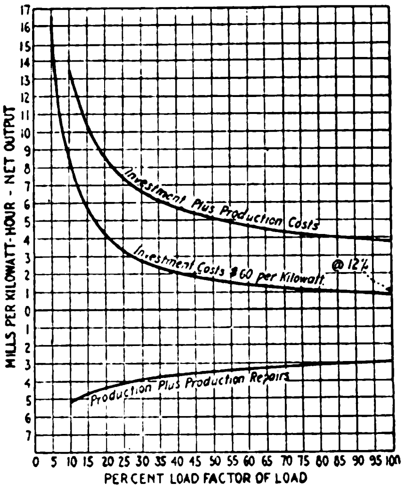


Fig. 4

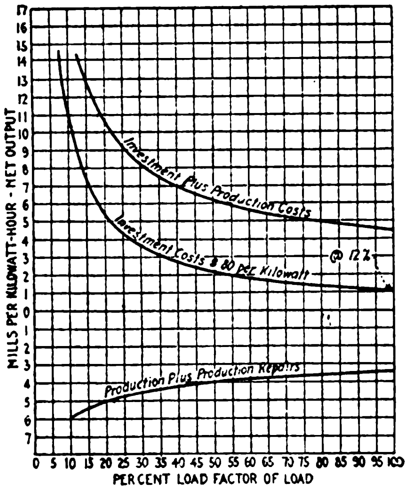


Fig. 5

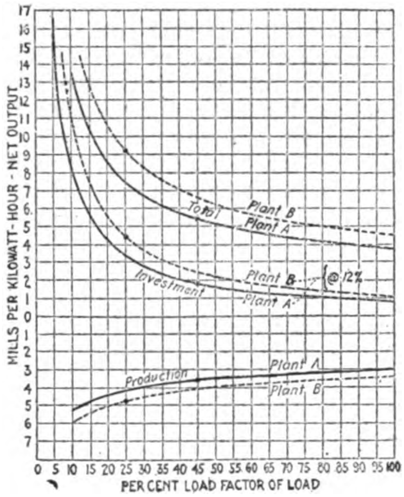


Fig. 6

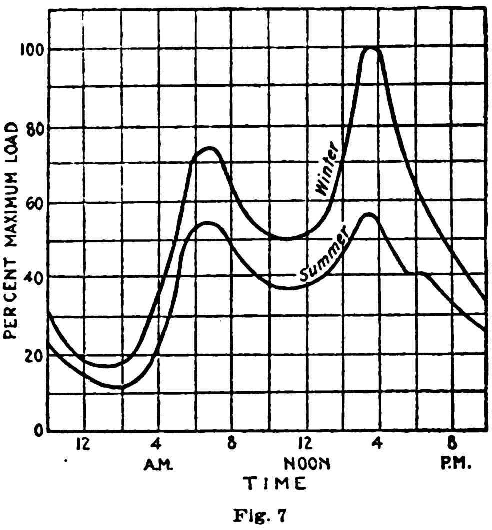


Fig. 7

Fig. 1—Daily average cost of power, steam and hydraulic plant—typical city load; Fig. 2, cost of power during day—summer load; Fig. 3, cost of power during day—winter load; Fig. 4, variation in cost of power with load factor in plant costing $60 per kilowatt; Fig. 5, variation of cost of power with load factor in plant costing $80 per kilowatt; Fig. 6, showing curves in Figs. 4 and 5 superimposed; Fig. 7, typical railway load curves; Fig. 8, combined load curves for large and small stations.

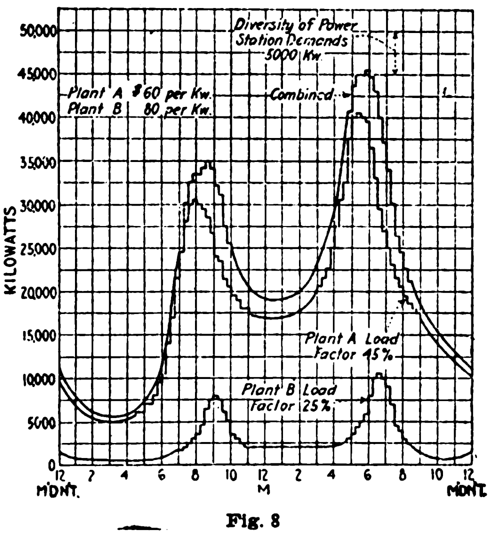


Fig. 8

Graphics of Power Generation for Electric Railways

present not very grave because the apparatus is being improved and made more capable of withstanding lightning shock.

POWER COSTS IN LARGE PLANTS

The size of plant has quite an appreciable effect on the cost of power. Below certain sizes, say below 1000 kw., the efficiency of the steam turbine goes down very rapidly with the size. In plants where such sizes of unit are needed it would be better to buy reciprocating engines, direct-connected to the generators than to put in turbines. As the size goes up, however, the turbine shows considerable improvement over what the reciprocating engine can do, and in units of 30,000-kw. capacity or more there is a very marked improvement. The unit purchased not long ago by the Interborough Rapid Transit Company is going to generate 70,000 kw. on 10.5 lb. of steam per kilowatt-hour.

Further, there must be a certain number of men to operate stations; engineers, firemen, oilers, etc. A man can take charge of a large unit as easily as he can a small one, so that the cost of labor does not go up in proportion to the size of the plant. That is another factor which makes a large plant cheaper proportionately. In a very large plant, however, the cost of these items is almost negligible, whereas the costs of coal and water are very important items, especially the former.

For illustration, when we started developing power for the electrification of the Manhattan Elevated Railroad system in New York, about fifteen years ago, it took almost 3 lb. of coal per kilowatt-hour and to-day we are using but 1.5 lb. with modern turbines. When the older units were put in they were the finest ever built and cost about $250,000 each. But owing to the progress of the steam turbine it seemed advisable to take out the engines and replace them with turbines, although their scrap value was only about $10,000 each. The problem of writing off this difference is a real one. It touches the question of what we might call the effect of obsolescence upon the economy of production.

SHALL RAILWAYS GENERATE OR PURCHASE POWER?

The general question as to whether the railway company should manufacture its own power or buy it, is a very interesting one. If we look at the question in its broadest aspect, there is no reason why a railroad company cannot build just as economical plants as any power company can build. The only difference is the one pointed out in Fig. 8, that is in the time differential. Suppose that there was a capacity of 50,000 kw. which the railway required only at certain times. If power could be sold to some consumer who would come in and fill up the "valley" in the railway load, power could be sold for practically nothing but the operating cost. It would, at the same time, cut down the cost to the railway, which would certainly expect to make a profit on what was sold.

The flatter the load curve, the cheaper the power. That is the main incentive for the general power company to get loads from all sources, various kinds of loads, and especially night loads. If the railway can build up a load factor as good as the power company can, then there is no reason why the railroad company should not make the power and sell some of it to some one else. If the power company can build up a better load factor than the railway can, for any reason, then the railway can make power cheaper than the power company can make it.

STEAM VERSUS WATER POWER

In the hydroelectric plant the first cost is probably two to three times what it would be for a first-class modern steam plant. The average installation of hydroelectric plants at the present time in first cost will amount to not less than $150 per kilowatt of capacity. A first-class steam plant can be put up to-day for an amount varying from about $55 to $75 per kilowatt of capacity depending on the size. If a big dam must be built for a large water storage, then the hydroelectric plant may run from $200 to $250 per kilowatt of capacity.

Another difficulty with the hydroelectric plant is that there are usually certain dry seasons when the hydroelectric power will be cut down largely, if not stopped altogether. The water supply is very uncertain unless enormous expense for dams and storage is incurred.

The financial question exists even in such water supplies as that furnished by the Niagara River. Some months ago in a consulting capacity I came in contact with a case where a large company, not very far from the Falls, was confronted by two conditions. First of all, it was not allowed to get any more power from the Falls. The governments of the United States and Canada had established a certain maximum number of cubic feet per second which they would allow to be diverted from the Falls, in order to preserve its scenic beauty. That point has now been reached. After making a thorough investigation of the shape of the load curve, and an analysis of the whole situation, and taking into consideration what power is costing now, it developed that the company could afford to put in a large steam plant of its own and make power at least as cheaply as it could buy power at Niagara Falls. That, of course, is conditioned on the load factor. If the full load would continue more than twelve hours a day the hydroelectric power would be cheaper. This company is now building a plant which will cost $4,000,000 so as to make the greater part of its own power.

If such a condition exists at Niagara Falls, one can imagine what the condition is in the average water-power plant, which runs dry half the time. When we talk of cheap hydroelectric power, there is a string attached to it. It is cheap, of course, when you consider only the cost of operating the water-power plant. But, as pointed out before, the money spent in building the plant must be paid for. Instead of paying for coal or other supplies as in a steam power plant, interest, etc., must be paid for the money in this case. For practically all cases where the load is that of a lighting or railway company, which means that its load factor is not more than 50 per cent at the very outside and in some case it goes down to 30 per cent, water power is a very questionable investment.

In connection with the operation of combined water-power and steam plants the following point should be noted. In order to make a hydroelectric proposition pay, and at the same time sell power at a low cost, the power must be used for a considerable number of hours in a day, or otherwise it must be sold at a high price or it will not be a paying proposition. The steam power plant, with its low fixed charges for a short number of hours per day (ten or twelve as the case may be), and for even a shorter time over the peak load, helps out by cutting down the fixed charges on the hydroelectric power, and in allowing these fixed charges to be distributed over twenty-four hours instead of six or seven.

DIRECT OR ALTERNATING CURRENT

Among other questions involved in the subject of power for electric railways is that as to whether it is better to operate a number of isolated plants, or to give up the d.c. system and extend with the a.c. generation system, in turn, converting the alternating current by means of rotary converters into direct current. The answer to that question, it seems to me, would necessarily depend to a very large extent on the size of the plant and the amount of load. This comes back again to the question of cost of power production.

The high-tension alternating current is cheaper to make, as a rule, but if the location of an existing power plant is far away and the load is small, then in all probability d.c. power is as cheap as a.c. power. When new units are to be put in, however, it would in general be a mistake to buy any more d.c. units, unless it may be simply a small addition, the reason being that it is necessary in practically every case to have engine-driven units for the small sizes. As already pointed out, if the units are small, better economy will be obtained from the engine, for in small sizes the economy of the steam turbine is poor. Again, the turbine requires a large amount of condensing water in order to get a good vacuum, and in some cases this may not be obtainable. On the other hand, if a new plant is being built then undoubtedly, where the transmission distance is not too great, it will probably pay to put in one central power plant to generate alternating current, and transmit it at the required high tension.

Electric Locomotive Drive

Discussed by Committee on Electric Rolling Stock at Convention of American Railway Master Mechanics This Week

At the annual convention of the American Railway Master Mechanics' Association, which was held in Atlantic City on June 19-21, the feature of most interest to the electric railway industry was the report of the standing committee on the design, maintenance and operation of electric rolling stock, a large part of this being devoted to the subject of electric locomotive drives. The report included descriptions of all means for transmitting power between the motors and the driving wheels that are in use on electric locomotives in this country. In connection with the gearless motors used on the New York Central Railroad, the report stated that, contrary to general opinion, the lack of spring support in this design did not appear to be hard on the track. There was, in fact, no track distortion whatever, nor undue wear on the rails. The opinion of the track foremen on the electrified district is that the rail wear from motor cars is greater than that produced by the locomotive, but in this connection it should be mentioned that 100-lb. rails are used within the electrified zone.

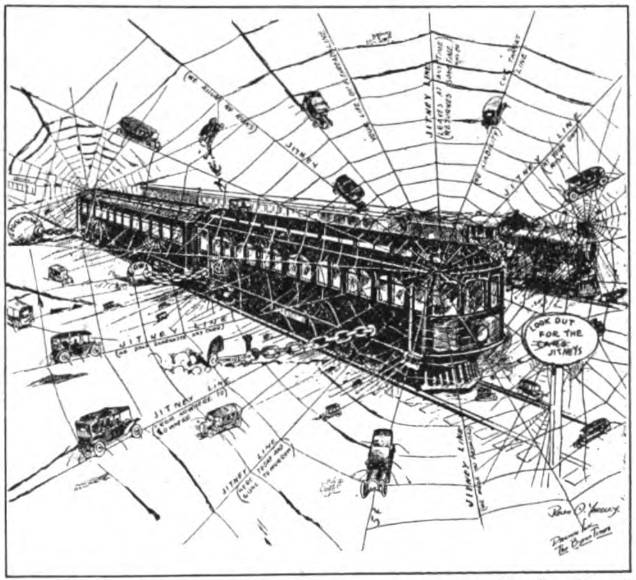
Comment was made upon the use of flexible gears as applied to the locomotives for the Chicago, Milwaukee & St. Paul Railway, these being said to produce an exceedingly quiet-running machine, although speeds as high as 60 m.p.h. were attained. Descriptions were given of the side-rod type of locomotive used on the Pennsylvania Railroad, and on the combined side-rod and jack-shaft design for the Norfolk & Western Railway. The quill type of drive used on the New Haven locomotives was also mentioned briefly.

In conclusion, the report stated that experience with electric locomotives had not been sufficient to warrant a final conclusion as to the merits of the various systems of transmission of power between the motors and the drivers. The fact that scarcely two orders for electric locomotives have been built from the same plans is evidence of this, and in view of the infancy of electric traction as applied to steam railways, it should not be surprising if a variety of designs continue to appear. As yet, however, the Scotch yoke, which has been used rather frequently on foreign locomotives, has not been applied in America.

The report also dealt with the subject of train detention statistics, stating that at the present time there is practically no uniformity in the delay records of railroads. There should, however, be delay statistics that are compiled with special reference toward the needs of the motive-power department as separate from the operating department. These motive department statistics should show miles per detention for the guidance of that department, leaving the basis of miles per minute detention for the sole use of the operating department. The records should classify train detentions under the headings of man failure, mechanical failure and electrical failure. All train detentions of one minute or more should be recorded, but delays to following trains should not be included in the motive power statistics, as such records are only misleading.

Artist's Idea of Jitney Competition

A very effective cartoon on the existing transportation systems in California appears in the issue for May 5 of the Byron (Cal.) *Times*. It is from the pen of Ralph O. Yardley, and the interurban car and the steam locomotive are shown stopped by an anchor and chains labeled "Commission," "Laws" and "Legislation," while the jitneys have spun a web about the car and locomotive. The jitney lines are marked "from nowhere to nowhere," "here to-day and gone to-morrow," "we assume no risks," "we don't guarantee anything," "at your own risk," "we make no promises," etc.


We assume no risks
Jitney
Jitney Line
Cut Throat Line
Jitney Line
Look out for the ~~Cars~~ Jitneys
Jitney Line
Jitney Line (From nowhere to nowhere)
Jitney Line (Here to-day and gone to-morrow)
Jitney Line
Ralph O. Yardley
Drawn for The Byron Times

Artist Yardley Draws One of the Most Remarkable Pictures of the Year Touching the Jitney Subject. Operators of Railway Lines, Who Have Spent Millions of Dollars, Are Honeycombed by the Irresponsible Jit, Which Networks Their Cars and Tracks, Hampers Transportation and Clamors for Public Support.
(Drawn Especially for the "Byron Times" by Ralph O. Yardley.)

CARTOON FROM BYRON (CAL.) "TIMES"

A reproduction of this sketch is published herewith.

The committee on electric wiring systems of the electrical industry has appointed a sub-committee to investigate bare grounded return wiring systems. William S. Boyd, Western Association of Electrical Inspectors, 175 West Jackson Boulevard, Chicago, Ill., is secretary of the sub-committee. The sub-committee desires the co-operation of the electrical industry in its studies and requests that information on wiring systems in which bare grounded conductors are used be sent to the secretary.

Storeroom Systems*

A Practical Discussion of the Purchasing and Handling of Supplies and of Stores Accounting with Specific Recommendations as to Procedure

By A. SCHWARZ
Vice-President Toledo & Western Railway

WHERE possible, material stock should be kept close to its point of use. For example, wheels and axles should be stored in a place convenient to the wheel press and lathe; lumber should be stored in a place near the carpenter shop and, in fact, all heavy materials should be stored just as near the point where it will be made ready for application or use as is possible after first unloading, effecting a saving in labor of expensive rehandling.

Material ordered for any specific purpose may be shipped direct to the point at which it is to be used but should be handled through the store accounts. If material is finally charged to operating or construction accounts by other than the stores department, a stock transfer voucher or storehouse invoice crediting stock accounts should be rendered against the department making final accounting for the material.

To care for this material properly the storehouse should be subdivided as follows: lumber, wheels, axles and castings, oils and waste, track material, line materials and miscellaneous materials such as are used in common by all departments of the railway, a material clerk being placed in direct charge of each of these classes of material. This material clerk should be provided with an office as near as possible to the stock over which he has charge so that he will be in position to see what is going on. Of course if the quantity of stock on hand does not justify this plan, one clerk may be able to handle all stock.

Where bins or racks are used to store material, they should have painted or stenciled on them a sufficient description of the material to enable an inexperienced person to fill the order by comparing the material called for on orders with the description on the bin. Lumber should have a sign of some sort showing size, kind, etc., stenciled or nailed on each different pile so that a glance will tell what the material is. Frogs, switches, etc., should have stenciled on them the number and weight. Bolts need nothing more than the size ½ in. x 5 in., car brasses should be marked 5 x 9, 4 x 8 or whatever their size. It is not improbable that two-thirds of the stock can be so marked. In each of the bins should be a card having on it the stock account number and the serial number so that each time a new item is added, simply the next serial number has to be used. That serial number can refer to a book in which is kept whatever description is necessary. On this card should also be shown the stock account number. It is likely that this article may be used for different work and naturally would be classed under one or more accounts. However, it is proper that they should be kept in stock only under one account. The fact that one draws out of stock material that may be charged to various operating accounts has no bearing on the stock room. The only thing to determine is the proper account to which to charge it.

The value of this can be explained by the fact that the general ledgers in the storekeeper's office can be written up by sections according to stock account and serial numbers which may designate the page number on which the item will be found. We will suppose the storekeeper's office receives an order bearing number 5-20. The clerk handling the stock ledger knows at once that on page 20 of section 5 will be found what he is looking for. The 5 is the stock account number and 20 is the serial number.

On this card should also be kept a record of the quantity in the bin, which is a very easy matter, for the card may be whatever size you choose, preferably 4 in. x 6 in. Each time the storekeeper draws out or adds to any stock he should at once enter on this card a record of this withdrawal or addition so that at all times without counting your stock you have a record at each bin. These records may be checked by inventories taken, say, every three months.

These cards also serve another purpose. In red ink on this card can be placed a figure which has been predetermined shall be the figure representing the minimum amount of this stock to be carried on hand. The storekeeper can then, when he reaches this minimum figure, jot it down in a book so that at the end of the month he may make requisition for this stock. This is a protection for the storekeeper as well as the purchasing agent. This card can also be used to give records of monthly consumption, and in case of rising markets the storekeeper can probably persuade the management to order a six months' supply or a year's supply, which on large roads is very often a considerable item.

Of course, where material cannot be placed in bins it will be necessary to keep these cards in the office of the material clerk in charge.

HANDLING OF REQUISITIONS

On large properties the amount of material purchased each month entails a very great amount of clerical work in the purchasing agent's office, and to distribute this work over a month's time in his office requires that different storehouses forward their requisitions at stated periods. A storekeeper required to forward his requisition on the first of each month will necessarily require his material clerks to furnish him a list not later than the 25th of each month showing what material should be ordered. These lists must show the material number, description of article and quantity on hand as shown by the bin cards. The storekeeper should then have these lists checked against his material ledger. This check will show any discrepancy which might creep in and determine whether the material clerk is properly accounting for stock or any abnormal usages. The clerk making this check will show on the lists the quantity to be ordered according to the record of previous consumption. These lists may then be turned over to a stenographer to be written up.

According to my way of thinking, requisition blanks should be large enough for ordering twenty-five to thirty items on a sheet, preferably 9 in. x 14 in., and should be drawn up as follows: Column for stock account and serial number (as 5-20), description of article, quantity on hand, average monthly consumption, quantity desired and purpose for which material is to be used. These requisitions should be made in triplicate, the original forwarded to the purchasing agent, the duplicate retained by the storekeeper and the triplicate turned over to the material clerk. A separate sheet or sheets should be prepared to cover each individual stock account.

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*Abstract of a paper presented at the Toledo meeting of the Central Electric Railway Accountants' Association, June 14, 1916.

In issuing orders for material on requisitions the purchasing agent should forward to the storekeeper two copies of his order to the supply house. One of these copies should have space provided on the back for reporting the receipt of material to the purchasing department by the storekeeper. The original order forwarded by the purchasing agent to the supply house should bear notation "Show our order and requisition number on all packages." If this is done, the material clerk, on receipt of the material, may check same on his copy of the requisition as being received and make an intelligent report of the receipt to his superior by referring to the order and requisition number. This is a requirement closely watched on steam railroads, for you have no idea what amount of work is entailed on a large system if this plan is not followed.

Another suggestion is that all articles must be shipped to the head of the department who makes the requisition and not shipped in the name of the railroad only, providing they are not handled through the storeroom. This plan should be followed also when there is more than one storeroom, such as maintenance of way, shop or car storehouses. These departments often use similar material, and if the name of the head of the department is on the shipment, it often saves a great deal of trouble in determining who shall handle and take care of the material. Whenever shipments are made out on the road to substorekeepers it should be shipped to the name of storekeeper who is to receive it.

INVOICES AND THE RECEIPT OF MATERIAL

On receipt of material, the storekeeper fills out the receipt on the back of the order as mentioned above and forwards it to the purchasing agent who, on receipt of the invoice, attaches this receipt to the invoice, and makes it a part of the permanent record. If only a part of the order is received, another form called "partial received slip" should be forwarded to the purchasing agent.

All invoices should, of course, be sent by the supply house direct to the purchasing agent who transmits them to the storekeeper. On a large system, ability to take advantage of a ten-day discount is very rare, as the red tape necessary on these systems is hard to overcome. On a small system the discounts mean quite a great deal in the course of a year and the material received slips originated by the storekeeper should be quickly transmitted to the purchasing agent so that if it is a discount bill the auditor may take advantage of such discount. The invoice can then be sent to the storekeeper for proper entry as to price and O. K. by himself. However, in a case like this, to be safe in the matter, all invoices if vouchered before passing through the storekeeper should be marked "vouchered" with a large rubber stamp, (preferably in red ink) signifying the auditor has vouchered. We had difficulty at first with our properties in handling discounts but find that we are now able with this method to take advantage of the majority of our discounts.

Purchasing agents and auditors, if co-operating properly with manufacturers, can readily get them to agree that discount for material received during one month will be allowed if paid before the tenth day of the following month after the receipt of material. Under this method, those invoices received after the tenth of the month need not be vouchered until properly O.K.'d by the storekeeper, but when such invoices to be vouchered are received between the first and tenth day of the month, they should be passed to the auditor by the purchasing agent, as explained, on receipt of the slip from the storekeeper stating that the material had been received.

On large systems where the purchasing agent and perhaps the general storekeeper are not located at the point where the stock is received, the supply house is required to make invoices in triplicate, the original and triplicate being sent to the purchasing agent and the duplicate sent direct to the storekeeper at the point to which the material is consigned. The storekeeper, after receiving the material, can quickly make whatever entries he needs, and on receipt of the original from the purchasing agent who forwards it as soon as his records are taken, may quickly O.K. and return it to the purchasing agent in time to take advantage of any discount which may appear.

The storekeeper should maintain a record of his material received reports to the purchasing agent. This record should show the following information: Date received, purchase order number, date purchase order returned, firm from whom received, description of material, quantity, cost, freight charges, total cost, unit cost, stock and serial number and remarks. Before forwarding these reports to purchasing agent the storekeeper will fill out as much of this record as possible.

In the column headed "remarks," a serial number may be given to each of these received reports returned to the purchasing agent, and this serial number can be placed on the order. When forwarding the invoices to the storekeeper for approval the purchasing agent should attach this receipt to the original invoice, as explained. The storekeeper, on receipt of these invoices, completes his material-received record which is easily done by referring to his receipt number, which he placed on the receipt before forwarding it to the purchasing agent. He turns to this number in his material-received record and fills in columns of date invoice checked, material cost, total cost and unit cost. This, it will be seen, absolutely overcomes a possibility of the storekeeper approving two invoices covering the same material, a number of cases of which I have known to occur.

DISBURSEMENTS

No material should be disbursed by material clerks without an order signed by the foreman in charge of the work on which it is to be used or the head of the department in which it is to be used. When these orders are filled and the material clerks have made the proper entry on their bin cards and have placed on them the stock account and serial number, they should be turned over to the storekeeper. His office will show on the face of the orders, price and extension, stock account to be credited and operating or construction account to be charged. We believe credits to stock accounts and debits to operating and construction accounts should be balanced daily and a recapitulation of each five days' business made. This not only tends to keep the office work up to date but often saves a great deal of checking at the end of the month when the stock report is due in the auditor's office and when time is valuable on account of many other reports being due.

We believe the storekeeper's office should maintain a general ledger compiled so that each stock account will have a separate section, the pages of each section bearing a number and description of material which corresponds with the number and description on the material bin containing that particular item.

The value of this system of material numbers, which is easily established, cannot be overestimated. Those of you who have kept a record of material either by card or book system, will agree, I am sure, that any sort of an index to such systems is a great consumer of time to the office force, whereas, if the outline I have given is followed, this work will be done by the material clerk, who is not usually an extremely busy person.

This ledger should also show receipts and disbursements, quantity on hand and the average monthly consumption. Under "receipts" should be provided space for date received, from whom received, cost and the page number in the material-received record from which the item is posted, as this information may be desired later on for ordering similar material. If, when receipts are entered in the ledger, it is seen that the cost of material received differs from cost of material previously purchased and a part of that material is still in stock, the value of the material in stock and the value of that last received should be averaged and this price posted in the price column under disbursements.

Under disbursements should be shown date disbursed, quantity, price, balance in stock and value. Disbursements should be posted daily and the ledger balanced monthly. The latter plan is for the purpose of comparing actual stock on hand with that charged against the storehouse by the auditor.

REPORTS OF MATERIAL IN STOCK

We believe the storekeeper should also furnish the various departments with a list of what material he carries in stock. When making requisitions on the storehouse for material, departments should make two sets of requisitions, one to cover material which will have to be purchased and the other to cover that which will be furnished by the storehouse.

I am a firm believer in carrying everything received and disbursed through the stock accounts. We have on our properties a system whereby on any construction work a great many articles are charged directly to the income account on the requisition. I am firmly against such a method, for with a man inclined to be dishonest it is a very easy matter to order more stuff than necessary and not use it but sell it later on, and no one will be any the wiser unless a very strict check is made by the engineering department of such usages, but there are few properties where such a strict check is made.

Some persons will argue that special stuff or special tools should not be carried through stock. Why make fish of one and fowl of another? If you are going to do something, do it right. It might mean a trifle more bookkeeping, but a storekeeper delights in having his accounts checked closely and, I believe, will always agree that this is the safest method for him.

On large steam railroads where a centralized storeroom transmits tools to various points along the line for direct use by section men or car repairers, these tools are often charged out directly to the operating account. The foreman after receiving these tools must make a return to his proper officer so that this officer when receiving the invoices from the general stores department does not O.K. unless he has a foreman's receipt which, of course, is all right, although I have known of men ordering more tools than necessary and getting away with them.

A foreman in charge of work will often draw from the stockroom more than is needed for the job and when finished will return what is left. Such credits should be handled in the same manner as if the material was received from a manufacturer, namely debiting the stores account and crediting the operating account to which it had originally been charged. No invoices are necessary, except that on a large system it is wise to have a form on which the foreman records what he returns to the stockroom. This enables him to account for the articles withdrawn.

Some of you, no doubt, are in the same position as ourselves, namely, that we carry stock for freight and passenger cars, rotary stations, line department, track department, new-business department and, in fact, do a general business. One storekeeper should have charge of all these stocks if for no other reason than that of economy, for, by centralizing, the storekeeper is able to reduce the amount of stock necessary, providing each department is required to give him a minimum amount of each stock required. This minimum amount can be further minimized by proper co-operation, which, in the course of a year, amounts to quite a sum of money to a large concern. Any abnormal demands on the storekeeper should be anticipated, giving the storekeeper time enough to obtain such supplies.

Departmental Expense Statements*

The Author Presents a Series of Report Forms and Explains Their Purposes and Application

BY L. T. HIXSON
Auditor Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

THE classification of operating expenses provided by the Interstate Commerce Commission is not intended to give the detailed information necessary for the various departments of a company but considers the entire company as a unit. Therefore, in order to get data relative to the different sub-divisions comprising this company unit, the operating expenses must be subdivided. The prime factor, then, is the manner of accomplishing this result with the least expense and without interfering with the official classification. This has been accomplished by the Terre Haute, Indianapolis & Eastern Traction Company, as described below.

The operating expenses have for some years been considered separately for seven railway divisions and one lighting division. The operations of the present departmental expense statements, however, are confined to six railway divisions by reason of our accounting conditions requiring separate statements for a combined railway and lighting property. These statements under the present conditions answer for departmental expense accounts. There is no intention of charging to the various departments indirect and overhead expenses. The charges cover only such items as are directly under the control of the department head, and the comparisons each month show very clearly whether the department heads are giving the proper attention to their work.

In addition to the I. C. C. classification charge number being noted on invoices, storeroom requisitions and payrolls, the division as well as the department symbol is shown, and, in posting these items to our distribution sheet (Form I), this information is given. The distribution sheet used covers pay-rolls, invoices and vouchers, and stores, the last named appearing on the back of this form. The front of the form (looseleaf, 9⅜ in. x 11⅞ in.) shown herewith, provides space at the top for account title and number. Charges are distributed under the proper subheads, and at the close of each month are posted to the sub-ledger by division totals. This ledger contains looseleaf sheets (11⅝ in. x 14¾ in.) with the necessary columnar rulings for the seven divisions. For example, the sub-ledger sheet for account 3, "Ties," has a column for each railway division and a grand total column, there being only one entry each month to the various columns, coming directly from Form I, above mentioned. There is also a memorandum ledger sheet (which is the same as the

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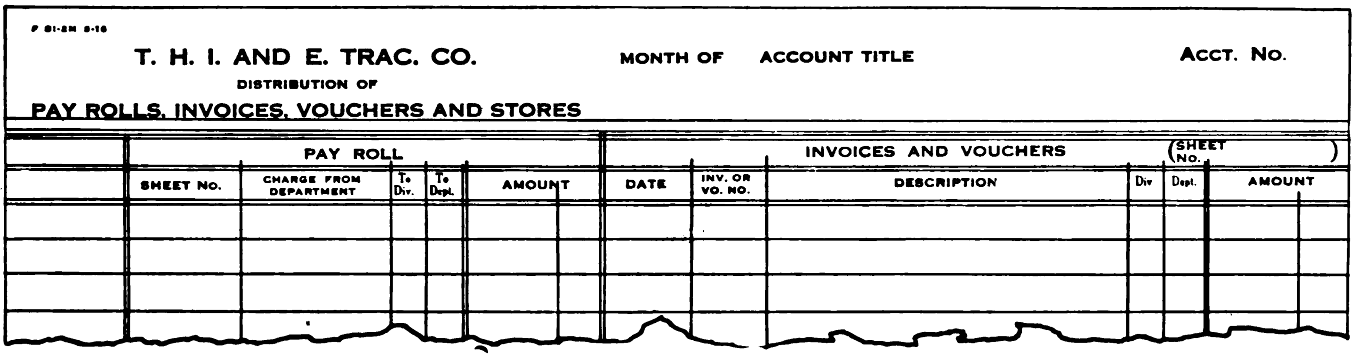
*Abstract of a paper presented at the Toledo meeting of the Central Electric Railway Accountants' Association, June 13, 1916.



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T. H. I. AND E. TRAC. CO. MONTH OF ACCOUNT TITLE ACCT. NO.

DISTRIBUTION OF

PAY ROLLS, INVOICES, VOUCHERS AND STORES

	PAY ROLL					INVOICES AND VOUCHERS (SHEET NO.)					
	SHEET NO.	CHARGE FROM DEPARTMENT	To Div.	To Dept.	AMOUNT	DATE	INV. OR VO. NO.	DESCRIPTION	Div	Dept.	AMOUNT

DEPARTMENTAL EXPENSE—FORM I—DISTRIBUTION SHEET FOR PAYROLLS, INVOICES AND VOUCHERS, AND STORES

sub-ledger sheet just described) kept for each account by departments.

After the accounts for the month have been balanced, the charges to the various departments are drawn off from Form I and entered in the proper division column on the page showing the correct account title and department. For convenience, these departments are lettered from A to P, and what is termed department "Z" covers indirect and miscellaneous charges, so that the total of all departments equals the grand operating expense.

After the memorandum department ledger is made up, the expense items by departments are drawn off in pencil on ruled sheets in order that typewritten statements may be made. These statements are in practically the same form as the ordinary monthly expense statement, with the exception that they eliminate all charges for which the department heads are not directly responsible. For example, the statement to the master mechanic at Department A (Lebanon, Moorsville and Crawfordsville shops) covers the following accounts:

Way and structures:
24a B., F. & G.—carhouses
24b B., F. & G.—shops
Total

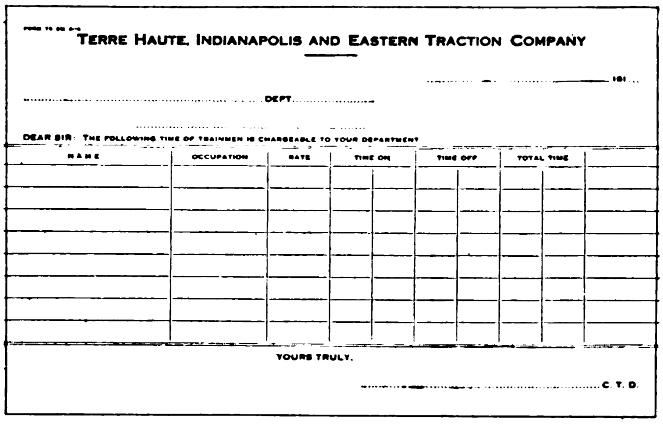
Equipment:
29 Superintendence of equipment
30 Passenger and combination cars
31 Freight, express and mail cars
32 Service equipment
33 Electric equipment of cars
36 Shop equipment
37 Shop expense
Total

Conducting transportation:
67 Miscellaneous car service expense
70 Carhouse employees
71 Carhouse expense
Total

General and miscellaneous:
94 Stationery and printing
95 Store expense
Total
Grand total
Total—1915

This statement contains columns for the divisions concerned, with a total column, and it presents the charges for the current month and the accumulated totals for the year to date. The figures for the previous year are not given in detail but only in total. Each department head receives a copy of the statement applying to his department, while the president and other officials are provided with the complete departmental expense statements, together with a summary of all departments for the current month and period to date in the present and preceding years.

In order that there may be no errors in inter-departmental charges, Form II, which is in reality a bill (9⅜ in. x 6 in.) is furnished to the head of the department for any charges made to his department from some other department. This bill is approved, and the distribution is shown on the right. If the bill be incorrect, it is returned with a statement as to the reason for not approving. The charges which are made against the department are shown on the books for the current month as suspended items, subdivided to show the charge to the proper department. When all bills have



TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY

.... 191...

.... DEPT. ....

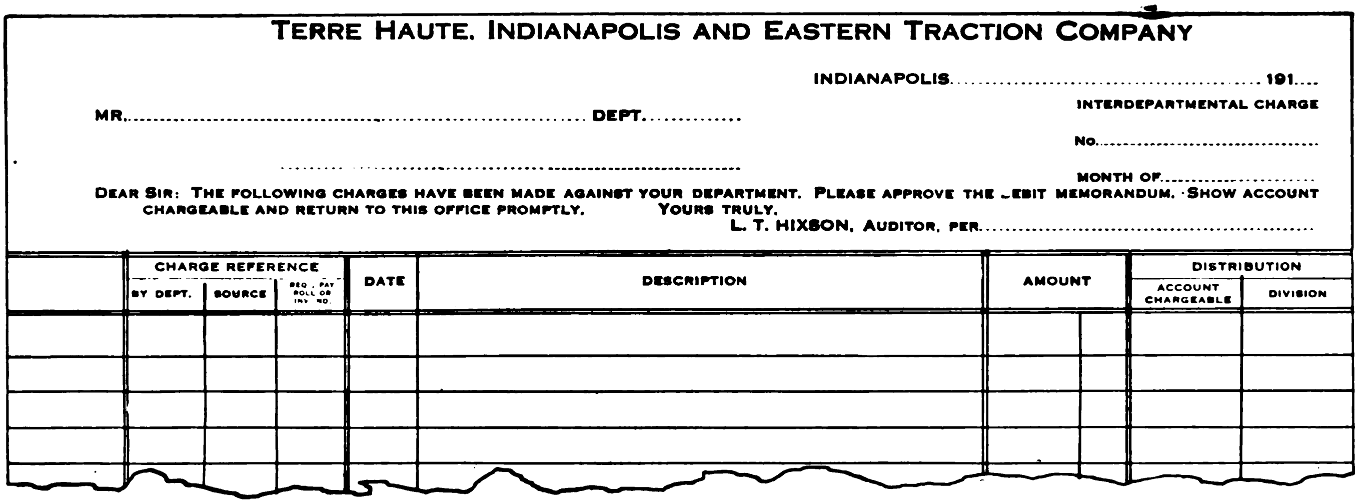
DEAR SIR: THE FOLLOWING TIME OF TRAINMEN IS CHARGEABLE TO YOUR DEPARTMENT

NAME	OCCUPATION	RATE	TIME ON	TIME OFF	TOTAL TIME	

YOURS TRULY,

.... C. T. D.

DEPARTMENTAL EXPENSE—FORM III—LABOR NOTICE SENT DAILY TO DEPARTMENT HEADS TO GIVE BASIS FOR CHECKING BILLS



TERRE HAUTE, INDIANAPOLIS AND EASTERN TRACTION COMPANY

INDIANAPOLIS.............................. 191....

MR.............................. DEPT. ....

INTERDEPARTMENTAL CHARGE

NO..............................

MONTH OF..............................

DEAR SIR: THE FOLLOWING CHARGES HAVE BEEN MADE AGAINST YOUR DEPARTMENT. PLEASE APPROVE THE DEBIT MEMORANDUM. SHOW ACCOUNT CHARGEABLE AND RETURN TO THIS OFFICE PROMPTLY. YOURS TRULY,

L. T. HIXSON, AUDITOR, PER..............................

	CHARGE REFERENCE			DATE	DESCRIPTION	AMOUNT	DISTRIBUTION	
	BY DEPT.	SOURCE	REQ., PAY ROLL OR INV. NO.				ACCOUNT CHARGEABLE	DIVISION

DEPARTMENTAL EXPENSE—FORM II—BILL SENT TO DEPARTMENT HEADS TO SHOW INTERDEPARTMENTAL CHARGES been sent through for the month, this suspense is cleared by journal entry, the items being distributed in the same manner as invoices from various firms would be distributed.

In order that the department head may have the proper information to check these inter-departmental bills, a notice is given to each department head daily covering the charge for labor (Form III). While this form (8¼ in. x 5⅜ in.) was provided for the use of the chief train dispatcher in reporting time of trainmen, it is used with some changes in connection with all other labor. In case material is taken from a storeroom where the storeroom is under the direction of some other department, a duplicate of the storeroom requisition is turned in to the department head by his employee who receives the material. These forms (storeroom requisition and Form III or labor notice) are retained until the interdepartmental bill is received, so that the department head has at all times the proper information to approve or decline to approve a bill.

While the plant outlined above would appear to be unwieldy and somewhat expensive, it has been found in actual practice that the amount of work and expense was greatly overestimated. It is certainly more satisfactory to be able to provide statements for the different departments showing the exact expense for which the head of each department is directly responsible, than to include in the charge to a department a miscellaneous assortment of indirect and accrued accounts over which he has no control, as is usually the case.

Why Modern Motors Are Economical

A Symposium in Which Is Demonstrated the Ability of Modern Motors to Reduce Energy and Maintenance Costs

AT the meeting of the Illinois Electric Railways Association held in Chicago on June 9, 1916, the presentation of the three papers abstracted below was the occasion of the valuable discussion reported in last week's issue of the ELECTRIC RAILWAY JOURNAL. They summarize the situation with regard to field-control and other modern motors.

Railway Motor Field Control

BY D. C. HERSHBERGER

Electrical Engineer, General Engineering Division, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

The method of controlling the speed of a railway motor by varying the field strength is as old as the art of practical railway motor construction, although the term "field control" was not adopted until about ten years ago. About 1888 to 1890 the Sprague Company was building double-reduction geared motors having three separate field coils per pole. With the three coils in series it was possible, with some of the smaller motors, to eliminate resistors. The coils were arranged in series-parallel groups on the intermediate notches, while on the last notch all coils were connected in parallel. On the large motors it was necessary to employ resistors.

A year or two later there were a few motors which employed the "loop" system, which was similar to the present method of field control. Practically all of the equipments of this period employed rheostatic control without series-paralleling of the motors.

The first Westinghouse series motor, No. 1, designed and tested early in 1890, was essentially a field-control motor. The field was wound with two sets of coils and speed regulation was obtained by the sectional field method, otherwise the control was straight rheostatic. The armatures were connected permanently in parallel and the field windings of the different motors were also in parallel. The No. 2 was also a field-control motor designed for narrow gage.

The field control was abandoned for the time on account of considerations of simplicity, cost, commutation and motor overloading. A period of about fifteen years elapsed before it was applied to locomotives, and twenty years elapsed before it was again applied to car equipments. The introduction of the commutating-pole motor, the general improvement in railway motor design, and a better understanding of motor application led to a revival of field control. The principle of the modern field control is shown in an accompanying diagram.

The next application of field control was made in 1906 on the a.c.-d.c. passenger locomotives for the New Haven Railroad. These were equipped with four 250-hp. motors of the gearless type. The full field may be used or either of two higher speeds may be obtained by shunting part of the field current through a grid resistor of low ohmic value when operating from the d.c. supply. Forty-one of these locomotives have been in satisfactory operation for ten years.

The giant motors of the Pennsylvania Railroad locomotives stand out as a remarkable application of field control. To date, they are the largest motors in existence employing this method of control. Each motor weighs approximately 44,000 lb. and is capable of developing 2000 hp. The control used is different from that just described, in that, instead of the field being shunted, half of it is cut out on the final notches in series and in parallel. On notches between full field and short field a part of the field current is shunted through a resistor. Series-parallel control is used, and this, with the field-control feature, provides eight efficient running positions. A tractive effort from 65,000 lb. at 24 m.p.h. to 5300 lb. at 76 m.p.h. is the great range on these locomotives. During acceleration the energy consumption is but 55 per cent of what it would be without field control. At 20,000-lb. tractive effort per locomotive, the change from full field to short field increases the speed 37 per cent. Thirty-three of these locomotives have been in most satisfactory service in the New York Terminal zone since 1910. One of these engines was awarded the Grand Prize at the Panama-Pacific International Exposition.

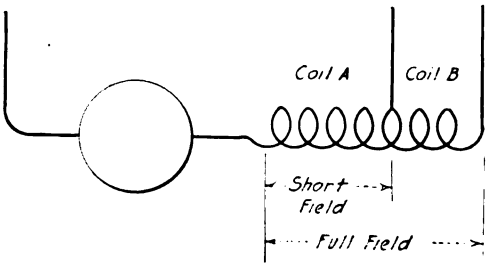
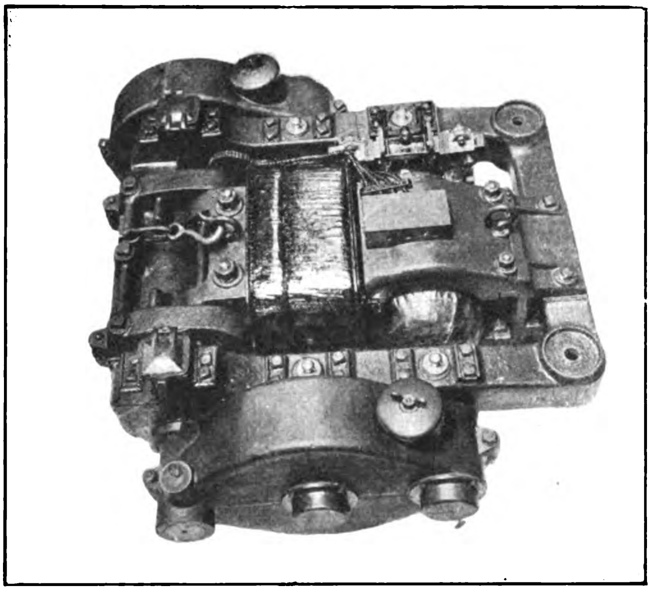
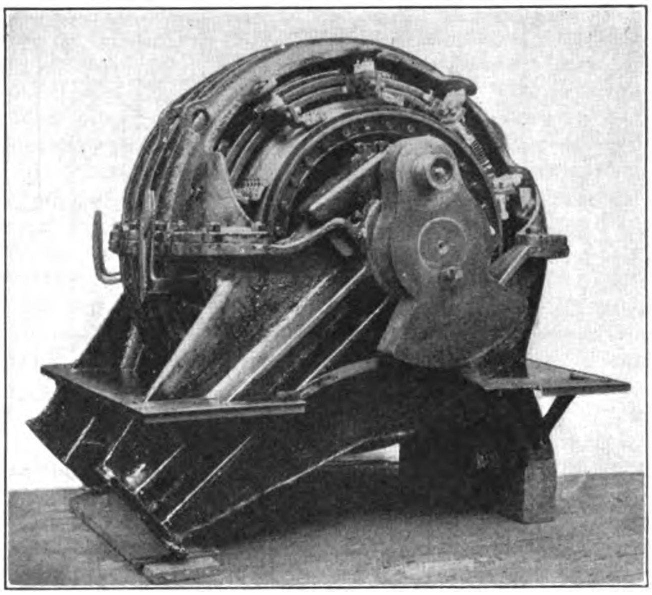


DIAGRAM SHOWING FIELD-CONTROL PRINCIPLE

In the latter part of 1910 H. H. Adams of the Metropolitan Street Railway, New York, was investigating



EARLY FIELD-CONTROL MOTOR



2000-HP., FIELD-CONTROL LOCOMOTIVE MOTOR

car designs relative to reducing operating costs by the use of lighter-weight cars and more economical motor equipments. It was decided that field-control motors be tried out, the anticipated energy saving being approximately 10 per cent. Under Mr. Adams' direction a double equipment of No. 307-C3 motors received a thorough test in 1911, this being the first application of modern field control to city service. The results of these tests are shown in Table I on page 1181.

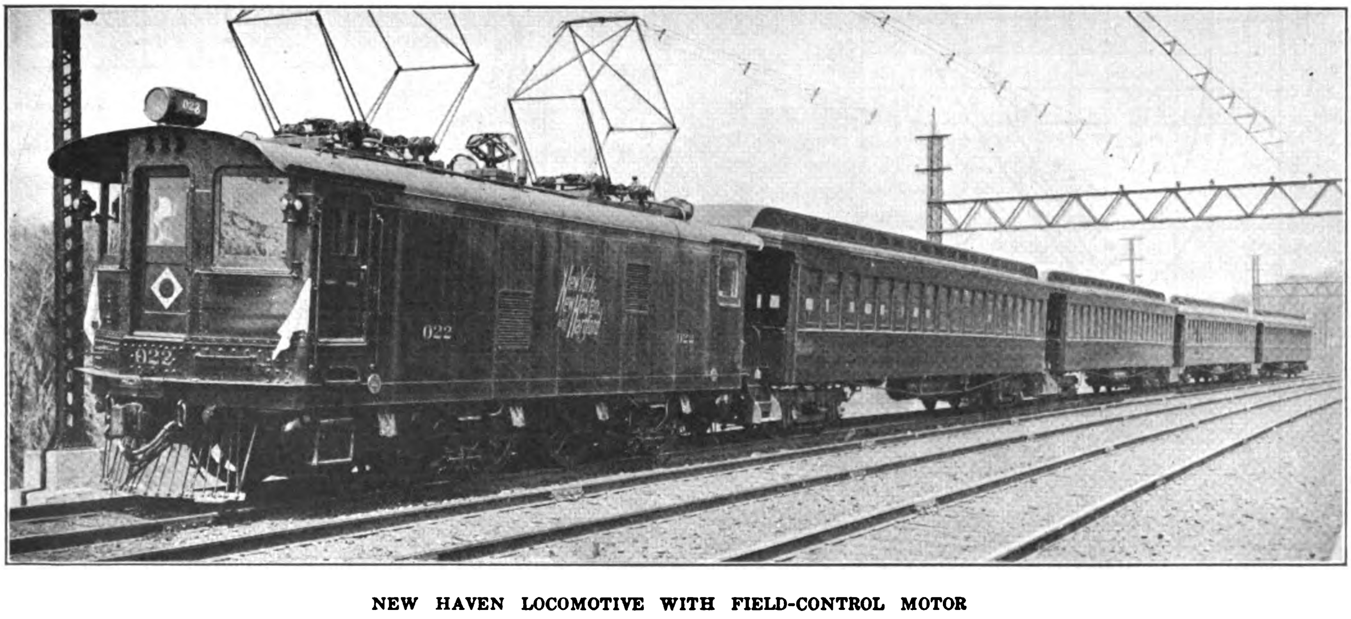
Comparing tests Nos. 1 and 2, it will be observed that an energy saving of 7 per cent was effected. This was due to the use of a lower-speed armature and a greater gear reduction. With 20 per cent more stops in test No. 3 than in No. 1 the saving was 12 per cent. This was due to the use of field control and larger gear reduction.

In test No. 3 the equipments were operated in series throughout the congested district and in series-parallel on the remainder of the trip. While there were 23 per cent more stops than in test No. 2, the energy saving was 5.5 per cent, due entirely to field control. In test No. 4 the number of stops and other service conditions were about the same as in tests 1 and 2, but the motors were operated to make full use of field control in both series and parallel over the whole line. This test showed 7 per cent less energy consumption than test No. 3, with its greater number of stops, and 12 per cent less than test No. 2, with practically the same service conditions. The temperature rise on the 60-hp. motors in test No. 1 was approximately 48 deg. C., while on the 40-hp., field-control motors in test No. 4 it was only 58 deg. C., which is a perfectly safe operating temperature.

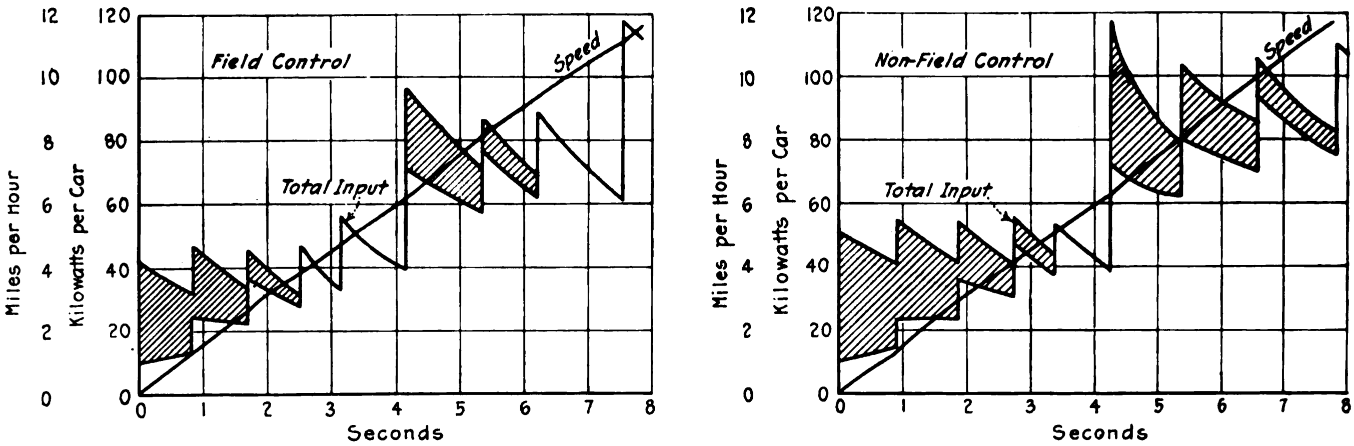
In Chicago modern field-control motors were first put in service in 1913 on both the elevated and surface lines through the efforts of H. H. Adams, superintendent of shops and equipment of the Chicago Surface Lines, and H. A. Johnson, master mechanic Chicago Elevated Railroads.

OPERATING PRINCIPLES OF FIELD-CONTROL MOTORS

The principles of this type of motor are best illustrated by referring to a field-control motor characteristic as illustrated herewith. The two sets of speed-tractive effort curves shown in the figure can be taken to represent respectively the characteristics of two non-field-control motors of different speeds but the same horsepower rating. The slow-speed, high tractive effort motor is the most economical in accelerating, while the higher-speed motor permits maintaining a higher sched-



NEW HAVEN LOCOMOTIVE WITH FIELD-CONTROL MOTOR



NOTCHING DIAGRAMS, FIELD-CONTROL AND NON-FIELD-CONTROL MOTORS

ule speed. Thus the two good features of both non-field-control motors are embodied in one with field control.

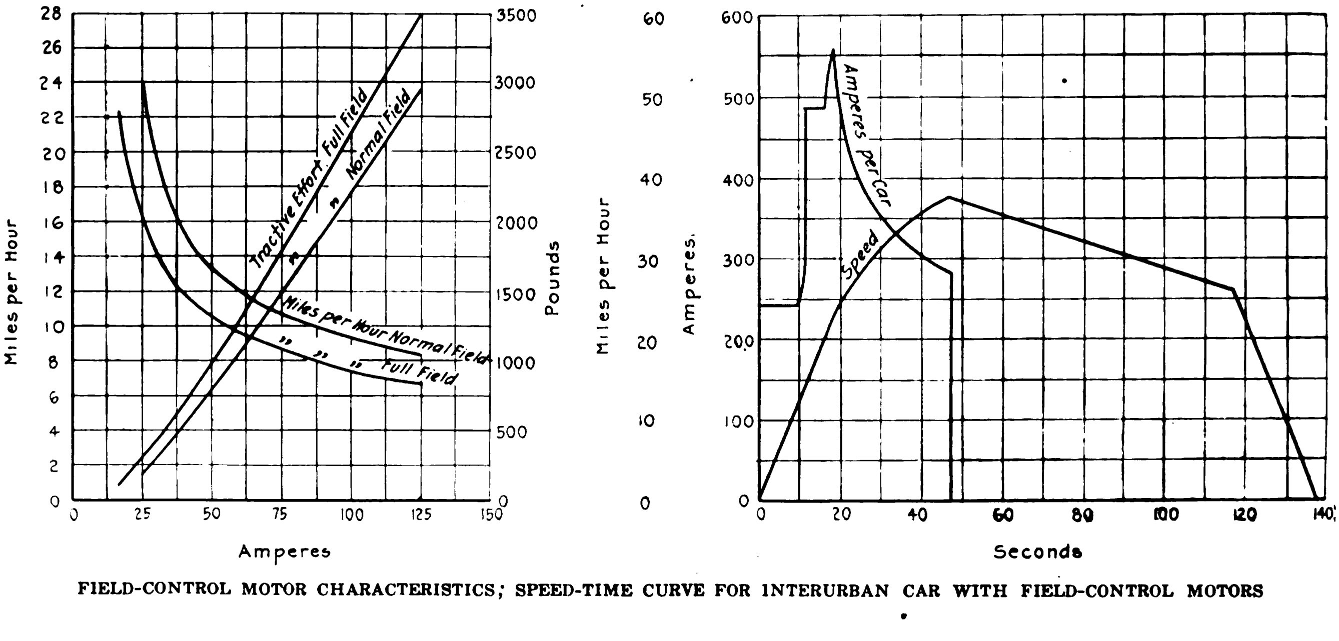
In the old motors without commutating poles it was necessary to employ a larger number of field turns in order to secure a strong field to get satisfactory commutation. With commutating poles and present-day motor design, it is possible to employ a much weaker field and still obtain satisfactory commutation and freedom from flashing. With the modern non-field-control motor the field strength, which controls the speed and the tractive effort, is a compromise between those of full field and short field of the field-control motor, using the same frame.

On city surface lines the number of stops per mile approaches the maximum, while the schedule speed and the balancing, or free-running speed are a minimum for railway work. In this type of service a motor with a low armature speed is most economical. The rheostatic loss, other things being equal, varies as the square of the speed at which the resistors are all out of the circuit. It follows, then, that the shape of the motor characteristic and the accelerating rate have a large influence on rheostatic loss. An unsaturated motor having a steep speed curve will, for a given accelerating rate, have all grids out of the circuit at a lower speed than a saturated motor with its flat speed curve, both motors geared for the same balancing speed. This applies to both field and non-field-control motors.

The accompanying notching diagrams have been calculated for a 50-hp. non-field-control motor and a 50-hp. field-control motor. Both motors are geared to give the same balancing speed and maintain the same schedule with a car with average load weighing 20 tons. An average accelerating rate of 1.5 m.p.h.p.s. was used. The non-field-control motor is geared 16:68 with 33-in. wheels, while the field-control motor has a ratio of 15:69 and 33-in. wheels. The average trolley voltage is 500. In each case a controller with five series points and four parallel points is employed. The diagrams show speed and total energy input per car, while the shaded portion shows the rheostatic losses.

On the basis of eight stops per mile, the total rheostatic loss for the non-field-control equipment is 0.3 kw.-hr. per car-mile, while for the field-control equipment it is 0.16 kw.-hr., a difference of 53 per cent. The total input when accelerating to 11.75 m.p.h. is 0.13 kw.-hr. for the field-control motor and 0.15 kw.-hr. for the non-field-control motor. The former is 86 per cent of the latter, a saving of 13.5 per cent in energy consumption. The speed at which all grids are out of the circuit with the non-field-control equipment is 11.75 m.p.h., while for the field-control equipment it is 9.3 m.p.h., or 79 per cent of the former.

The most prominent factor which determines motor size for a given service and car weight is that of continuous current capacity. With a low-speed, field-control motor, the heating current for average city service is approximately 10 per cent less than that for a low-speed non-field-control motor. It is usually the case that for a service where a non-field-control motor has



FIELD-CONTROL MOTOR CHARACTERISTICS; SPEED-TIME CURVE FOR INTERURBAN CAR WITH FIELD-CONTROL MOTORS

TABLE I—RESULTS OF METROPOLITAN STREET RAILWAY TESTS OF FIELD-CONTROL MOTORS

Test Number	Weight of Loaded Car, Tons	Motor	R.p.m. at 40-hp	Gear Ratio	Stops per Mile	Slow downs per Mile	Average Duration of Stop, Seconds	Schedule Speed, M.p.h.	Average Voltage	Watt-hours per Ton-Mile
1	20.2	Standard 60-hp.	560	4.6	6.97	2.86	8.503	7.126	557	152.26
*2	19.7	Standard 40-hp.	550	5.12	6.78	3.08	7.765	7.261	556	141.63
†3	20.2	Field-control, 40-hp.	445	5.12	8.33	3.11	7.240	7.142	551	133.85
4	19.7	Field-control, 40-hp.	445	5.12	6.88	3.56	7.335	7.409	555	124.41

*Normal on field-control motor.
†In congested district ran in series only.

just enough capacity for a given service a field-control motor one size smaller will do the work satisfactorily.

FIELD CONTROL IN INTERURBAN SERVICE

Interurban service presents various conditions which must be met with the same motor equipment. Practically all interurban railways enter one or more large towns or cities, requiring low-speed running and a relatively large number of stops. This part of the service is most economically maintained with low-speed equipment. Many railways give both local and limited service, in which it is desirable to use the same motor and gear ratio for both classes of service. Field control permits economical running over the low-speed city sections, with a gear ratio economical for local service. With the same gearing it gives a higher limited speed than could be obtained with the same size non-field-control motor correctly geared for the local schedule.

For high-speed service it is advantageous to use a motor having a high rotational speed. This is determined largely by the balancing speed required to maintain the schedule. A relatively light motor will perform the high-speed schedule, because increasing the armature speed increases the horsepower rating of the motor. A limiting factor to high-speed armatures is that of mechanical strength with high peripheral speed.

A 75-hp. field-control motor geared for local service, as heretofore described, and operating as shown in another diagram, will maintain a limited schedule speed of 38.4 m.p.h., which is the same as that possible with the next larger size of non-field-control motor. At the same time the 75-hp. field-control equipment, as compared to a 90-hp. equipment, consumes 15.9 per cent less energy in local service and 11.7 per cent in limited service. The energy consumption in limited service is somewhat more than with the ordinary 75-hp. motors on account of the higher schedule speed maintained with the field-control motor. The comparative results are shown in Table II.

TABLE II—INTERURBAN SERVICE DATA

Motor Type	Standard	Field-Control	Standard	Standard	Field-Control	Standard
Length of run, miles	1	1	1	6	6	6
Duration of run, seconds	150	150	150	611.8	563	563
Duration of stop, seconds	12.5	12.5	12.5	60	60	60
Schedule speed, m.p.h.	24	24	24	35.3	38.4	38.4
Accelerating rate, m.p.h.p.s.	1.25	1.25	1.25	1.25	1.25	1.25
Braking rate, m.p.h.p.s.	1.25	1.25	1.25	1.25	1.25	1.25
Motor equipment	4-75 hp.	4-75 hp.	4-90 hp.	4-75 hp.	4-75 hp.	4-90 hp.
Amperes at full load of motor	130	130	156	130	130	156
Weight of car equipped and loaded, tons	38	38	39.5	38	38	39.5
Accelerating current, amperes per motor	127	122	177.5	127	122	177.5
Speed at which rheostats are all out, m.p.h	21.3	20.3	28.2	21.3	20.3	28.2
Coasting time, seconds	60	70	77.5	67.8	86.2	86.7
Speed at which brakes are applied, m.p.h	27.1	26	25.7	30	30	30
Kilowatt-hours per car-mile	2.4	2.27	2.70	2.025	2.11	2.39
Watt-hours per ton-mile	63.2	59.7	68.4	53.4	55.5	60.5
Temp. rise in service from air 25 deg. C.	58	60	70	50	58	60

The substation capacities for interurban systems are usually determined by the maximum loads imposed upon them and by the apparatus commercially available. With single-track lines, the peaks usually occur at passing points, where two cars or trains are starting. With the field-control equipments these peaks are reduced from 10 per cent to 20 per cent throughout the greater part of the acceleration. Reference to the speed-time curve shown herewith indicates that for short periods at the end of the acceleration a relatively high peak is attained. This peak can be reduced by having the motorman halt on the full field notch for a slightly longer time than on the other notches before going over to short field. It seems to be a habit of the motorman to halt on the notch next to the last on full parallel for a somewhat longer time than on the other notches, especially in city service. These peaks are, therefore, frequently reduced as a consequence.

On many interurban roads there are severe grades. With a field-control equipment these grades can be taken at reduced current either in series or parallel. In some cases it may be advisable to use the full-field notch in parallel, even though the current is somewhat more than with non-field-control equipments operating in series. The former would save time and reduce motor heating.

CONCLUSIONS

The prime object of field control is to permit more efficient operation.

Although a field-control equipment is somewhat more expensive in first cost than one without field control, it may be a "penny wise, pound foolish" policy to purchase the non-field-control equipment. It has been found in many cases that field-control equipments pay for the additional first cost in from two to three years. After this period the saving is so much "velvet."

Field control has in recent years been applied to all classes of railway service, and the indications are that it will be applied to far greater extent in the future.

To date the application of field-control motors in this country amounts to approximately 840,000 hp., distributed among some fifty operating companies.

It is difficult to determine the total annual saving effected by the use of the field-control motor. It is, however, estimated at approximately one-third of a million dollars per year.

Comparative Economies of Old and New Motors

BY W. A. CLOUGH
General Electric Company, Chicago, Ill.

Since the early days of large organized industry, economy of operation has been recognized as the keynote of success. From the time when the large steel corporations proved that it was good business to scrap inefficient equipment long before it was worn out, the subject of replacing obsolete equipment has received a great deal of studious attention. Electric railways, however, have in years gone by been very slow to appreciate that this same procedure should properly be applied to their equipment. But conditions have very materially changed. At the same time that the new equipments were being developed, the old ones were receiving from master mechanics a great deal of attention with the view of cutting down the maintenance costs, and in the last few years wonders have been performed in this field. But even when the old equipments have been brought to their very lowest possible maintenance cost, it is essential now as never before to introduce

TABLE I—MAINTENANCE DATA ON OLD-TYPE MOTORS

Type of motor...	WP-30	GE-800	GE-1,000	W-12A	GE-52, 54	GE-67	GE-80
Number in service	2,151	485	1,350	108	330	2,738	1,656
Miles per motor per year.......	4,800	13,000	26,000	8,000	26,000	32,000	39,000
Cost per 1000 miles, dollars:							
Inspection	0.38	0.19	0.18	0.20	0.40	0.11	0.14
Repairs	5.42	2.46	1.71	1.64	2.40	1.14	.88
Total	5.80	2.65	1.89	1.84	2.80	1.25	1.02
Annual cost per motor 40,000-mile basis, dollars	232.00	106.00	75.60	73.60	112.00	114.80	40.80
Saving per motor per year if replaced with modern motors, dollars	224.00	98.00	67.60	65.60	104.00	42.00	32.80

still further economies if profits are to be made by the average road.

It will, of course, be understood that the only valid reason for replacement is economy of operation, and it is essential that each case be studied individually, before any definite recommendations can be made. But often the majority if not all of the following arguments can fairly be applied.

MAINTENANCE

Recently a man who has had wide experience with railway motors stated that he had ceased to put much credence in maintenance figures as ordinarily secured from operating companies, because different companies include different items in their maintenance costs. My own experience leads me to the same conclusion, and it seems to me that the subject of motor maintenance is of sufficient importance to warrant this association in making definite recommendations as to maintenance accounting. It seems fair that maintenance should contain two main divisions, the actual repair of the motor and the inspection of the motor, and in the data given herewith these two main divisions of maintenance are kept separate.

There are many factors which influence the cost of maintenance, such as the age of the motor, the service to which it is subjected, and the care that is given it. The largest influencing factor is the last named.

The influence of the motor age on the cost of motor maintenance is illustrated in Table I, which contains data for several motors now considered as obsolete, the data being average values for several roads. It should be noted in the table that the costs for the different roads varied approximately from 50 per cent to 200 per cent of the average.

For comparison of the average costs of modern motors Table II is given. This table includes average data for the following types of motors: GE-212, W-312, GE-213, GE-216, GE-227, GE-200, GE-203, W-307, W-306, GE-201. These motors have been in service from two to six years, and their average age is approximately four years. The data for the several motors on different roads vary by approximately the same percentages as the obsolete motors, but they furnish undeniable proof that a modern motor will cost on the average of from 75 to 80 per cent less to maintain.

Lubrication is not ordinarily included under maintenance cost, yet this very surely is a minor item that should receive consideration. In one instance the saving in lubricating materials was cut 50 per cent by the adoption of modern motors.

TABLE II—MAINTENANCE DATA ON MODERN MOTORS

Total number of motors..................................	6,140
Average miles per year per motor.....................	39,000
Average inspection cost per 1000 motor-miles, dollars....	0.035
Average repair cost per 1000 motor-miles, dollars.......	0.18
Average total cost per 1000 motor-miles, dollars........	0.215
Average cost per motor annually, dollars...............	8.60

TABLE III—ECONOMIES DUE TO MOTOR WEIGHT REDUCTION

Type of motor........	WP-30	GE-1000	W-12A	GE-67	GE-80
Saving per motor per year due to weight if replaced by modern motor, dollars......	30.00	12.50	15.00	25.00	45.00

The tables show that the savings on inspection, including the labor of lubricating, is cut by the use of modern motors in about the same ratio as the cost of repairs. That is, the modern motor may be run a great many more miles between inspections.

SAVINGS DUE TO WEIGHT REDUCTION

During the last few years the weight per horsepower of modern motors of capacity below 100 hp. has been reduced approximately 30 per cent. In addition there has also resulted, through ventilation and the application of greater skill in design, a greatly increased continuous capacity. Taking the conservative figure of 5 cents saving per pound per year, Table III has been prepared to illustrate the economies afforded by a modern motor in this respect. These economies are the combined result of power saving and reduction in wear and tear of track, special work and trucks.

Since Table III was made up there has come to my attention a case where $75 per year per motor was saved in power alone by replacing Westinghouse 101-B motors by modern motors.

If the attempt is made to calculate the power savings alone there are factors other than weight which enter into consideration. If the power consumption per car-mile is calculated at the car, any reduction in weight will result in a saving of losses between the power house and the car. Ordinarily this would be from 20 per cent to 25 per cent of the power saving at the car.

THE SERVICE FACTOR

Another factor, none the less real but much more difficult to reduce to dollars and cents, is what may be termed the "service factor." It is made up of the following items:

Savings of car-service expense due to reduced number of pull-ins.

Increased public support due to better, less interrupted service.

Greater annual car-mileage per car due to reduction in time required for inspection and repairs at the shop.

The first two items need no comment. A concrete example will serve to illustrate the last factor clearly. Suppose that ten cars which make an annual mileage of approximately 26,000 each can be equipped with motors which, by reason of fewer failures, enable it to remain in service continually so as to make 39,000 miles

TABLE IV—MAINTENANCE DATA FROM A TYPICAL RAILWAY

Type of motor............	GE-1000	GE-800*	GE-67	GE-90
Number in service..........	34	12	88	12
Motor miles run............	1,060,022	38,958	3,083,384	663,932
Miles per motor per year...	12,630	3,240	35,000	55,330
Number of armatures rewound	36	9	34	7
Number of armatures repaired	113	14	105	34
Total of armatures changed.	149	23	139	41
Miles per armature defect...	7,110	1,475	22,150	16,150
Actual cost of all repairs, materials only, dollars....	2,045.80	....	5,026.92	305.44
Estimated cost of inspection and repairs, labor only, dollars	2,216.20	....	3,792.08	212.56
Total cost per year, dollars..	4,262.00	....	8,819.00	518.00
Cost per thousand motor-miles, dollars............	4.00	....	2.87	0.78
Fair cost for modern motors per thousand motor-miles, dollars	0.25	....	0.25	0.25
Annual saving per motor possible with new motors, dollars	131.25	....	91.70	29.15

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*Data not available on maintenance costs.

annually. This is equivalent to adding five cars to the service.

Briefly, then, the modern motor is making possible marked economies due to a reduction in repair cost of from 75 to 80 per cent, and in inspection cost of from 50 to 75 per cent, and a power of a percentage which is roughly, although less usually, equal to, or slightly less than, the percentage of reduction in weight. At the same time there is a possibility of giving from 5 to 25 per cent more service with the same rolling stock. If the distinct economies can be shown to amount to at least 15 per cent of the necessary investment it would be economical to replace obsolete motors with modern ones.

To illustrate what may be accomplished along the lines suggested above, the following report is given. A certain road operates 196 motors of following types—GE-1000, GE-800, GE-67 and GE-90. The maintenance costs of all motors are high as compared with many other roads, largely due to the use of high-speed gearing, excessive grades, the use of trailers, etc., with resulting overloading, high temperatures and frequent burnouts. Table IV shows the results obtained.

The data given in Table IV are from actual records, with the exception of the labor costs on which no figures were available as the time of motor inspectors and repairmen is not divided among the different classes of motors handled. The labor costs are, therefore, an estimate, but are proportioned to the material charges on a basis obtained from other roads where accurate records have been kept of both material and labor charges on the same types of motors as are considered here.

Among other things these data bring out the small annual mileage made by the GE-1000 and GE-800 motors as compared with the GE-67 and GE-90 motors. In the case of the GE-800 motors this is, perhaps, due to their use on service cars which are only operated at rare intervals. The GE-1000 motors, however, are for the most part on cars very similar to those equipped with the GE-67 motors, which make three times as much mileage annually. The excessive trouble given by the former type naturally causes the cars to be held from service except when no others are available, and they are frequently tied up in the shop for repairs when actually needed on the road.

The low mileage per armature failure indicates the cause. While no exact figures for field failure could be obtained, there were 104 of these on all motors for the year, the majority of which were of the GE-1000 type.

It seems reasonable to assume that if these motors were replaced with modern ones the cars on which they are mounted could and would be used to the extent as the other single-truck equipments, and would make an annual mileage of 35,000 in place of the present 12,000.

The magnitude of the savings on maintenance costs could be secured by more efficient motors is indicated by the difference in cost per 1000 motor-miles between the GE-1000 and the GE-90 motors. The latter, which are themselves of obsolescent design, cost less than 20 per cent of what the former do for maintenance, and a really efficient motor of recent design should cost not more than a third as much. Assuming, therefore, that with modern motors 35,000 miles annually could be made per car, the motor maintenance per car would not be above $17.50 per year. The present equipments cost for the same car-mileage $280. When the other and corresponding savings already referred to are taken into account, a fair and reasonable estimate of the total savings would be at least $300 per car per year. The cost of making the exchange would be not over $900 per car. The investment would, therefore, return between 33 1/3 per cent and 40 per cent annually.

Tests of Field-Control Motors

BY H. A. JOHNSON

Master Mechanic Chicago Elevated Railroads

An analysis of the electrical energy consumed in average electric car operation shows that only about 60 per cent is usefully utilized, the remaining 40 per cent being dissipated in rheostatic losses, internal motor losses, friction and windage. Of this waste about 40 per cent disappears as heat in the resistance grids and it is primarily in reducing this loss that the field-control motor is finding extensive application. This type of motor is arranged with a tap on the field coils so that the last resistance step in parallel, or in both series and parallel if desired, can be dispensed with and a fraction of the field turns cut out instead, to weaken the field and produce the additional speed. The reduction in heat loss in the resistance is accomplished at the expense of an additional unit control switch or controller finger with very little complication in the motors themselves.

In 1913 the Chicago Elevated Railroads purchased twenty-one 2-motor field-control equipments and have since put in service 184 additional 2-motor G.E. and Westinghouse equipments. Tests have just been completed to determine how much economy was being obtained by the use of the newer equipment.

For the purposes of the tests it was necessary to use two different motor cars, one equipped with two 165-hp. standard four-pole motors and one equipped with two 160-hp. field-control interpole motors. The two cars were of approximately the same weight and their bearings were all well worn in. They were operated with the same trail car in each test, so that the comparison of energy consumption on a ton-mile basis cannot be much in error. Both of the motor cars were equipped with Westinghouse unit-switch, automatic control, which was set at a smooth and uniform acceleration of 1.26 m.p.h.p.s. on resistance steps. A calibrated Sangamo watt-hour meter was used, with automatic, calibrated time recorders to obtain a complete time record.

TABLE I—ECONOMY OF FIELD CONTROL MOTORS

	Non-Field-Control Motor	Field-Control Motor	Saving, Per Cent
Total weight of motor car and trailer, tons	61.76	62.44	..
Setting of current-limit switch, amp.	238	205	14
Average acceleration to 20 m.p.h., m.p.h.p.s.	1.26	1.26	..
Free running speed at 570 volts, m.p.h.	28.5	30.3	..
Average voltage at car	574	570	..
Average kilowatt-hours per run of 20.08 miles	131.0	122.4	..
Average watt-hours per ton-mile	106	97	8.5

The observations were taken in local service with 2.93 stops per mile and at a schedule speed of 14.6 m.p.h. Typical results are given in Table I.

The field-control motors show a saving at the car of 8.5 per cent, or, assuming 8 per cent line loss in this case, a total saving of 9.2 per cent at the substation bus. The necessary accelerating current of the field-control motors is 14 per cent less than that of the non-field-control motors, principally because a relatively much stronger field is available to produce the necessary starting torque. It has been the writer's experience that any substantial reduction in the maximum current handled by the control results in an appreciable economy in renewals and repairs of the control equipment, and to a lesser degree in the maintenance and failures of the motors.

To date the 205 double-motor equipments of field-control motors which have been in service on the Chicago Elevated Railroads from six months to three years have operated with entire satisfaction.

Economics of the Jitney

L. R. Nash Gives New Figures Showing That Operation of Jitneys Under Ordinary Conditions Is Not Financially Encouraging

IN a lecture to students in the graduate school of business administration, Harvard University, which is published in the May issue of Stone & Webster *Journal*, L. R. Nash recently reviewed the development of the 5-cent jitney movement and brought out some important points in regard to the economics of jitney operation. According to Mr. Nash, the earnings per jitney-mile lie ordinarily between 4 and 6 cents. One of the large distributors of Ford cars has estimated that the operating expenses and upkeep of its touring cars in jitney service should be 3.4 cents per car-mile excluding interest, taxes, insurance, housing and drivers' wages. Other conservative estimates of total cost of service, however, including the items omitted in the above estimate, lie between 5 and 7 cents per car-mile for Fords, between 10 and 15 cents for heavier cars and about 25 cents for large buses.

Mr. Nash states that he has been able to secure some previously unpublished data in regard to the actual cost of operating a Ford touring car in jitney service for nearly one year under particularly favorable circumstances. The owner, who also drove the car, was a good mechanic, doing practically all his repair work, and through unusual skill in driving and good business judgment in selecting his field he obtained much better results than could be expected from the average unskilled and careless operator. Some of the results of operation of this particular machine, carried out for the full calendar year 1915, are as follows:

Days operated	347
Hours operated per day	15.3
Miles operated per day	245
Schedule speed, miles per hour	16.0
Length of one-way trip (miles)	4.0
Car-miles per gallon of gasoline	20.5
Car-miles per gallon of oil	128
Average cost of gasoline per gallon (cents)	13.2
Tire-miles, per tire	12,000
Total annual mileage, approximately	85,000

Mr. Nash notes that the foregoing figures are more favorable than those usually reported, those for daily mileage and tire life being particularly so. The length of trip is not so favorable, being rather long for jitney service, but it was presumably selected because of its steady patronage and good pavement.

The operating figures of this car on a mileage basis are as follows:

Expenses per mile (cents):	
Gasoline	0.65
Oil	0.11
Tires	0.50
Repair bill and material	0.56
Owners' repair time at garage rates	0.73
Total repairs and renewals	1.29
Operating labor, estimated at 25 cents per hour	1.56
Total expense	4.11
Licenses, bond, taxes at interest	0.35
Total expenses and charges	4.46
Total gross earnings per mile (cents)	4.06
Deficit	0.40

The gross earnings per day of this car averaged slightly less than $10, and a total cost of service, assuming wages at 25 cents an hour, was nearly $11. It is estimated that to wipe out the deficit the range of operation should be reduced from 4 miles to about 3.6 miles, assuming a constant expense per mile and the uniform 5-cent fare. Mr. Nash notes that no accident cost was reported for the entire period, which situation would not continue indefinitely with the best of operators. A further study of the operation of the machine, which involved the assistance of a helper at 20 cents per hour, shows that with this payment the owner actually made only 17.4 cents per hour for his own operating time, which averaged 8.9 hours per day. He therefore earned from operation $44.50 per month or about $1.50 per day. Including his time spent on repairs at garage rates, his total earnings were $96 per month. As a driver the owner did a full average day's work at common laborer's pay, and he worked extra hours at his trade as mechanic on the repair work and made a good living, but less than he could have made in good times at his regular work at $4 per day in regular hours only. If he had not been a good mechanic he could have done only a part of his repair work, and his earnings would have been reduced to that extent.

The Ford car used in this case had been driven 38,000 miles before it started in the jitney service. Before the end of its jitney year all important parts had been renewed, so that the owner estimated an indefinite life under repair expenditures at the rate actually made. Hence, it is said, no depreciation allowance is required and the figures given above contain none. Other makes of cars could not be renewed as readily and the cost would be much greater.

In view of the favorable conditions under which this Ford operated, Mr. Nash concludes that the showing for the financial success of the jitney under ordinary conditions is not encouraging. In general it has been estimated that electric railway service costs about 0.7 cent per seat-mile and that jitney service costs about two and a half times as much. If the jitney as an investment is to be at least equally attractive with the electric railway, which is not considered particularly profitable, it must in some way offset this difference of 250 per cent in cost of service. If it can travel twice as fast as the street car its earnings per seat-mile, other things being equal, will be double, leaving the margin of difference between the street car and the jitney only 25 per cent. If everything else remains equal except the haul, this must for equal profit be less to the extent of this 25 per cent for the jitney than for the street car. Actual experience seems to indicate that there is at least this difference under average conditions. According to Mr. Nash, it should be clear from the figures given that light cars of the Ford type are more successful than any others, and in fact are probably the only ones which have paid their way under normal conditions. The operating expenses and maintenance of the heavy cars and large buses are too great for successful competition with electric railways. He sums up the financial situation by saying that 3 miles or less is the usual limit for profitable operation of jitneys of the most economical type, and under good pavement and traffic conditions.

In discussing the future field of activity for jitney operation, Mr. Nash states that communities must make up their mind that they cannot have a short-haul jitney and a long-haul street car both at a 5-cent fare. If the short-haul riders demand jitney service and the demand is granted, the long-haul riders must pay increased street-railway fare, possibly double. Moreover, many questions arise as to how the operation of jitneys could be controlled even in the short-haul field. In Mr. Nash's opinion, the only logical solution would be to issue a blanket license to a responsible concern to furnish all the jitneys in the city, or a particular section of it, presumably with transfer privileges. This plan would provide definite responsibility, a means of enforcing regularity of service and sufficient assets to cover accident liability. Company operation of jitneys, however, has been tried on a rather small scale and it failed, and the universal experience thus far has been that administration and higher wages ate up all the profits which individual owners might possibly have made.

In general, therefore, Mr. Nash believes that under strict, adequate regulation and protection to patrons, the jitney as an individual venture will have great difficulty in surviving in good times. As an organized independent business, it has no economic excuse for existence. In either case, it is a cause of traffic congestion and an added danger to necessary users of the streets, and should be eliminated or restricted to a field which cannot yet be definitely foreseen. As to possible future useful and profitable fields, the suggestion is offered that jitneys might be employed by electric railways in comparatively undeveloped sections as feeders to street car lines. Their relatively small cost and low operating expense per car-mile might adapt them for pioneer temporary use, until sufficient traffic developed to justify track extensions. Moreover, instead of using the usual small gasoline car for this purpose, an electric jitney might be developed along the lines of the so-called "trackless trolley" which has been operated to a limited extent abroad. This would involve a comparatively small investment per passenger, with the high power efficiency of the central station instead of the relatively low efficiency of a small gasoline engine. In some such service as this, the jitney in a modified form might find a permanent usefulness.

Prospects Poor for Seattle Municipal Lines

Report of Superintendent to Council Shows that Division "A" Is Facing Twenty Years or More of Losses

In response to a recent resolution by Council, A. L. Valentine, superintendent of public utilities, has submitted a report to the general effect that Division "A" of the Seattle (Wash.) Municipal Street Railway must be operated for twenty-three years before it will become a paying utility, even though an extension is made into Ballard. This estimate is made with the assumption that there will be no radical changes in methods of urban transportation to reduce the normal patronage. Mr. Valentine states, however, that owing to the probability of a radical modification of the state of the art before the expiration of the twenty-third period, he does not believe that any special value would attach to an estimate of the number of years required to overcome the total loss during this period. The following gives in abstract form the main parts of Mr. Valentine's report.

The total length of Division "A" of the municipal lines is 4.214 miles, this being equivalent to 7.803 single-track miles. The number of persons naturally tributary to the division is computed to be 4120. This figure is reached on the assumption that the line would go through the business district and enjoy transfer privileges to other lines in the city. As a matter of fact, Mr. Valentine says, the figure is subject to a large deduction because of the inability of the city to issue transfers. In 1915, he states, the Puget Sound Traction, Light & Power Company collected 21,368,468 transfers from among the 61,060,906 fare passengers, the transfers thus representing 35 per cent of the total fare passengers. Deducting 35 per cent from the 4120 passengers naturally tributary to Division "A" leaves 2678 persons as tributary to the line if it were to go through the main business district without transfers.

INVESTMENT AND EARNINGS FIGURES

The total fixed investment in the division up to April 1, 1916, was as follows: Way and structures, $262,579; equipment, $87,241; power (substations and equipment, including site), $49,844; total plant and equipment, $399,664; general (including interest during construction), $13,500; grand total, $413,164.

The gross earnings and cost of operation and maintenance of Division "A" for seven months in 1914, the calendar year 1915 and the first three months of 1916 were as follows:

	1914, 7 Months	1915, 12 Months	1916, 3 Months
Passenger revenue	$9,864	$15,370	$3,720
Station and car privileges	122	200	50
Rent of equipment to Division "C"	1,607	2,432	455
Miscellaneous	....	....	35
Total earnings	$11,593	$18,002	$4,260
Maintenance of way and structures	$539	$4,346	$1,496
Maintenance of equipment	910	5,880	1,390
Power purchased	6,311	5,943	1,385
Conducting transportation	10,457	14,242	3,496
General	152	434	17
Total expenses	$18,369	$30,845	$7,784
Operating ratio, per cent	158.46	171.35	182.70

The 1915 maintenance cost per car-mile on Division "A," exclusive of interest, was $0.026856 for way and structures and $0.036336 for equipment. The total operating cost per car-mile on the same division amounted to $0.1906.

DEPRECIATION

Sums were indicated for depreciation for 1915 on Division "A" by the State Bureau of Accountancy as follows, according to Mr. Valentine's report:

	Value	Rate. Per Cent	Amount of Depreciation	Less Maintenance	Net Depreciation
Way and structures:					
Poles and fixtures	$11,656	10	$1,165	$605	$560
Distribution system	27,959	10	2,795	76	2,719
Shops and carhouses	19,233	2	384	....	384
Total	....	....	....	....	$3,655
Equipment:					
Cars	$51,383	5	$2,569	$710	$1,859
Fare boxes	1,323	8½	112	....	112
Fenders	1,200	8½	102	....	102
Freight cars	7,678	8½	652	....	652
Service equipment	1,422	8½	120	....	120
Electric equipment of cars	21,044	8½	1,788	227	1,561
Shop equipment	2,774	5	138	....	138
Furniture	413	5	20	....	20
Total	....	....	....	....	$4,568
Grand total					$8,233

No provision for a renewal reserve was made, however, as the operating revenues were less than the operating expenses. The deterioration in way and structures and equipment was handled by deducting the depreciation from the investment in calculating the taxable value. No obsolete property was placed in suspense account.

TAXES AND INTEREST

In the matter of the amount of taxes and interest Mr. Valentine advises that municipal street railway bonds bearing 4½ per cent interest have been issued to the extent of $425,000. Interest thereon is $19,125 per year. There has been invested in plant account and equipment in Division "A" sums aggregating $399,664, from which depreciation for 1915 to the amount of $8,233 was deducted, leaving a net taxable value of $391,430.

As the Puget Sound Traction, Light & Power Company on an appraisal value of its street railway plant of $19,737,122 estimates its proportion of taxes for the railway at $264,424, according to Mr. Valentine, it is paying taxes at the rate of 1.3398 per cent on its railway property. On the basis of this percentage, a proper comparative tax charge for Division "A" would be

$5,244. The total yearly amount for taxes and interest would be $24,369, not now covered by the operating report.

EXTENDING THE LINE TO BALLARD

Extensions into Ballard could be made on different routes, but in Mr. Valentine's opinion Route No. 3, serving a territory the north end of which does not have street railway facilities equal to those in other parts of Ballard, would be the preferable one for an extension. The length of this route from Thirteenth Avenue West on Nickerson Street to West Eighty-fifth Street on Thirty-second Street Northwest, would be 3.42 miles, and the estimated cost of the extension, not including the track work the city is to place on the Fifteenth Avenue Northwest bridge and approaches, would be $96,213. Of this $7,990, representing the cost of construction on Division "A," would be taken from the balance in the municipal street railway bond fund. This remainder of the estimate ($88,223) would represent new cost of construction in Ballard.

Division "A" as extended to Ballard, Mr. Valentine estimates, would have annual revenues of approximately $27,000 with annual operating expense, exclusive of interest and taxes, of $61,955. Interest would aggregate $23,095 and taxes $6,534. The revenues would undoubtedly increase as the result of the increase in the tributary population, and the increase in the riding habit, but in Mr. Valentine's judgment the annual increase in the population tributary to Division "A" as extended would not, even with the extra transportation facilities afforded, exceed 5.5 per cent. This percentage increase applied to the whole population would mean that Seattle would gain 18,000 each year. From 1900 to 1910 the increase in population was from 80,671 to 237,194, while according to the United States census figures the earnings per capita of the Puget Sound Traction, Light & Power Company increased from $8.56 in 1900 to $14.66 in 1910. From these figures Mr. Valentine concludes that the increase in the riding habit in Seattle would, under normal conditions, approximately double with the trebling of the population. Therefore, there would be a 0.6 per cent increase in the riding habit for each 1 per cent increase in the population.

THE POOR OUTLOOK

"Assuming that there will be no radical changes in methods of urban transportation, and considering the elements of increase of population, increase in riding habit, increase in operating expense and also in plant investment due to equipment, paving, etc.," Mr. Valentine estimates that "it will take at least twenty-three years for Division 'A' as extended to Ballard to become a paying proposition. This line would start the first year with a loss of $34,995 on operation plus $23,095 for interest, and the total loss in the twenty-third year would be in excess of $668,000." Owing, however, to the probability that prior to the expiration of this period the state of the art of urban transportation may be radically modified, Mr. Valentine does not believe that "any special value or utility would attach to an estimate of the number of years required to overcome the loss noted."

CONNECTING THE TWO DIVISIONS

If an extension to Division "A" as at present operated were made to Riverside to a connection with the Lake Burien line, or Division "C," Mr. Valentine feels that the total revenue of Division "A" for the first year would be not to exceed $38,500. This would be exclusive of any revenue which might be derived from a transfer arrangement with the present patronage of the Lake Burien line. With operating expenses estimated at $53,400 and interest amounting to $22,226, the loss the first year would be $37,126. The loss during the fifth year would be $26,500 and the loss during the tenth year $12,900.

INCREASING THE REVENUES

The city department has had under consideration the matter of attempting to develop a package or carload freight business along Division "A," but it is said that in view of the fact that the formerly extensive package freight business of the Puget Sound Traction, Light & Power Company has practically vanished within the last few years, it has been deemed inadvisable to experiment along this line. If it were merely a matter of securing additional revenue this could be done by increasing the service, but to do so would be simply to add to an already heavy operating deficit. It is quite plain, Mr. Valentine admits, that relief is not to be sought in this direction.

The lines have been operated for such a limited period, it is averred, that no accurate data as to the probable rate of increase of earnings and expenses can be secured therefrom. Division "A" as at present operated would not, however, in Mr. Valentine's judgment, even with the possibility of industrial development in the territory contiguous to the north end, earn an amount equal to the operating expenses and interest prior to 1936. Division "C" as at present operated would not, even with freight-hauling possibilities, earn an amount equal to the operating expenses prior to 1926.

Moreover, Mr. Valentine confesses, the service rendered by the present line of Division "A" or any of its proposed extensions would not under present conditions be such as to warrant any increase in fare. The line with proposed extensions would come into direct competition with routes of the Puget Sound Traction, Light & Power Company which, having been long established, have a fixed patronage, give generally equal fares, cover more advantageous routes, which afford a more frequent headway, and possess the privilege of transfer interchange. In case, however, Division "C" should be extended into the business district, it is believed that those living outside the city who now pay to the municipally and privately-owned lines a minimum total fare of 10¼ cents would be willing to pay the city line a fare in excess of the 6¼ cents they are now paying.

GENERAL CONDITION

In general, Mr. Valentine says, the rapid changes in the art of urban transportation which recent years have brought about render the entire status of the street railway business uncertain and unsatisfactory from the standpoint of the operator. The tendency of all costs has been steadily upward, while the fare has remained the same, and more recently the competition of gasoline motor vehicles, both public and private, has made heavy inroads into the revenues. Even the tentative plan of the street railway companies, involving the operation of one-man cars on more frequent headways to increase their revenues will, in Mr. Valentine's opinion, have but little merit in rendering the status of the street railway business more satisfactory to the operator.

At a recent meeting of the San Francisco Labor Council, Coroner Leland gave the following statistics regarding fatalities due to street traffic in San Francisco. For the twelve months ending May 1, 1916, jitneys killed seventeen, the United Railroads twenty-two, privately-owned automobiles forty-six, and the Municipal Railway nine. Of this total the accidents on Market Street were six killed by jitneys, two by the United Railroads and one by the Municipal Railway.

ASSOCIATION NEWS

Important Convention Committee Meetings Were Held in Atlantic City This Week—The Human Element Discussed by Manila Section—Association Committees Are Rounding Up the Year's Work

Activities of the Company Sections

PORTLAND (ME.) SECTION ENDS SEASON

The fourth meeting of Section No. 9 was held in Portland, Me., on June 13. This was ladies' night and the attendance was about 100 members together with a large number of ladies. Supper was served and this was followed by dancing and cards.

At a meeting of the executive board announcement was made that a representative of the Westinghouse Electric & Manufacturing Company would give a talk on air-brake equipment at the October meeting. A committee was also appointed to consider the advisability of organizing a minstrel show and to select a manager for the purpose if the show appears feasible.

MANILA SECTION

Meetings of joint company section No. 5 were held on March 7 and May 2 in Manila, P. I. On the earlier date the principal speaker was R. E. Brooks, assistant superintendent of shops and carhouses, who discussed "Derailments, Their Cause and Prevention." At the later meeting, E. I. Jeffrey, assistant chief engineer of power plants, read a paper on "The Power Plant Employee and His Qualifications."

After pointing out how troublesome derailments are to railway operation, Mr. Brooks analyzed the causes of this trouble, which he attributed largely to the motormen. He pointed out that motormen are not as careful as they might be, partly owing to the fact that they are expected to run according to schedule and hence must sometimes risk derailment to keep their cars on time. Mr. Brooks' idea of derailment prevention was that, while all derailments cannot be prevented, many can be by the exercise of proper discipline. Whether the man at fault be a machinist, a blacksmith, a carhouse man, a trackman or a motorman, he should be held strictly accountable for the results of his work.

In the discussion the impression seems to be general that the speaker had been too easy on the shops, and that no one department is responsible for derailments. Co-operation is necessary in preventing them.

The ideal power plant employee, as pictured by Mr. Jeffery, is one with a suitable technical education, practical experience and personality. He pointed out the results of accurate observation in power plant operation and prompt attention to defects. Intelligence and resourcefulness in emergency are very important in this work. One of the most forceful parts of Mr. Jeffery's paper was that in which he emphasized the necessity for effort on the part of power-plant men to keep out of ruts. For this purpose it is necessary to read systematically, to associate with other men in the same business, and to take an active part in associations in this field. The text and advertising pages of technical journals are of great value. He called attention of the willingness of the local company to pay one-half of the tuition fees of employees enrolled in the correspondence courses of the American Electric Railway Association, and ended with this epitome of the subject: "It is up to every man to be as good as he says he is and better than his superiors think he is."

In the discussion the subject was extended to include other employees, and the difficulties of the local situation in handling native help were pointed out. Two of the predominant characteristics of Filipinos are that they are sensitive and sympathetic, and these qualities must be considered in handling them. In one department by encouraging the Filipino employees to read the value of the service of some had been doubled. C. N. Duffy, vice-president, in closing the discussion, explained the company's attitude toward educational efforts, and pointed out how necessary it is for employees to utilize these if they expect to be considered for higher duties and responsibilities. He said that while he did not desire to reflect on the capabilities of the academic, theoretical or purely scientific "experts," after all the real expert is the practical man who can do things and who has done them.

General Association Activity

EXECUTIVE COMMITTEE MANUFACTURERS' ASSOCIATION

A meeting of the executive committee of the American Electric Railway Manufacturers' Association, to discuss the future plans of the association, was held at the Marlborough-Blenheim, Atlantic City, N. J., on June 20. L. E. Gould, vice-president in charge of finances, presided. Others in attendance were: E. F. Wickwire, Charles R. Ellicott, M. B. Lambert, F. A. Elmquist, Bertram Berry and B. A. Hegeman, Jr., representing George Stanton of Cleveland.

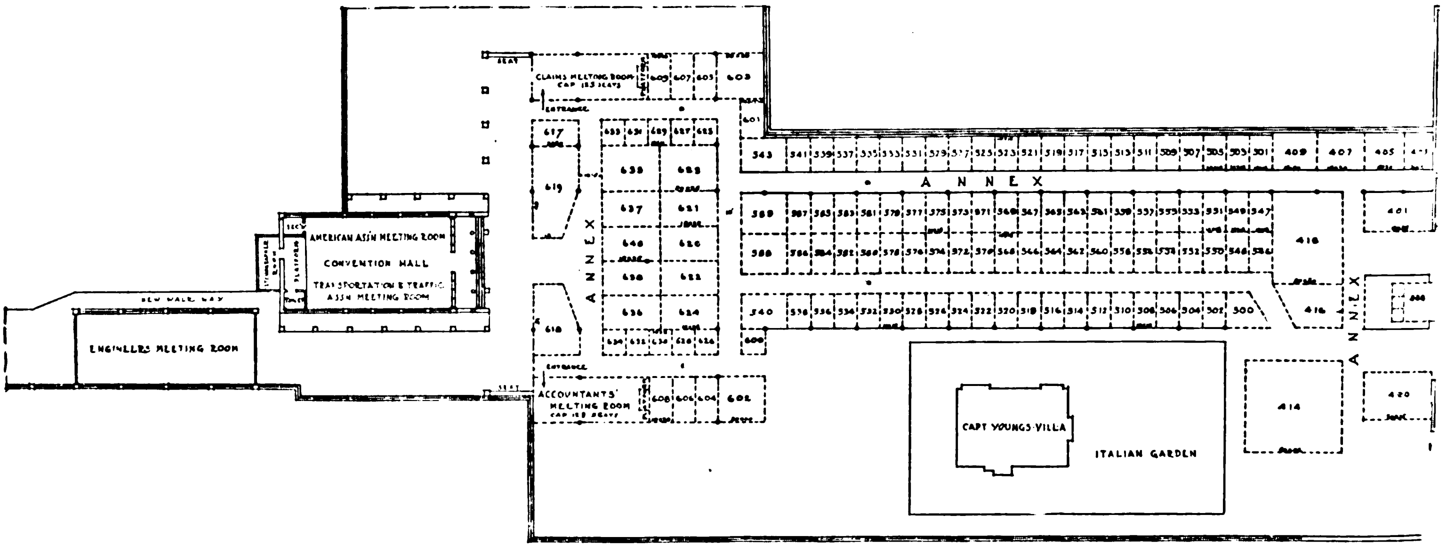
WAY COMMITTEE HOLDS FINAL MEETING

The final meeting of the way committee of the American Electric Railway Engineering Association was held in the office of Chairman C. H. Clark, engineer maintenance of way of the Cleveland Railway Company, Cleveland, Ohio. On June 8 representatives of the manufacturers of electric railway special work met with R. C. Cram of Brooklyn and Mr. Clark to revise the specifications for built-up special work which were prepared by the 1915 way committee, but not submitted to the convention for approval. These specifications were further revised by the way committee, and will be submitted as a recommended standard. At the first meeting of the way committee held on June 15, the following members were present: H. M. Steward of Boston, A. E. Harvey of Kansas City, W. F. Graves of Montreal, R. C. Cram of Brooklyn, E. M. Haas, Chicago, C. H. Clark of Cleveland, and E. M. T. Ryder of New York.

This meeting of the committee held over for three day and two night sessions, and owing to the large amount of work necessary on some of the subjects, the committee decided to continue those relating to the revision of the design of 7-in. and 9-in. joint plates with special reference to the sizes of bolt holes and fits; the recommended designs for layouts for switches, mates and frogs; the use of rolled manganese and other alloy steel rails; the investigation of high elastic-steel machine bolts for use with mechanical joints; the preparation of specifications with definitions for sundry track materials, and the report upon the most efficient types of hand track tools. The way committee has submitted the recommended symbols for recording surveys which were reported by the 1915 committee to other committees interested for their revision and approval. The report on ballast for suburban and interurban lines, which was prepared by L. A. Mitchell, Anderson, Ind., will be submitted to the association as information. Specifications for pavements for use with grooved-girder and plain-girder rails were prepared by Mr. Harvey, and those for wood block, granite block and brick will be submitted to the association as recommended standards. A report on specifications for preservatives and the treatment of wood for inclusion in the Engineering Manual was prepared by Mr. Haas, and the committee decided to submit it to the association as recommended practice.

JOINT COMMITTEE ON BLOCK SIGNALS.

The joint engineering and transportation and traffic associations committee on block signals met in Buffalo on June 15 with the following members in attendance: J. W. Brown, Public Service Railway, vice-chairman; G. N. Brown, New York State Railways, Syracuse-Utica Lines, and G. K. Jeffries, Terre Haute, Indianapolis & Eastern Traction Company. There were also present by invitation, R. V. Collins, United States Electric Signal Company; F. M. Day, General Railway Signal Company, and H. W. Griffin, Union Switch & Signal Company.



YOUNG'S MILLION-DOLLAR PIER AT ATLANTIC CITY WITH

A drawing of a signal number plate prepared by a sub-committee was exhibited and discussed. It was decided to recommend block figures as nearly as possible of the dimensions shown in the drawing, the method of attachment of the plate to the signal being subject to the approval of the customer. It was reported that clearance diagrams had been approved by the power distribution and heavy electric traction committees. The joint committee approved the suggestion of the latter committee that on the drawing showing the clearance, where men are not allowed to climb up the side or ride on the top of the car, there should be a note appended providing an increase in the distance between the center line of the track and the base of the signal where the signal is placed on the inside of the curve, the amount of this increase to depend upon the degree of curvature and the amount of super-elevation of the outer rail.

It was reported that progress had been made toward getting the American Railway Association and the American Electric Railway Association together to consider jointly the block signal rules. A tentative meeting between representatives of the two associations had been arranged for the latter part of June. A full report on tests for contactor signals was received and with minor changes accepted. Proposed instructions covering methods for using standard aspects for trolley contact signals were also considered.

Progress reports on other assignments were received, and it was decided to refer to next year's committee the development of a form of contract for signal installations and a study of operation without dispatchers.

FALL CONVENTION ACTIVITY

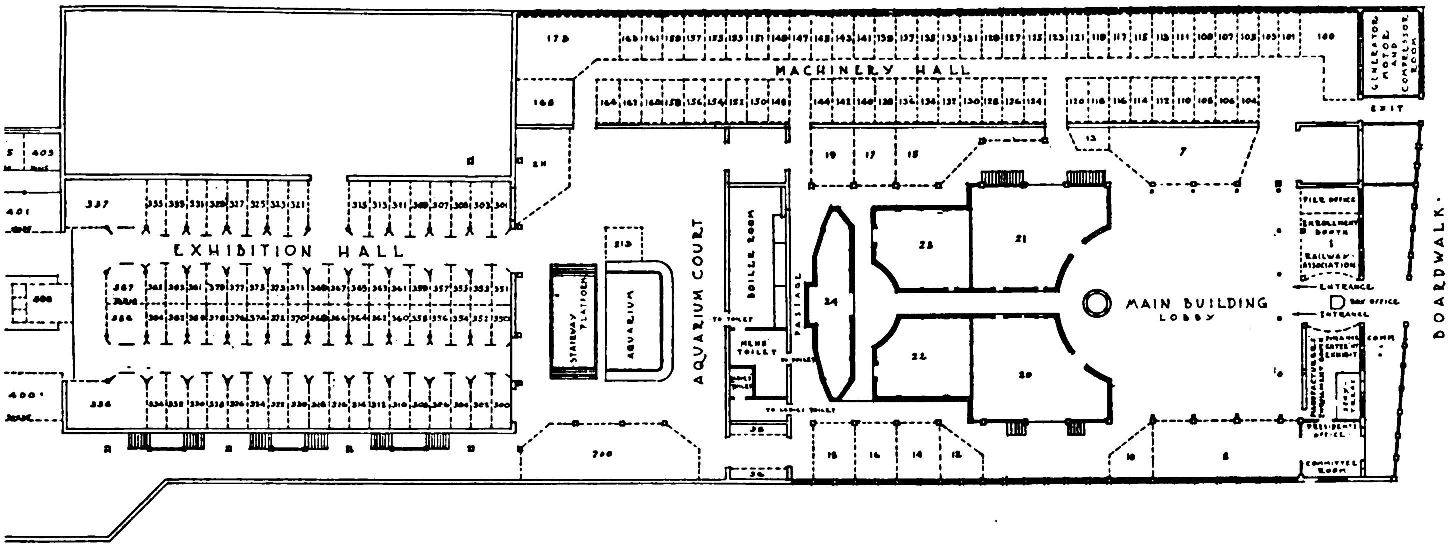
Earnest activity marked the convention committees' work at Atlantic City this week. Plans and budgets were approved and details were settled so that work is now in full swing and the committees are proceeding with the activities so necessary to assure a highly successful fall convention. The committees which met at Atlantic City on June 20 at President Henry's call were the general convention committee and the committees on exhibits, finance, entertainment and membership. A general session was first held, then the individual committees met separately, and later at a general session reports of the committee chairmen were heard.

H. C. Donecker, vice-chairman of the general committee, who presided, spoke of the fine way in which committee members had co-operated. Earnestness in a successful fall convention had been the watchword. E. B. Burritt outlined the status of the sale of space. But a very short time had elapsed since the distribution of the plans of the pier showing the arrangement of the booths, nevertheless space had been allotted to member companies whose requirements totaled more than 20,000 sq. ft. Mr. Burritt also spoke of the comparatively large number of manufacturing companies which had joined the American Electric Railway Association. The number on June 20 was about 120. In addition Mr. Burritt had received inquiries from a large number of other companies which contemplated joining and exhibiting.

S. D. Hutchins, Columbus, Ohio, co-chairman of the membership committee, described the work of his committee members and the success they were having in building up interest in membership. Mr. Henry, when complimenting the membership committee, referred to the amount of dues to be paid by manufacturing companies. The dues for this convention year, which ends Oct. 31, 1916, will be only one-half of the full annual dues. All of the privileges of the convention will be open to all representatives of all railway and manufacturing member companies without payment of fees other than those for membership or exhibit space.

Daniel W. Smith, Detroit, chairman of the committee on exhibits, outlined before the general committee the steps that had been taken toward completing arrangements for furniture, flowers, policing, signs, handling exhibit materials, etc. The floor plan as arranged for the 1916 convention is shown herewith. Mr. Smith stated that John G. Barry, Schenectady, had been appointed vice-chairman of the committee on exhibits. Also a sub-committee on exhibit arrangements was appointed as follows: J. C. McQuiston, East Pittsburgh, chairman; Frank H. Gale, Schenectady; A. L. Price, Mansfield, Ohio, and S. M. Wilson, Philadelphia.

E. F. Wickwire, Mansfield, Ohio, chairman of the committee on entertainments, outlined the plan of the series of entertainments which will be given during the fall convention. His committee had decided upon the general plan for association social gatherings and for special entertainment for the ladies. Announcement of the details will be made later.



LAYOUT OF CONVENTION EXHIBIT AND OFFICE SPACE

Before adjournment, President Henry and the general committee approved the budgets for the work of the entertainment and exhibit committees. In conclusion, Mr. Henry spoke a word of appreciation to the committee members. Those in attendance included the following:

General convention committee: H. C. Donecker, vice-chairman, Newark, N. J.; Daniel W. Smith, Detroit, Mich.; R. I. Todd, Indianapolis, Ind.; E. F. Wickwire, Mansfield, Ohio; L. E. Gould, Chicago, Ill., and E. B. Burritt, secretary, New York.

Exhibit committee: Daniel W. Smith, chairman, Detroit, Mich.; John G. Barry, co-chairman, Schenectady, N. Y.; John J. Stanley, Cleveland, Ohio; Miles B. Lambert, Pittsburgh, Pa.; J. J. Dempsey, Brooklyn, N. Y.; William H. Heulings, Jr., Philadelphia, Pa., and L. J. Drake, Jr., New York.

Sub-committee on exhibit arrangements: J. C. McQuiston, East Pittsburgh, Pa.; Frank H. Gale, Schenectady, N. Y., and A. L. Price, Mansfield, Ohio.

Entertainment committee: E. F. Wickwire, chairman, Mansfield, Ohio; J. N. Shanahan, Newport News, Va.; William V. Dee, Providence, R. I.; W. G. Kaylor, Philadelphia, Pa., and B. F. Wood, New York.

Finance committee: L. E. Gould, chairman, Chicago, Ill.; George F. Allen, representing William Simpson, Chicago, Ill., and F. A. Elmquist, New York.

Membership committee: S. D. Hutchins, chairman, Columbus, Ohio, and Edwin B. Meissner, St. Louis.

BOOKLET ON COMPANY SECTIONS

The association has issued an attractive illustrated booklet designed to impress upon executives the advantages of the company section movement. It contains a history of the movement, tells "what company sections are, what they do, how they do it, and how they are organized." In a letter accompanying the booklet Secretary Burritt says:

"It is the belief of the committee on company sections and individual membership that electric railway men generally do not fully realize the tremendous possibilities of company sections of the American Electric Railway Association in improving the usefulness and morale of both officers and employees.

"For that reason the inclosed pamphlet is being forwarded to you in the hope that after reading it carefully, you will do what you can to develop the company section idea among your associates."

Development of Chicago Surface Lines

An interesting statement issued by the Chicago Surface Lines pointing out its development in the nine years between Feb. 1, 1907, and Feb. 1, 1916, states that $90,000,000 of new capital has recently been put into rehabilitation, new equipment, and new extensions. Twenty-three hundred new cars have been purchased, 700 miles of track have been rehabilitated and 175 miles of track have been built. Three tunnels have been reconstructed. The 5-cent fare zone has been extended through the Calumet district with free transfers and a universal transfer system has been adopted. It is now possible to travel 30.5 miles for a nickel as compared with 13.1 miles ten years ago.

COMMUNICATIONS

Paving Track Allowances

Brooklyn Rapid Transit Company
Brooklyn, N. Y., June 12, 1916.

To the Editors:

I am glad to note that the Electric Railway Journal has taken up editorially the important question of track pavements, because I believe there is no question of greater importance to the street railway companies, particularly in view of the costly pavements now required as against the comparatively cheap pavements which were installed in tracks in the early construction days when franchises were accepted with the stipulation that the railroad company should maintain the track pavements.

I do not believe that many railway companies to-day know exactly how much the pavement in track is costing for maintenance. Information along this line should be covered by the American Electric Railway Engineering Association, with a view to furnishing data upon which to base arguments in favor of legislative changes looking toward relief in some manner from this incubus. It certainly seems absurd that the railroad companies should continue to install and maintain costly pavements upon which the companies impose no wear and from which there is no income. Neither is the pavement maintenance looked upon as a tax, but in effect, I believe, it is one of the largest single items of taxation to which any street railway company located in a large city may be subject.

R. C. Cram,
Assistant Engineer Way and Structure Department.

Features of Freight Operation on the L., A. & W. St. Ry.

Cumberland County Power & Light Company
Portland, Me., June 5, 1916.

To the Editors:

In response to certain questions which have been asked regarding details of the freight service performed by the Lewiston, Augusta & Waterville Street Railway, as outlined in my article published in the issue of the Electric Railway Journal for March 11, I take pleasure in giving the following additional information:

First, regarding the form used in collecting data in our farm survey, the accompanying illustration shows the card which we have found very useful by the railway company in securing general information with a view to increasing the productiveness of farms, in connection with which we are providing storage for farm products until the market requires them. The cards, which are filed in an index, show the location of each farm, the name of the owner, his acreage, crops and stock, the length of his hauls to the electric road and to the steam railroad, and his attitude toward the electric road. They also contain his suggestions or criticisms regarding the plans outlined by the agent.

Another point is in connection with the preparation of freight department statistics. In order that the management may be reasonably sure as to whether the freight department is a source of clear revenue to the company or is being operated without advantage, the auditor compiles a monthly statement, showing thereon the sources and amount of revenue, with comparisons of the corresponding month in the previous year. Against the revenue are charged the following items:

A maintenance-of-way charge (based on car-miles operated) for track, roadway and overhead repairs.

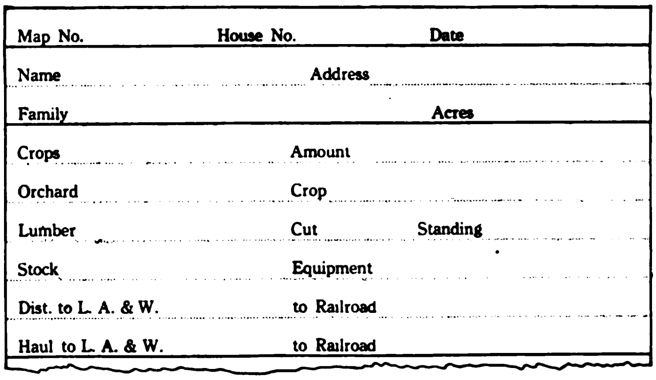
A maintenance-of-equipment charge for repairs of cars and electrical equipment, a proportion of shop superintendence and depreciation of equipment.

Traffic charges for all freight department superintendence, solicitation and advertising.

Transportation charges, including a proportion of the superintendence of transportation, wages of freight conductors and motormen, miscellaneous car service expenses, wages of station employees and station expenses, drayage, per diem charges for cars, losses and damages, cost of lubricants, and miscellaneous expense.

Power is charged for on a car-mile basis for each mile operated.

The general expense account, which includes the proportion of the general officers' salaries and expenses, clerks' salaries, law expenses, injuries and damages, stationery and supplies, insurance, rent of track and facilities and miscellaneous general expenses.



Map No.	House No.	Date
Name	Address	
Family		Acres
Crops	Amount	
Orchard	Crop	
Lumber	Cut	Standing
Stock	Equipment	
Dist. to L. A. & W.	to Railroad	
Haul to L. A. & W.	to Railroad	

FILING CARD FOR DATA ON FARM PRODUCTIVENESS

After all operating expense has been charged, a deduction is made for taxes, interest on investment, and rental of land. The remaining figure shows surplus or deficit.

Among other sources of profitable freight business on the lines of this company is that of hauling materials for road construction. During the summer of 1915 the Maine Highway Commission placed a contract for the construction of 8 miles of concrete road between Portland and Biddeford, Me., this road being the main artery of travel from New York and Boston into the State. The problem of distribution of materials confronted the contractor, and this problem was solved by securing from the railway company a guarantee to transport gravel, rock, filling and cement, distributing them as desired from dump cars, the tracks being parallel to and located on the road to be built. The sand, gravel and filling were hauled in 15-ton loads by motor cars with two dump cars, of 7½ tons capacity each, attached. These cars were loaded under spouts in the gravel pits from storage bins.

By working two trains 18 hours per day, from 300 to 350 net tons of material were hauled per day. Similar loads of cement were hauled from the company's steam railroad siding, transfer being made from the steam equipment at that point by the shipper. The total gravel, sand and filling furnished amounted to 21,609 tons for the 8 miles of State road, the cement used being 2715 tons. At numerous points along the line, the company handled similar work in smaller amounts, in each case effecting a saving in the construction cost and securing a neat return for the freight department.

F. E. Wood, General Freight Agent.

The Public Works Direction, Madrid, Spain, is receiving tenders for the construction and operation of an electric tramway at Melilla, Spanish North Africa. The minimum rolling stock required on the line is sixteen closed cars.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Successful Under-Water Coal Storage

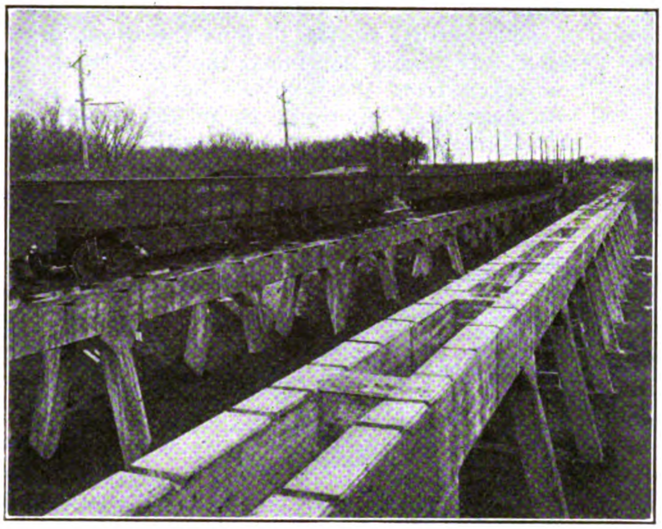
BY J. D. WARDLE
Chief Engineer Iowa Railway & Light Company, Cedar Rapids, Iowa

The Iowa Railway & Light Company, which operates about 50 miles of interurban line and has more than 350 miles of high-tension transmission distribution serving lighting and power customers in central Iowa, has recently put into service a large under-water coal storage. This plant is located on the Cedar Rapids-Iowa City interurban division about 3 miles distant from the generating station in Cedar Rapids. Iowa coal is purchased and is delivered to the company at its southern terminus, Iowa City. It is then brought over the interurban line for a distance of 25 miles to the storage plant.

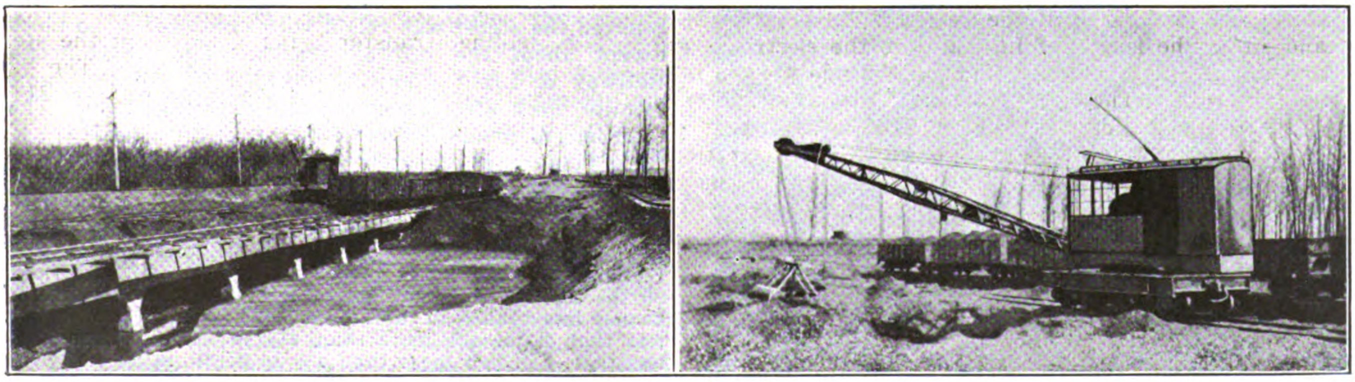
An accompanying illustration shows the general design of the reinforced concrete trestles which extend the long dimension of the pit, 420 ft. The width of the pit is 135 ft., and the height from the floor to the top of the rails is 22 ft. The west wall of the pit is a fill of the interurban line, the other three sides are made up of banks with a slope of 1 to 1. The two concrete trestles are each surmounted by a single track laid on I-beam cross-ties extending a sufficient distance outside of the rails to carry a walkway so that the hopper bottom cars can be tripped.

Iowa coal when piled ignites itself readily, and therefore it is necessary to keep the pit flooded. The water supply is provided by two Gould centrifugal pumps driven by 10-hp. motors which are fed from the trolley. A comparatively small amount of water is needed after the pit has once been flooded. Coal is reclaimed from the pit with a 15-ton American Hoist & Derrick Company's electrically operated locomotive type crane. This crane has 8000-lb. lifting capacity at 50-ft. radius and a 20-ft. boom with a 60,000-lb. capacity on a 12-ft. radius. The crane has a total weight of 67 tons and is used for general road service as well as for loading coal out of the storage pit into the cars.

The consumption of coal is about 250 tons a day, and it formerly was necessary to carry 5000 or 6000 tons in reserve in cars at a per diem charge for the cars of 45 cents. Now with the new under-water coal storage plant in operation, the reserve in cars has safely been reduced to ten cars on the track, and therefore the per diem charge proportionately reduced from $45 to $4.50 a day. In times of threatened shortage, the new storage plant will afford a reserve capacity of 22,000 tons. This pit has been a successful investment, first because it provides safe, long-time storage of a reserve supply of coal, and second, because it has brought about a reduction in the per diem charges on coal cars of approximately $40 a day.



DESIGN OF REINFORCED CONCRETE TRESTLES FOR UNDER-WATER STORAGE



STORAGE PIT OF THE IOWA RAILWAY & LIGHT COMPANY, SHOWING 15-TON CRANE USED FOR RECLAIMING COAL FROM PIT

Devices for Protecting Armatures

BY R. H. PARSONS
Electrical Foreman

Repairs to armatures are expensive, often ranging from $20 to $60, the sum varying with the type, size and condition. A repaired armature, although electrically and mechanically perfect, is easily damaged. As a pin renders an automobile tire temporarily useless, so a tiny piece of steel cut into the coils or between the commutator bars will as quickly disable the most carefully completed armature. The winder may turn out an armature in first-class condition, but improper handling en route to the motor might damage the coils so

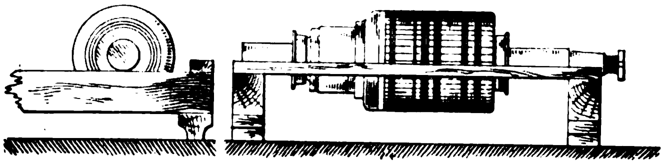


FIG. 1—SKIDS FOR STORING MOTOR ARMATURES

that it would have to be returned to the workman, reflecting unjustly on his workmanship.

Rolling an armature on the floor is the worst practice possible. It should not touch the floor from the time it is taken from the winder's horse until it is placed in the motor. This would be an ideal condition, but as armatures cannot be stored in the air or left on horses, other means should be provided for their protection. Armatures brought into the shop for repairs should be stored on skids, as illustrated in Fig. 1. These are made of two 3½-in. x 7-in. planks set upon 4-in. blocks, and placed parallel on the floor, properly spaced for the armatures on hand. In the interval between winding and banding, the armature can be left on these skids, but as soon as it is banded and ready to be sent to another part of the shop for commutator turning or bearing fitting, it should be covered with a jacket similar to that shown in Fig. 2.

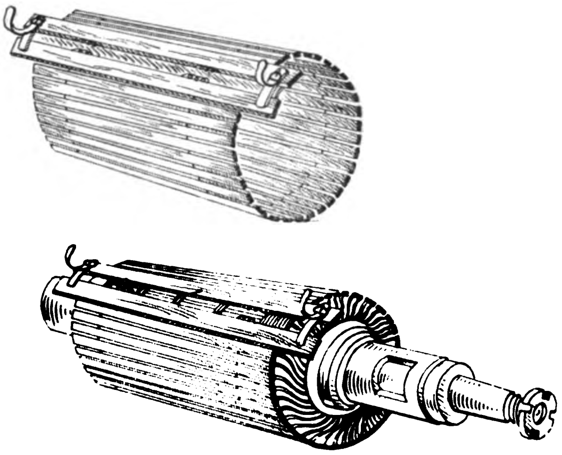


FIG. 2—JACKET FOR PROTECTING ARMATURES IN TRANSIT

This jacket consists of a number of hardwood pieces, finished smooth and held together by strong ropes run through holes in the ends of each piece. The two end pieces, which are longer than the others, hold the jacket together by means of straps. These jackets serve as a suit of armor, and can be easily placed on the armature. They cause no inconvenience in handling and are invaluable in protecting the armature. The jacket should remain on the armature from the time it is banded until it is placed in the motor. Then the removed armature should be placed in the jacket and returned to the armature room. Armatures incased in these jackets may be placed on rough, wet, or dirty floors or upon sharp lathe chips or tacks without injury, it being assumed that they are subjected only occasionally to these abuses.

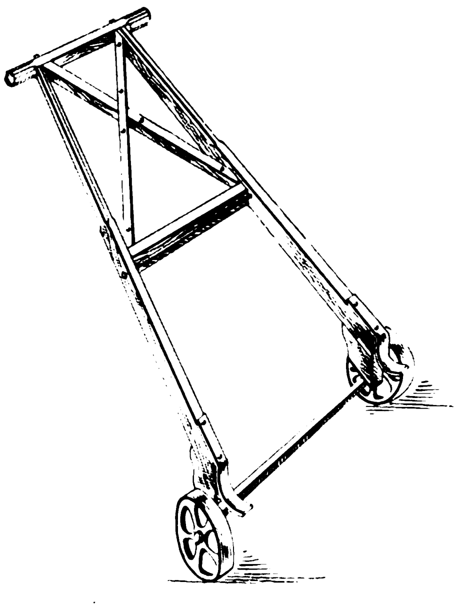


FIG. 3—ARMATURE CARRIAGE FOR USE OVER SHORT DISTANCES

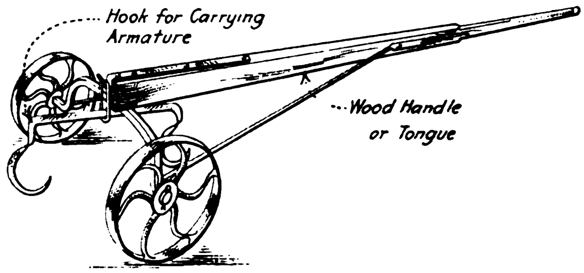


FIG. 4—ARMATURE CARRIAGE FOR USE OVER LONG DISTANCES

It is often necessary to transport an armature on wheels on account of not being able to reach all the machines in the shop with the jib cranes. Two armature carriages are shown in Figs. 3 and 4. The one shown in Fig. 3 can be used between machines in the armature room, while that in Fig. 4 is too large for such purposes. It can be used, however, for conveying the armature to different parts of the building, across streets, or anywhere within reasonable distance. Each carriage performs two functions, lifting and carrying. A long handle which acts as a means of moving the truck, also acts as a lever to raise the armature from the floor. If the handle of either is raised high in the air, the hooks for handling the armature are lowered until they are in a position to pick up the armature shaft.

Granite Paving Blocks Recut and Relaid for $1.59½ per Yard

BY E. R. DIKE
Engineer Maintenance of Way Chattanooga Railway & Light Company, Chattanooga, Tenn.

Previous to reconstruction and repaving on Market Street from Ninth Street to Main Street the entire street, including the railway tracks, was paved with old-style granite blocks. These blocks were 4 in. or 5 in. wide, 5 in. or 6 in. deep, and 10 in. or 12 in. long. When repaved the street was relaid with creosoted wood block except about the railway tracks. The Chattanooga Railway & Light Company decided to use the same granite block after recutting and dressing them. The total length involved was 3600 ft., mostly double track, there being approximately 6000 sq. yd. in all to relay.

The blocks were recut and laid under the following specifications:

The old granite blocks shall be recut to a substantially rectangular shape so as to present fair and true surfaces on the top, bottom and ends. The blocks when recut shall be not less than 5 in. nor more than 10 in. in length, not less than 3 in. nor more than 4½ in. in width, and not less than 4 in. nor more than 4½ in depth, although if the depth of the old blocks before recutting is such as to permit it the recut blocks may have a depth of not less than

4¾ in., nor more than 5¼ in. The blocks shall be recut so that they may be laid with close end joints, and with side joints not exceeding ½ in. in width. A new top face shall be provided for each block, which face shall be so cut as to show no greater depression than ¼ in. below a straight edge laid in any direction across the face and held parallel to the general surface of the block. Each course of blocks shall be of uniform width and the blocks so laid that all longitudinal or end joints shall be broken by a lap of at least 2½ in.

All blocks used shall be free from seams, scales or discolorations showing signs of disintegration, and all blocks which in quality and dimensions do not conform to these specifications will be rejected.

The blocks shall be laid in courses at right angles to the rails, excepting stretcher courses next to rail, which shall be laid as directed by the engineer.

Nelsonville filler block or its equivalent shall be used under the heads of the rails on the inside of the track. This block shall be of such shape and dimensions as to conform to the channel of the rail and shall be similar in quality to a standard vitrified paving block.

All block shall be well settled in place by means of a tamping block and tamper of approved size and weight. All blocks found to be too high or too low shall be relaid so as to conform to the required grade or surface. Any defective blocks shall be removed and good blocks substituted therefor.

On the outside of the rails the channel of the rail shall be completely filled with a Portland cement mortar mixed in the proportion of one part of cement and three parts of clean sand, said mortar to be put in place previous to laying the blocks along the outside of the rails, and to be flush with the head of the rail.

For filler a one-to-one cement grout was used, applied in several successive coats to insure a complete filling of the joints.

The contract for this work was let to a local contractor who recut the blocks and relaid them on a foundation of limestone screenings for the sum of $1.59½ per square yard. This price included the cost of the screenings and the cement filler, but of course did not include any concrete foundation, as the blocks were relaid on the existing concrete and wherever it was necessary to remove any concrete it was replaced by the railway company. The contractor furnished the filler block and also filled the head of the rail as described above.

This work was completed several months ago and at present gives every indication of being a durable and satisfactory paving.

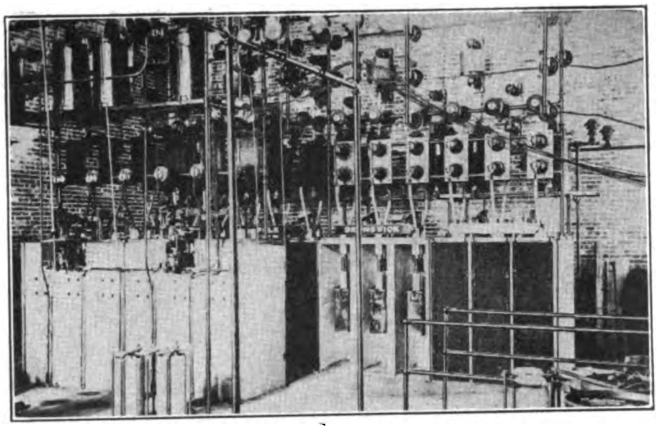
New Transformer House of the C., S. & C. Railway at Elyria, Ohio

BY A. P. LEWIS
Superintendent of Power and Shops

The Cleveland, Southwestern & Columbus Railway has just completed a transformer house in connection with its generating station located at Elyria, Ohio. The 22,000-volt main transformers, which are all oil type, were originally located in the basement of the engine room, jeopardizing the station apparatus through the possibility of fire in a transformer, due to short-circuits or grounds. Serious consideration was also given to the danger of water getting into the basement and flooding the transformers during high-water times.

Accordingly a brick and steel transformer house with a slate roof was built about 50 ft. from the engine room and connected with it by a large concrete tunnel shown in an accompanying illustration. All of the low-tension cables and control wires are carried in the tunnel which also provides free passage from the engine room to the transformer house. The two can be isolated from each other by steel fire doors in case of emergency.

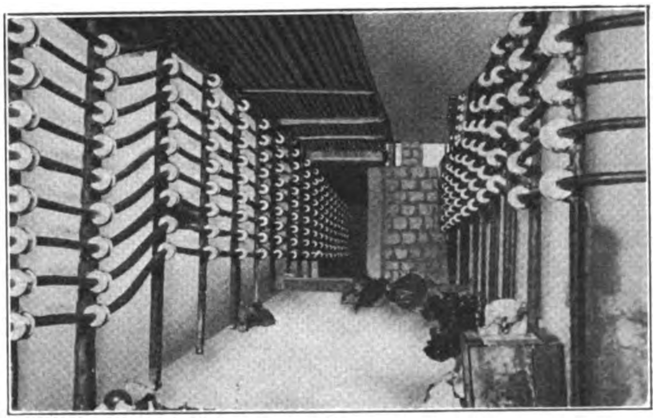
The installation was made as simple and as safe as possible by using only standard material such as 33,000-volt line insulators for supporting bus wires, which are No. 00 copper trolley wire, and 1¼-in. pipe and fittings for racks and framework. To avoid possibility of inductance in pipe-work, brass fittings were used freely wherever necessary. All of the lighting and control wires are carried in conduit and the high-tension oil switches are installed in concrete cells. The outgoing three-phase, high-tension lines, four in number, are carried through the building wall through 14-in. tiles fitted with glass through the center of which a hole is drilled for the passage of the wire. Lightning arresters are of the electrolytic type and are located outside the transformer house on a concrete floor directly under the outgoing lines. They are surrounded by a high wire fence. Disconnecting switches are provided for cutting out all switches, lines and transformer banks. Of the last-named there are four, of three transformers each, totaling 10,000 kw.



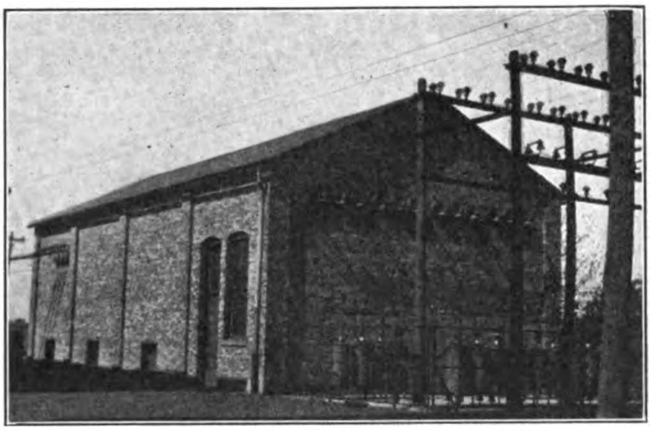
TYPICAL BUS STRUCTURE IN TRANSFORMER HOUSE, C., S. & C. RAILWAY

Each bank of transformers is surrounded by a concrete curbing 6 in. high so that in the event of oil overflowing from the transformers it will not spread over the building. From the base of each transformer a pipe is carried outside the building to a sewer. In the line of this pipe is a quick-opening valve, located outside the building wall and inclosed in a glass box. In case of fire in a transformer the glass is broken, the valve is opened and the oil from the affected transformer is quickly drained out into the sewer which runs directly into the river.

The standard practice of drying out oil and transformers used by this company may be of interest in this connection. The oil is pumped into barrels and the transformers are cleaned of all sediment. From the barrels the oil is filtered into a large metal vat, in which several car-type electric heaters are located. By adjusting the flow of current in the heater, the oil is



TUNNEL CONNECTING ENGINE ROOM WITH TRANSFORMER HOUSE, C., S. & C. RAILWAY



TRANSFORMER HOUSE RECENTLY INSTALLED BY C., S. & C. RAILWAY

brought to exactly the right temperature and held there for from twenty-four to forty-eight hours.

For drying out the transformers the following method is used. They are first raised about 14 in. from the floor and several electric heaters are placed under them. They are next inclosed in a canvas tent which contains a hole in the top. Then by regulating the current in the heaters and the opening in the top of the tent, the case, coils and core are brought to the right temperature and held there for from twenty-four to forty-eight hours. We have dried out dozens of transformers in this manner and have yet to lose a transformer on our system.

Maintenance of Motor Leads

BY E. D. RANSOM, B.E.

It was found some time ago on a large city railway system that sending wire to the maintenance shops and allowing it to be cut to necessary lengths for use as motor leads gave the following troubles: In the first place more wire than was necessary was used, as care was not taken to determine the proper lengths, and to provide a margin of safety the leads were always cut too long, resulting in considerable waste of wire. Again, there was often a tendency to use an improper size of wire if the correct size was not obtainable at the shop in question. In many cases, when the wire was inserted in the brush-holder or the field terminal, care was not taken to see that all of the strands were in the terminal holes. This resulted in a poor connection, which caused the leads to burn off at the terminals. In addition to the above troubles, due directly to this careless manner of using stranded wire, trouble was also experienced with terminal screws cutting into strands, which resulted in burned connections. This was taken care of at the same time that leads were made standard by the use of a copper sleeve inclosing the strands.

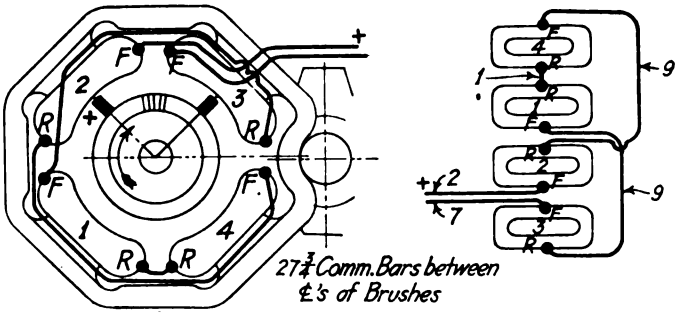


FIG. 1—TYPICAL DIAGRAM FOR IDENTIFYING MOTOR LEADS

TABLE I—FIELD LEADS FOR SEVERAL MOTORS

Lead No.	Type of Motor	Length of Lead	Size of Wire
1	WH-101 GE-80	0 ft. 11 in.	B. & S. gage, No. 5, flexible
2	WH-68	1 ft. 6 in.	B. & S. gage, No. 5, flexible
3	WH-68	1 ft. 10 in.	B. & S. gage, No. 5, flexible
4	GE-80	3 ft. 0 in.	B. & S. gage, No. 5, flexible
5	GE-80	3 ft. 10 in.	B. & S. gage, No. 5, flexible
6	WH-68	4 ft. 10 in.	B. & S. gage, No. 5, flexible
7	WH-101	5 ft. 5 in.	B. & S. gage, No. 5, flexible
8	WH-68	5 ft. 10 in.	B. & S. gage, No. 5, flexible
9	WH-101	6 ft. 9 in.	B. & S. gage, No. 5, flexible
10	WH-81 GE-57	1 ft. 6 in.	B. & S. gage, No. 3, flexible
11	WH-81 WH-93	1 ft. 8 in.	B. & S. gage, No. 3, flexible
12	WH-81 GE-57	2 ft. 2 in.	B. & S. gage, No. 3, flexible
13	WH-93	3 ft. 8 in.	B. & S. gage, No. 3, flexible
14	WH-93	4 ft. 2 in.	B. & S. gage, No. 3, flexible
15	WH-81 GE-57	5 ft. 10 in.	B. & S. gage, No. 3, flexible
16	WH-81 WH-93	7 ft. 2 in.	B. & S. gage, No. 3, flexible
17	GE-64	1 ft. 6 in.*	B. & S. gage, No. 1, flexible
18	GE-64	3 ft. 3 in.	B. & S. gage, No. 1, flexible
19	GE-64	4 ft. 7 in.	B. & S. gage, No. 1, flexible

To reduce the frequency of motor-lead failures, all leads were made of the proper length and size of wire for each type of motor, and were equipped with terminal sleeves. To make this possible it was first necessary to standardize the internal wiring of the various types of motors as follows: The lengths of leads for the best wiring conditions were determined, each lead being given an individual number. Fig. 1 shows a diagram for a WH-101 motor, which is representative of the type of diagram used for each type of motor. Table I shows the lengths of leads, the sizes of wire and the types of motor for the several leads.

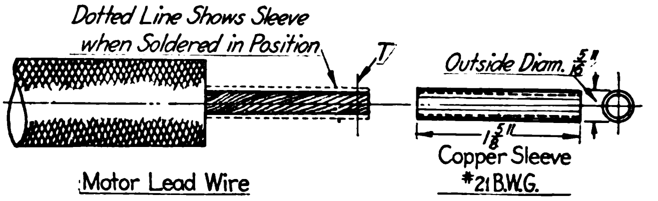


FIG. 2—COPPER SLEEVE FOR REINFORCING MOTOR LEAD TERMINALS

The maintenance shop employees can now pick out the lead wire required from the proper motor diagram and, by referring to Table I can place an order with the department of electrical repairs for the lead numbers required. These leads are furnished all ready to be placed in the motor shell and inserted in the terminals. The table gives lengths for field leads only.

In addition to Table I, Table II was prepared showing the proper lengths of motor leads outside the motor shell. The lengths shown in Table I are the total lengths of leads. The proportion of lead inside and outside the shell is arranged so that the lengths outside have the values given in Table II. To prevent trouble caused by different length leads in the same cleat which resulted in chafing and grounding on motor shell, calculations were made from which this table was developed. All lengths of lead were arranged in such a way that they would not cause binding on curves nor be in danger of chafing or catching on the motor shell.

After the above tables had been satisfactorily ar-

TABLE II—LENGTHS OF FIELD LEADS OUTSIDE THE MOTOR SHELLS

Types of Car and Motors	Length of Lead of Outside of Shell
Single-truck, open and closed cars, with WH-68 motors	25 in.
Double-truck, open and closed cars, with WH-49 motors	30 in.
Double-truck, open and closed cars, with WH-81 motors,	30 in. (except axle jumper, which is 45 in.)
Double-truck, closed, open and convertible cars, with WH-101 or WH-68 motors	30 in.
Double-truck, convertible cars with GE-80 motors,	30 in. (except axle jumper, which is 45 in.)
Double-truck, semi-convertible cars, with GE-90 motors	46 in.
Double-truck, semi-convertible cars, with WH-81 or WH-93 motors	30 in.

ranged, all motor lead wire was concentrated at the department of electrical repairs. It was received in 500-ft. coils and cut to proper lengths, after which the sleeve mentioned previously, and shown in Fig. 2, was put on. This sleeve consists of a piece of copper tubing of dimensions as shown, and is placed over the strands and firmly soldered in place. The chief advantage of this sleeve is that all strands are firmly held in place, making the result as good as a solid wire of equal size. The use of this sleeve eliminated many cases where the terminal screw was set in so tight that it cut or spread the strands, causing the lead to burn open-circuited.

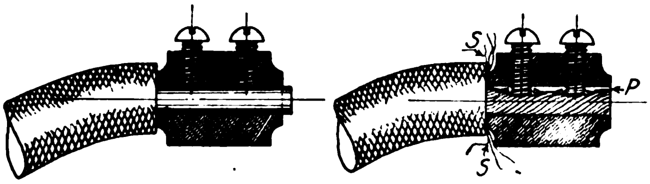


FIG. 3—MOTOR LEAD TERMINALS WITH AND WITHOUT REINFORCING SLEEVE

Fig. 3 shows a motor lead fastened in a field terminal both with and without terminal sleeve applied. The letter *P* indicates the sinking of the screw into the strands. In many cases it was found that nearly three-fourths of the diameter of the wire was cut through and the lead had burned off at this point due to poor contact and insufficient carrying capacity. The letter *S* shows the outside strands which had unravelled and did not get in the terminal at all. Such cases gave rise to burning at the terminals and a possibility of grounding through these strands to the motor shell. The sketch at the left in Fig. 3 shows the wire held as firmly as if it were a solid wire, the terminal screws being pressed against the sleeve which protects the strands. It must be understood that before this step of standardizing motor leads was accomplished, the old-style fields having permanent leads were replaced with fields equipped with terminals, and it was at this time that these troubles were experienced.

The concentration of the supply of motor leads and end connections at the department of electrical repairs insured the proper length leads of the correct sized wire. In addition the ends were carefully prepared for insertion in terminals, making motor lead maintenance as nearly foolproof as possible. Since the above methods have been in use cases of motor lead trouble due to the lead connection to the field are practically unknown. The length of lead outside the shell has been so changed from time to time that the present length, as shown in Table II, is such that motor lead replacement depends only on the life of the wire used.

An Unprepared Test of the Small Fire Extinguisher

The ready advantages of the type of small fire extinguisher containing volatile liquid of low conductivity to electricity were well demonstrated in an accidental manner on June 5, when a fire broke out in the motor windings of an Omaha street car, just as the car was passing the office of the Johns-Manville Company. According to the Omaha *World-Herald,* an employee of that company, who happened to be looking at the passing car, rushed out with a fire extinguisher and extinguished the blaze with practically no damage, and the car was able to proceed. This prompt action would doubtless have been impossible by using water which, furthermore, would have been dangerous on account of its property as a conductor of electricity.

Flood-Light to Illuminate Time Board

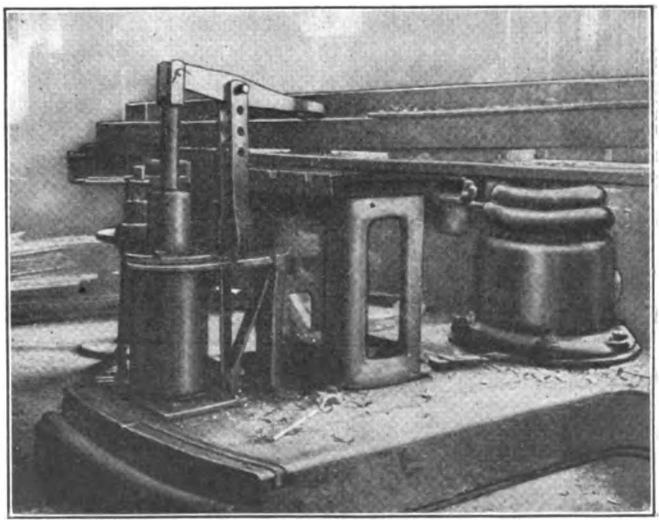
The time board of the Springfield (Mo.) Traction Company, shown in the accompanying illustration, is illuminated by the use of a small General Electric flood-light. This time board, which is located near the "Frisco" depot, is of great convenience to the traveling public, and will be of still greater convenience as soon as a Western Union clock is installed in the space left for it in the center of the board.

CARS LEAVE FOR
PUBLIC SQUARE
NORTH SIDE
10 20 30 40 50 60
10 20 30 40 50 60
FROM 6:00 A.M. TO 11:30 P.M. AFTERWARDS
OWL CAR ON THE HOUR FROM 12:00 TO 6:00 A.M.

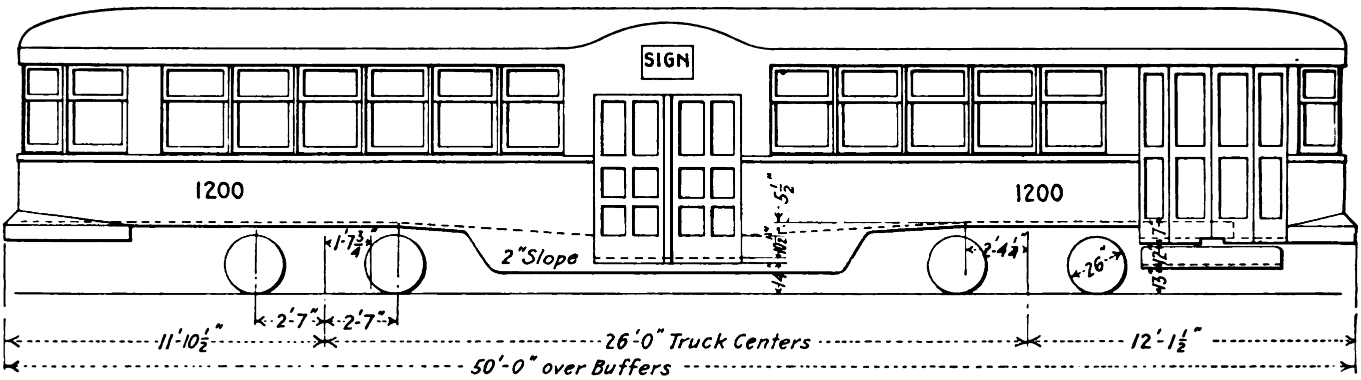
TIME BOARD OF SPRINGFIELD TRACTION COMPANY ILLUMINATED BY FLOOD-LIGHT

Air Clamp Facilitates Drill Operations

Bolting the work in position on the radial drill in the shops of the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been obviated by the substitution of an air clamp. It has also had the effect of greatly simplifying and hastening all drilling operations. This attachment in the clamped position is shown in the accompanying illustration. It consists of a 7-in. x 12-in. standard air-brake cylinder and an engineer's valve mounted on the radial drill bedplate. Several lengths of clamping arms are provided for different drilling operations and the pivoted point of the clamping arm is adjustable vertically. Air for this clamp is obtained from a shop compressed air line, where a pressure from 80 to 100 lb. per square inch is available. The pressure at



AIR CLAMP WHICH SIMPLIFIES DRILL OPERATIONS



ELEVATION OF NEW PAY-AS-YOU-PASS CAR FOR ROCHESTER, N. Y.

the end of the clamping lever, however, is multiplied at the brake cylinder and by the lever arm, and a force of approximately 1900 lb. is obtainable at the end of the clamping lever.

Fifty Pay-as-You-Pass Cars for Rochester

The New York State Railways-Rochester Lines have just ordered from the Cincinnati Car Company fifty front-entrance, center-exit cars of Peter Witt's post-payment design. As shown in the accompanying elevation and plan, the cars will be 50 ft. long over the buffers and 26 ft. between truck centers. The height from the pavement to the exit level at the center will be 14 in., and the height from this level or well to the main floor, 10¼ in. At the front entrance, the height from the pavement to the tread of the folding step will be 13 in., the height of the riser 12 in. The doorway to the front well will have an over-all width of 5 ft. 4¾ in., and will be furnished with a center railing to encourage two people to enter at one time. This front well will be 7 in. below the main body floor. The riser is to be set radially, one object being to secure extra seating capacity and another to permit the passenger to take one step on the lower level before using the riser.

The bodies will be mounted on Baldwin arch-bar trucks fitted with Hess-Bright ball-bearing journal boxes and National 26-in. diameter cast-iron carwheels. The four motors are to be of the GE-258 type, fitted with ball bearings on the armature ends and rated 25 hp. each at 600 volts. The K-12 single-end control to be used includes magnetic line switches.

As the rides in Rochester are comparatively short and it is desired to handle the traffic most expeditiously, longitudinal seats of Hale & Kilburn manufacture are to be used. They will seat fifty-two people. The Cleveland type fare box is to be placed at the center of the car and on the main floor level.

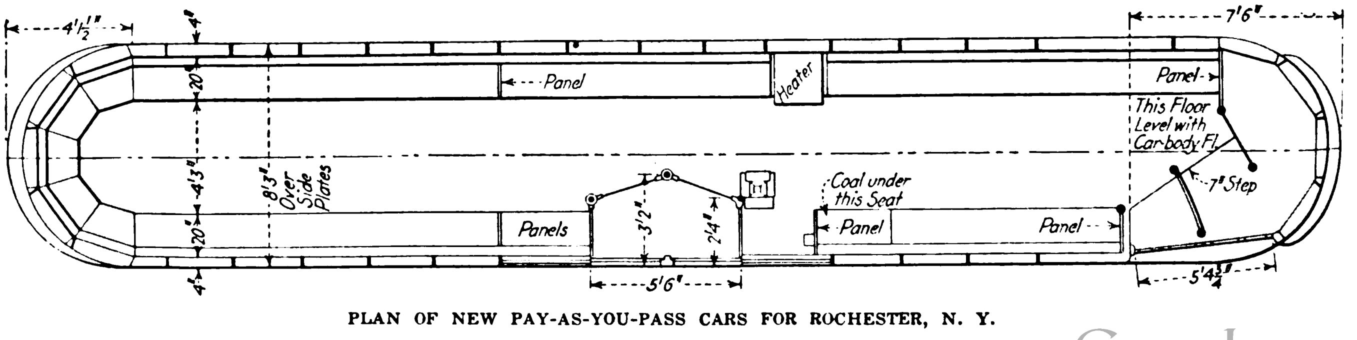
These cars will be furnished with Hunter signs bearing 6-in. to 7-in. lettering. Signs will be placed over the center exit doors, in the window on the devil strip side opposite these doors, and in the center sash at the front end.

The Consolidated Car Heating Company will furnish the pneumatically-operated door and step mechanisms, the motorman's signal, the passengers' buzzers and the forced-draft heaters. Other equipment on the cars include Q-P trolley catchers and Eclipse fenders.

The Equipment Makes the Wreck Car

Wreck cars for street railway service need not be elaborate, but there are many elements of their equipment which are essential to the quick handling of wrecked cars. There is nothing particularly novel about the construction of the wreck car used by the Public Utilities Company of Evansville, Ind., except that it is a car built especially as a wrecker. This is a double-end car of all wooden construction, fitted with side doors. Westinghouse No. 56 motors and General Electric K-35-G control. The car is 34 ft. long over all, and 8 ft. 6 in. wide. Both ends are fitted with footboards for the convenience of the wrecking crew. The car is equipped with automatic couplers for interurban service and an ordinary link and pin coupler for street railway service.

As a result of experience the equipment of this wreck car, which is used for both city and interurban service, has been added to and improved until the mechanical department believes it is as near perfection for the service it performs as it can be made. Just inside each of the center side doors are pivoted jib cranes with 8-ft. horizontal members fitted with 1-ton chain hoists. The motorman's positions at each end of the car are guarded with substantial wooden frames extending from the roof to the floor of the car. Fastened to these are curtains, which may be pulled down at night so that the light from the interior will not obstruct the motorman's vision. A combination heating and cooking stove, set in a box of sand, occupies a position near one end of the car, and immediately back of it is a combination tool box and bench. This box contains one 1¼-in. and one 1½-in. snatch block with 50 ft. of rope; 75 ft. of ⅝-in., 50 ft.

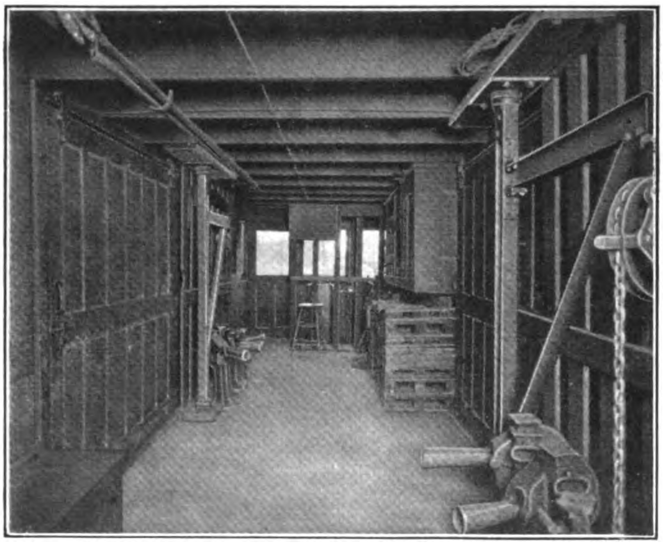


PLAN OF NEW PAY-AS-YOU-PASS CARS FOR ROCHESTER, N. Y.

of ½-in., 50 ft. of 7/16-in., 50 ft. of ⅜-in., and 50 ft. of 5/16-in. chain, all fitted with rings and hooks. On the wall of the car above this bench is a folding table, and in a cupboard on the opposite side of the car is a complete cooking outfit and set of dishes. Part of the outfit in the cupboard includes such staple groceries as may be kept there safely in buckets, tins, etc., and, in cases of emergency, arrangements are made completely to supply the larder.

In clearing wrecks jacks play a very important part, and this fact has not been overlooked in equipping the Public Utility Company's wreck car. This equipment includes two 35-ton Simplex ratchet jacks, two 20-ton jacks of the same type, four 15-ton jacks, two 10-ton jacks, one 15-ton slewing jack and two 15-ton journal jacks. A unique feature of the car equipment is the built-up blocking. These blocks range in sizes from 1 in. to 10 in. thick, all being 24 in. long and 10 in. wide. All of this blocking is made of 1-in. oak boards with oak separator blocks of various sizes. The complete selection of blocking includes fifteen 1-in. blocks, twenty 2-in. blocks, and ten each of the other sizes ranging from 3 in. to 10 in. and varying in size in steps of 1 in. Built-up blocking was adopted because it is much lighter than solid blocking, and thus it is more readily handled, and experience has demonstrated that it is just as serviceable.

Two trolley poles fitted with trolley wheels are also carried on brackets suspended from the roof of the car. There are two classification lamps and two marker lamps in a rack at one end, and beside these eight flags of various colors, a set of four railroad lanterns and six large lanterns for night work. In a set of bins mounted on one of the sides of the car is a complete stock of bushings, sleet cutters, fuses, tape, connectors, washers, nails, cotterpins, etc. At convenient points on the car sides and in especially prepared racks are mounted one axe, one hand axe, one cross-cut saw, one hand saw, one set of wrenches, one bolt cutter, one hack saw and a set of track repair tools, including gages, lining bars and spike mauls. Four small turtle-back car replacers and a magneto for testing car wiring are also made a part of this wrecking outfit. Various sizes of wire which can be used in making temporary repairs are carried in coils, and as a rule this is supplied in sizes Nos. 2, 4, 6 and 14. Other miscellaneous equipment includes trolley rope, waste, buckets, fire extinguishers, stools, brooms, etc. Many of these tools are shown in the accompanying illustration.


INTERIOR VIEW OF ONE END OF EVANSVILLE WRECK CAR

Insurance Increased for K. C., C. C. & St. J. Ry. Employees

The 133 employees of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., who constitute the insurance organization of the company, have increased their life insurance from $500 to $1,000, without additional assessments. Group insurance is carried by the Equitable Life Assurance Society, New York. Previous to 1905, the employees paid 10 cents a week, and the company paid $1 a quarter for each member, into a fund; benefits paid were $7 a week for disability, and $100 for death. A year ago the Equitable made a contract to carry the life insurance, each man being protected with a $500 policy. The organization continued its health and accident feature, the members continuing to pay 10 cents a week, and the company $1 a quarter for each. The surplus has continued to accumulate, and the doubling of the benefits for death was decided upon. It is likely that the Equitable, which may soon adopt the practice of disability insurance by groups, may take over the entire insurance feature of the organization. The men add money to the insurance fund each year with two or three entertainments. Last year about $500 was realized from such sources. The surplus now in the treasury would carry both health and life insurance projects for three years, with the 10 cents a week from members. The company and the organization, however, continue to add to such surplus.

Results on Vienna Railways During War

The report of the Municipal Railway at Vienna, Austria, for the fiscal year to June, 1915, is of unusual interest, because it shows the war's effect on a municipal enterprise that employed 12,368 persons at the time of the opening of hostilities. Of these, 5700 men joined the army immediately and 1706 more before the end of the fiscal year, and at that time 10,083 persons were employed, the vacancies having been filled chiefly by women. The service continued uninterrupted and also undertook new work, such as the transportation of wounded by special street trains and the forwarding of freight of all kinds. The official report of the city shows that the total number of paid miles covered by its street cars in 1914-1915 was 55,921,500, or only 11.2 per cent less than in the preceding year of peace, while 327,000,000 passengers were carried, or 1½ per cent less. The total revenue from the electric lines was $10,764,762; from street traction, $92,351, and from auto-omnibus service, $9,875. The last mentioned was just being inaugurated when the war came. Against this was an expenditure of $6,313,493 for electric, $155,862 for steam, and $23,065 for auto service, a total of $6,492,420 for operation expenses. This, with the usual annual charges for damages, benefits, dividend on invested capital of $39,077,500, etc., increased by $710,500 for expenses due to the war, made the total expenditures $10,021,695. There was a surplus of $861,676. Of the surplus, part was spent for new equipment, payment of money borrowed, etc.

The Boston *News Bureau* says that the Boston Elevated Railway's snow expense last winter was practically three times as large the year before. Up to April 1 it cost the Boston Elevated Railway $130,000 to take care of the snow and keep its lines open during the unusually severe weather which featured the winter. This $130,000 is more than one-half of 1 per cent on the $23,879,000 of stock.

NEWS OF ELECTRIC RAILWAYS

PORTLAND VALUATION FIGURES ANNOUNCED

Outline of Salient Features of Case—Statement Made by Company in Reply

The Public Service Commission of Oregon has handed down a decision in the matter of the value of the Portland Railway, Light & Power Company properties in western Oregon. The next matter to be taken up will be that of rates, unless the company can secure additional consideration of the valuation question. As stated in the ELECTRIC RAILWAY JOURNAL for June 17, page 1151, the commission has decided that the reproduction cost less depreciation amounted to $40,822,833 on June 30, 1915. This is $877,940 less than the company claimed the same valuation to be, according to its method of calculation. The commission's valuation of the reproduction cost new is $45,375,027. It is believed that this estimate will form the basis of the various rate investigations that will be made. The figure does not include any working capital, going value, investments in subsidiaries, construction work in progress or investments in undistributed construction accounts. The commission has made no allowance for going value, but an inspection of the decisions indicates that it is willing to receive additional testimony on this point and will give it attention in the future.

The company's complete claim before the commission was $61,040,004. The largest eliminations by the commission were $7,489,446 for "going value" and about $6,000,000 for property that the commission did not consider useful as public utility property. The commission will allow working capital to the amount of $1,110,000 instead of $1,850,000 deemed necessary by the company.

The commission concedes that the company's earnings have been falling off materially, and puts the blame of this on jitney competition and electrical competition in Portland. The commission's remarks on this point are as follows:

"It will be noted that the last few years has shown a marked falling off in earning capacity. This is shown by the record to be due to the following three causes: general and local depressed business conditions; the advent of competition in the electric lighting and power field, which has taken from the respondent a considerable proportion of its most profitable traffic and without correspondingly diminishing fixed and running charges, and the practically uncontrolled destructive competition of jitneys. While revenue has fallen off, it is evident that the effect has been kept to a minimum by rigid economy in other directions. To a very considerable extent the conditions shown for the last three years are abnormal; and the causes for the conditions have apparently reached the climax of their effect."

The commission apparently considers the question of going value to be debatable. Its decision reads in part as follows:

"In this figure the utility included $7,489,446 as representing the cost of developing its business, commonly known as 'going value' and which is not included in the figure found by the commission as representing the reproduction of physical properties. Whether this claim of going value is reasonable is not determined in the present findings. The theory upon which the going value claim was made is not approved by the commission, and the utility is afforded the opportunity to present further testimony upon the question of going value in order to bring its claim for this element of value, which is well recognized in utility valuations, within the rule of modern decisions.

"The amount claimed by the utility as representing going value is equivalent to 16 per cent of the figure found by the commission as reproduction cost of the physical property of the utility. In the appraisal submitted by the utility a claim was made that the value of its water rights used in both utility and non-utility operations, was $6,000,000. The Supreme Court of the United States has laid down a rule that developed water rights shall be valued in proceedings of this character.

"The commission, by its decision, materially reduced the claim of the utility for water right values, and the principal differences between the appraisals submitted by the utility and the ultimate findings of the commission lie in the elimination, for the present, of the utility's claim for going value, in reduction in the claim for water right and real estate values, in the reduction of percentages for overhead costs added to specific construction, and in a decrease in the amount claimed as working capital."

The commission finds that the company is now paying interest on $1,057,000 of city bonds for pavements. The company had no share in determining if this money should be spent, though it was one of the heaviest payers. It has already paid off about $1,000,000 of these bonds. The commission finds that out of every dollar taken in by the company, 20 cents is paid out to city, county and state for taxes, franchises, bridge rentals and other items of a similar nature.

The commission states specifically that the present findings are not to be considered the value of the company as a business entity. The commission found that the aggregate investment of the present holders amounted to $54,047,042, but this, of course, includes all company property.

Franklin T. Griffith, president of the company, said in part:

"The findings of the Public Service Commission have just been served on us and we have, as yet, had no opportunity to analyze the values found. From such study as we have been able to give the findings, however, it appears that the commission materially reduced our claims as to cost of construction of the physical property and also the values claimed for our rather extensive holdings of real estate used in both utility and non-utility operations. To what extent the commission has been influenced by the abnormally low prices of real estate during the last two years of extreme depression, we are unable to determine.

"One large item of value claimed by the company and not included in the commission's findings is the intangible element of going value which is representative of the cost to the company of developing its business and is not represented by tangible physical property. The claim of the company for this item was approximately $7,500,000, and this entire amount is excluded in the findings of the commission, although the findings state that going value is recognized in utility valuations as an important element and that the commission is willing to consider the allowance of a going value, provided that upon a further hearing the company is able to comply with certain specific conditions laid down by the commission in its findings as essential to the establishment of such a claim.

"The amount claimed by the utility as representing going value is equivalent to 16 per cent of the figure found by the commission as representing reproduction value of physical property. This percentage is of peculiar interest in view of the fact that this element of value in similar proceedings elsewhere in the United States has been found reasonable by courts and commissions when reaching a figure ranging from 20 to 30 per cent of the reproduction value of physical property.

"The developed water rights owned by the company are used about one-third in non-utility operations and two-thirds in utility operations. Our total claim for water right values is $6,000,000, and while we cannot, from the findings, determine as yet the theory of value adopted by the commission, it appears that the commission has allowed us practically our appraisal of water powers used in non-utility operations, in which the rate-paying public is not interested, and on some of our developed water powers used in utility operations has allowed us not much more than nominal values."

COURT PROCEEDINGS START IN SAN FRANCISCO

Construction Held Up While Question of the City's Right to Parallel United Railroads on Market Street Is Being Determined

In order to determine whether the Municipal Railway, San Francisco, Cal., has the right to construct its tracks parallel to those of the United Railroads on Market Street, the president of the board of works with a construction foreman started work on the Van Ness Avenue crossing on June 13. Attorneys for the United Railroads obtained from the United States District Court a temporary restraining order commanding the city to stop the work and to show cause on June 19 why a preliminary injunction should not be issued pending the settlement of the whole matter in the courts.

Both sides have agreed, it is affirmed, that the case will be carried to the end to determine whether the city has the right to build tracks wherever it pleases regardless of franchises issued to corporations. The United Railroads contends that the provision in its franchise declaring that the city shall not grant a franchise to a competing line for more than five blocks of parallel track binds the city as well as lines operated by private companies. On the other hand, the city cites the Knoxville case, decided a number of years ago by the Supreme Court and since accepted as precedent. In the Knoxville case a franchise was granted to a water company to lay mains and furnish water to the city for a number of years, but before the expiration of the franchise the city decided to build its own water system and furnish a municipal supply. The final decision in the case was that while the city was privileged to grant an exclusive franchise, it could not deprive itself of the right to construct a water system of its own whenever it should so elect.

By bringing up a constitutional question the United Railroads was able to enter the Market Street case in the federal district court. The fight is expected to be carried to the Supreme Court for its final decision. The city desires to complete the laying of double tracks all the way on Market Street from Kearny to the eastern portal of Twin Peaks tunnel and to run a connection on Church Street from Market to the present terminus of the municipal line on Church Street. This would give the municipality double tracks the entire length of Market Street, paralleling the United Railroads, and would connect the Church Street and Van Ness Avenue lines. The injuncton not only prevents further construction on the proposed lines affected, but will leave the city's Church Street line isolated and without means of getting cars to it when it is completed in the near future.

CHANGES RECOMMENDED IN QUEENSTON LINE

The Ontario Railway Board made public on May 29 its recommendations to the International Railway, Buffalo, N. Y., based on the study which it made of the property of the company at Queenston following the accident on the grade there last summer. The engineers reported to the board in November. The board orders that the tracks from the upper arch bridge to the Grand Trunk bridge be ballasted with stone and gravel, and that where the board's engineer directs suitable drains or ditches be placed in tracks with cross-drains to carry off the water. This work must be ready for the inspection of the engineer by June 15, 1916. All defective or decayed ties must be removed at once, and low joints be raised or ballasted under the ties; all outer rails which are in a worn condition and are situated on a curve must be replaced; guard rails must be inspected and added to or extended as the engineer of the board requires; the safety switch near Brock's monument must be reconstructed according to a plan approved by the board; all weeds and vegetable growths must be removed from between the rails and for a distance of 18 in. outside the track, as well as from the devil strip, and kept clear; portions of the cliff where the track approaches close to the edge must be inspected and reported upon not later than the first week in May each year.

The company is required, during the current year, to rebuild all its culverts under the tracks, of concrete or cast-iron pipe, and to reconstruct the railway from Queen Street in the village of Queenston to the river dock with a safety switch, and with altered grades and curves, in accordance with plans approved by the board. Hereafter cars with double motor equipment are to be operated to the Queenston Dock and all brake rods and brake equipment must be strengthened as required; sanders of ample capacity, as approved by the board, are to be fitted to the cars and adjusted to deposit the sand as closely to the wheels as possible. These must be inspected frequently.

The board directs that in operating up or down the Queenston grade an open car must not have a load of more than 30 per cent over the seating capacity, and closed cars not more than 30 per cent over its seating capacity. The board also requires stricter observance of the orders to conductors and motormen dealing with the speed of cars at curves, crossings, etc.

BUFFALO SOUTHERN RAILWAY STRIKE SITUATION UNCHANGED

All efforts to operate cars over the interurban lines of the Buffalo (N. Y.) Southern Railway, whose platform men have been on strike for seven weeks, have been unsuccessful. E. G. Connette, president of the International Railway, over whose tracks the line operates from the city line to the Main Street terminal, has notified Nathan A. Bundy, receiver for the Buffalo Southern Railway, that owing to an agreement between the International Railway and its employees, cars with non-union crews cannot be operated in the city limits. The sixty employees who went on strike for a wage increase and renewal of their agreement are willing to return to work at the old wage scale, but demand a renewal of their union agreement. Stockholders of the road have notified the Erie County Supervisors' Committee, which has investigated the strike situation, that they have no objections to the renewal of the agreement, but Mr. Bundy is firm in his refusal to recognize the union. He also refuses to arbitrate. P. J. Downey, of the New York State Board of Mediation and Arbitration, has threatened to conduct an investigation in court into the management of the road in an effort to bring about a settlement. Henry Lein, a stockholder, has retained counsel to start a stockholders' action to have Mr. Bundy removed as receiver.

SUBSIDIES SUGGESTED

An interesting program of maintaining the commercial standing of Louisville in spite of prospective prohibition legislation by extension of the electric railways out of the city is suggested in a letter published over the name of Rush C. Watkins, one of the leading business men of that city. Develop the city through interurban service, he suggests, and he proposes that the city shall aid in financing the extensions. His letter follows:

"There is little doubt, I suppose, that the statewide people of Kentucky are going to force a vote on prohibition within a few years, and if this is done Kentucky will likely go prohibition, as there are more voters in the dry than in the wet territory. Louisville will get a severe commercial blow and, in my judgment, one of the ways to offset this damage is by developing the city through interurban service.

"First—Build a line out the Brownsboro road.

"Second—Extend the Bardstown road line to Bardstown.

"Third—Extend the Preston Street line to Shepherdsville, or possibly this line could be run on to Bardstown cheaper.

"Fourth—Extend the Eighteenth Street road line to Mammoth Cave through Elizabethtown and Hodgenville. Push the government ownership of Mammoth Cave.

"Fifth—By all means extend the Shelbyville line to Frankfort, there connecting with the Bluegrass system which gives us traction service all over the Bluegrass country, and I believe we will get our share of that business instead of Cincinnati getting it all. Cincinnati, while a good neighbor, pays no taxes in Kentucky and is not in a position to reciprocate the business Kentucy gives her.

"Sixth—The banks are full of money, and a flotation of bonds to cover these extensions could be easily sold. Louisville and Jefferson county could afford to guarantee these bonds rather than not have these improvements."

ROCHESTER LINES REPLY TO COMMISSION RECOMMENDATION

The reply of the New York State Railways, Rochester Lines, to the recommendations for improvements in service in Rochester made by the Public Service Commission for the Second District of New York in connection with the decision adverse to the jitneys referred to in the Electric Railway Journal of May 20, page 957, was filed with the commission on June 20. The Rochester *Herald* of June 21 said that the reply had not been given out for publication there. In the absence of Horace E. Andrews, president of the company, from New York access to the copy of the reply at the office of the company in New York was made contingent upon securing the necessary permission from Rochester. This could not be done before going to press. From Albany it was reported that the answer of the company was in the nature of simply a formal reply, with the prospect of conferences being held by the company, city and commission representatives before final disposition is made of the case.

INTERURBAN MEN TESTIFY BEFORE TOLEDO COMMITTEE

At a meeting of the subcommittee of the Milroy Street Railway Commission at Toledo, Ohio, on June 16 D. D. Schenk, president of the Toledo & Indiana Railway, and E. A. Burrill, general manager of the Northwestern Ohio Railway & Light Company, estimated from statistics that seven interurban lines entering the city paid the Toledo Railways & Light Company $83,563 in 1915 for the use of its tracks. Six of these lines carried 2,418,797 passengers, but there were no figures to show what the seventh did. The average amount per car-mile paid to the company was 0.2015 cent. In addition, the roads paid a share of the maintenance of the freight and passenger depots. This information was sought by the committee in its endeavor to learn all the sources of revenue of the city line. Messrs. Schenck and Burrill estimated the cost of building single track at $60,000 a mile, and of double track at $110,000 a mile. They said that the interurban companies would prefer an independent track for their entrance to the city, because it would allow them to make better time.

ST. LOUIS MILL TAX JUDGMENTS PAID

The United Railways, St. Louis, Mo., on June 15 notified the City Counselor that it would send a check to the city for $1,839,205, the full amount of seven judgments in favor of the city to cover the mill tax owed by the company from 1903 to 1910. On the day following, payment was made. Acknowledgments were filed shortly before noon in the divisions of the circuit in which the judgments were obtained. The total amount due for that period is about $2,300,000, but the excess over what the United Railways has paid is represented by judgments against the St. Louis Transit Company. The United Railways contends that the transit company has no assets. No bond was put up to insure any possible judgment against the transit company. About $1,000,000 of mill tax has accrued since 1910. This is still in litigation. The money with which to pay the tax is available through a special reserve fund set up to meet a possible decision unfavorable to the company. The Supreme Court early in the previous week decided against the United Railways on its final appeal for a reopening of the case.

SELECTION OF TRENTON ARBITRATOR STILL UNSETTLED

Another conference was held at Trenton, N. J., on June 21 on the arbitration covering the reinstatement of employees of the Trenton & Mercer County Traction Corporation, but no agreement could be reached on the arbitrators and from present indications the arbitration in these cases will be prolonged for some time. C. Howard Severs, arbiter for the union, printed a statement in the newspapers in which he charged the company with delaying the matter. Peter E. Hurley, general manager of the company, has denied this. He said that the company is anxious to have the matter cleared up as soon as possible. According to Mr. Hurley the union objected to Samuel T. Atchley, warden of the New Jersey State Hospital for the Insane; J. M. Berrien, tax collector of Lawrence township, and William Hutchinson, retired. Mr. Hurley further said that when the third arbitrator was selected he would bring before the arbitrators the men who checked up the conductors and whose evidence was responsible for their dismissal. Representatives of the company and union on June 21 again discussed the proposed new working agreement to become effective on July 1. No conclusions were reached and further conferences will be held.

Progress Made in Massachusetts Arbitration.—It was announced in Springfield on June 18 that an agreement between the Springfield Street Railway and the Worcester Consolidated Street Railway and their employees has been reached so far as the wages of uniformed men were concerned. The next conference was arranged to be held at Worcester on June 22.

Increase in Wages Granted in Saginaw.—The Saginaw-Bay City Railway, Saginaw, Mich., has increased the wages of its motormen and conductors 1 cent an hour. Under the new scale beginners receive 21 cents an hour. The pay of men who have been in the company's employ five years or longer is increased to 25 cents an hour. On the interurban lines the scale is from 24 cents for first-year men to 27 cents for fourth-year men.

Action on Pittsburgh Transit Commissioner Delayed.—The City Council of Pittsburgh, Pa., upon motion of John H. Dailey, has referred back to the finance committee the resolution for the selection of a transit commissioner to consider and report on the rapid transit needs of the city with respect to some of the proposals for traffic betterment already advanced. The measure authorized the Mayor to nominate the commissioner, who is to be confirmed by Council.

Conductor Indicted for Using Spurious Coin.—An indictment has been returned by the United States Grand Jury in Buffalo, N. Y., against a conductor formerly employed by the International Railway charging him with using a coin in imitation of a nickel. The coin, when deposited in the fare box, would register as a penny. The evidence was obtained and presented to the Federal Grand Jury by United States District Attorney Stephen T. Lockwood, who acted in co-operation with local United States secret service operatives. The case will probably go to trial before District Judge Hazel.

Military Precautions Tightened at Niagara.—Owing to stringent military and immigration restrictions along the Canadian-Niagara frontier, conductors on all Gorge Route and International Railway cars operating over the Park and River division and Upper Steel Arch bridge at Niagara Falls, Ont., are instructed to notify the military authorities of all passengers who do not hold round-trip tickets. Tourists of German extraction are practically prohibited from entering Canada except under special permission. Armed uniformed Dominion soldiers ride on every car between Niagara Falls and Queenstown, Ont.

Rights Denied to California Monorail Line.—The Railroad Commission of California has denied, without prejudice, an application of the Clear Lake Suspended Monorail Company, for authority to issue $50,000 of stock and $900,000 of bonds, to provide funds to build a monorail line between Hopland, Mendocino County, and Lakeport, Lake County, 24 miles. The commission says that as it is estimated standard type of steam road can be built between these points for $600,000 and the estimate for the monorail construction is $1,223,000, the authority should not be granted. This denial does not preclude the applicant from renewing its petition.

Negotiations Still Pending on East Cleveland Franchise.—At a conference last week between officials of East Cleveland and Fielder Sanders, street railway commissioner of Cleveland, Mr. Sanders demanded that the suburb accept a franchise with a 5-cent cash fare and free transfers or six tickets for a quarter, with 1 cent for transfer. J. J. Stanley, president of the Cleveland Railway, agreed to this. Mayor Minshall of East Cleveland made a counter proposition that the company build a crosstown line in East Cleveland, renew its tracks and pave its portion of Euclid Avenue through the town and establish an express service on Superior Avenue for East Cleveland patrons. He did not commit himself to the higher fare which Commissioner Sanders proposed.

Kentucky Compensation Law Upheld.—One of the important court rulings of the year in Kentucky is that of the Court of Appeals of the State upholding, as the court of last resort, the constitutionality of the Kentucky workmen's compensation law. This measure will go into effect on Aug. 1 and the commission which will administer it is now listing employers who signify their intention to accept it. The measure is virtually compulsory, affecting businesses with more than five employees, since it deprives those employers, and employees, who do not accept it of the important common law defenses. No State fund is provided for and employers may insure with commercial or mutual companies or, if they are able, may carry their own insurance. All the electric railways in Kentucky will be affected.

Cleveland a Mecca for Pickpockets.—For the last two or three weeks pickpockets have been unusually active on street cars at Cleveland and in the crowds boarding and alighting from cars. It is estimated that $2,000 was taken in that way within one week. Chief of Detectives Rabshaw suggested to J. J. Stanley, president of the Cleveland Railway, that the motormen and conductors aid the police in apprehending offenders by acquainting themselves with the pictures of pickpockets in the Bertillon bureau and then keeping a close watch. In many cases the courts have suspended sentence and this has discouraged Mr. Stanley. He said that he is willing to co-operate with the police department if the thieves are punished when captured, but that "golden ruling" will do no good in such cases. He will, however, have the men warn passengers when they see suspicious characters enter the cars, and it will be done in such a way as to give all notice.

Agreement Predicted for Operation of New Philadelphia Line by P. R. T.—A meeting of the board of directors of the Philadelphia (Pa.) Rapid Transit Company, including Sheldon Potter and William Hancock, the two new city representatives, was held on June 19. Mayor Smith said that an informal talk with Mr. Stotesbury and Mr. Mitten led him to the conclusion that the transit company was in a "most receptive mood." The Mayor said: "We discussed the prospects for a new agreement between the company and the city covering transit matters, and arranged for a conference between the new city representatives and Mr. Stotesbury, Mr. Mitten and myself for the preliminary discussion. I do not know when this meeting will be held, but I think it will be soon. I have been studying the 1914 agreement in order that it might be used as the basis for the new contract. I feel certain that the company will take over and operate the new lines. It naturally does not want to be placed in the position of competing with other companies."

Comptroller Gives New York Subway Expenditure Figures.—William A. Prendergast, comptroller of the city of New York, on June 4 issued his report on the city's financial transactions for the first quarterly period of the year. Tables in the report show that the commitments for rapid transit construction to March 31 of this year aggregated $227,272,122, and the expenditures to March 31 were $164,613,010. In a summary of the report Comptroller Prendergast says: "The outlays by the city on the present subway operated by the Interborough Rapid Transit Company have amounted to $56,246,458. The commitments under contracts, which cover the additional railroads now in course of construction, to be linked with the present system operated by the Interborough Rapid Transit Company, total $65,925,888, of which $42,225,565 has already been expended. Under Contract 4, which comprises the Centre Street loop lines, the Fourth Avenue subway, and the other lines to be operated by the Brooklyn Rapid Transit Company, or the New York Municipal Railway Corporation acting for it, the city's commitments aggregate $102,211,190, of which $66,162,986 was expended up to March 31."

Strict Accountability Demanded in Bridge Fare Case.—The Public Service Commission for the First District of New York has ordered the Brooklyn & North River Railroad, which operates over the Manhattan Bridge from Manhattan to Brooklyn, not to engage in undue competition with the Manhattan Bridge Three-Cent Line, which operates over the same bridge. The Brooklyn & North River Railroad is owned by the Third Avenue Railway, New York Railways and the Brooklyn Heights Railroad. It received a franchise for operation across the bridge in 1913, the year after the Manhattan Bridge Three-Cent Line obtained its bridge rights. The franchise of the Brooklyn & North River Railroad was hedged about with restrictions that were designed to prevent it from competing unfairly with the Manhattan Bridge Three-Cent Line. The complaint that led to the present order was made on Dec. 13, 1915. The Three-Cent Line charged its rival with having started a service from Broadway, Manhattan, across the bridge to Concord Street, Brooklyn, with a rate of fare of 3 cents or two tickets for 5 cents. Commissioner Hayward held that no reasonable effort had been made, according to the evidence, to see that the 3-cent passengers of the Brooklyn & North River Railroad were dropped before being carried a reasonable distance from the Brooklyn terminal of the bridge. He believed that sort of service was indefensible under the franchise and should be discontinued. He added that the practice of turning back cars at Concord Street instead of sending them through to Fulton Street should be discontinued and it was so ordered.

PROGRAMS OF ASSOCIATION MEETINGS

Central Electric Railway Association

All those who decide at the last moment to take the Central Electric Railway Association's cruise on June 27-30 on the Great Lakes may make reservations with John Benham at the Hotel Secor, Toledo, Ohio, on Monday, June 26. A souvenir roster containing the names of all members and their guests, as well as their railway and business affiliations, will be published in connection with this trip. Those who make reservations with Mr. Benham on June 26 will not be included in the alphabetical list of attendants, but will be listed in an addenda which will be bound in the booklet. Up to June 21 more than 275 tickets for the trip had been sold.

Central Electric Railway Association

On June 20 William F. Stanton, secretary-treasurer of the New York Electric Railway Association, mailed to members the program for the thirty-fourth annual meeting of the association to be held on June 27 and 28 at the International Hotel, Niagara Falls, N. Y. The meeting will be opened at 10 a. m. on June 27. After the address of the president has been presented, the executive committee and the secretary-treasurer will report. Reports of committees will then be presented as follows:

Workmen's compensation insurance, by James P. Barnes, chairman; taxation and rates of fare, by E. G. Connette, chairman; safety rules by James P. Barnes, chairman; joint use of poles, by B. Penoyer, chairman; public relations, by C. Loomis Allen, chairman; membership committee, by James F. Hamilton, chairman.

The subjects for discussion at the session are as follows:

"The Use of Electric Railways in the Military Service," introductory paper by Col. J. B. Bellinger, U. S. A.

"The Advantage of Electric Traction in Time of War," introductory paper by James E. Hewes, general manager of the Albany Southern Railway, Rensselaer.

At the session of the association on the forenoon of June 28, the election of officers and other business will be transacted.

The program of entertainment for June 26 provides for tea and dancing at 5 p. m. and a concert and dancing at 9 p. m. On June 27 there will be golf at the Niagara Falls Country Club at 10 a. m., a concert from 11 a. m. to 12 o'clock noon, a luncheon for the ladies at the Buffalo Country Club at 1 p. m., an automobile trip for the ladies at 3 p. m., and tea and dancing at 5 p. m. The banquet will be held at 7 p. m. on June 27 and will be followed by dancing. At 10 a. m. on June 28 there will be a clock golf competition for the ladies; at noon there will be a trip through the power house at Niagara Falls, and at 2 p. m. a trip around the gorge route. The speakers at the banquet will include a number of men prominent in public life.

Financial and Corporate

ANNUAL REPORTS

Underground Electric Railways of London, Ltd.

The reports for the calendar year 1915 of the electric railways controlled by the Underground Electric Railways of London, Ltd., London, England, show that, while revenue has been larger, expenses have also been heavier. The Metropolitan District Railway alone of the group is under government control and has its net receipts guaranteed, but the Central London Railway, the City & South London Railway, and the London Electric Railway remain independent and have to bear unaided the higher cost of wages, fuel and materials. But under the "London electric railway companies' facilities act (1915)" the four railways, together with the London General Omnibus Company, have for the first time placed their net profits in a common fund to be divided in agreed proportions. The aggregate gross receipts of the five companies from all sources for 1915 were £5,481,144, of which £5,029,779 was retained by the several companies for revenue liabilities. The balance of £451,365 was divided in the following proportions: Central London Railway, 20 per cent, or £90,273; City & South London Railway, 2 per cent, or £9,027; London Electric Railway, 26 per cent, or £117,355; Metropolitan District Railway, 12 per cent, or £54,164, and London General Omnibus Company, 40 per cent, or £180,547.

The railways have benefited more from the arrangement so far than the London General Omnibus Company. The following table shows the revenue, expenditures and fixed charges of the railway companies:

	Revenue		Expenditure		Fixed Charges	
	1915	Increase	1915	Increase	1915	Increase
Central London Ry.	£316,527	£39,151	£156,523	£12,184	£38,131	*£2
City & South London Ry.	202,389	56,471	110,609	16,642	30,253	1,932
London Electric Ry.	963,131	181,186	428,307	83,306	270,522	37,286
Metropolitan District Ry.	1,066,247	133,016	511,721	97,751	350,432	6,770

*Decrease.

Each of the railways thus showed substantial improvements in its earnings, and, although the operating costs increased, the margin available for dividends was larger, and each company was consequently able to pay larger dividends than in 1914. The London Electric Railway paid a dividend of 1¼ per cent on its ordinary shares, as compared with five-eighths of 1 per cent in 1914. The Metropolitan District Railway paid a dividend of 3 per cent on its second preference stock, as compared with 2 per cent in 1914. The City & South London Railway paid its full dividends of 5 per cent on all its preference stocks, as compared with 5 per cent on its 1891 and 1896, and only 2½ per cent on the 1901 and 1903 preference stocks. The Central London Railway paid a dividend of 3 per cent on its ordinary stock, as compared with 2⅝ per cent in 1914. These dividends were paid after making adequate allowance for reserves and without decreasing, and in some cases increasing, the balances carried into next year's accounts. The London General Omnibus Company showed a falling off in revenue and a decrease in working expenses. The amount available for dividend was less than in 1914, and a dividend of 12 per cent, free of income tax, was paid, as compared with 16 per cent for 1914.

The various companies, it is said, were caused by the war to contend with difficulties, problems and requisitions which disturbed their operations. Before the outbreak of war they employed approximately 27,500 men; of these 7700 are enlisted and 6300 attested, representing approximately 50 per cent of the staff. When all these disturbing elements are taken into consideration the results show the strength and vitality of the enterprise. The maintenance of its revenue during war-time is a proof of the strength and soundness of the position of the Underground Electric Railway system as a great transport enterprise.

The "facilities act" above mentioned, under which an agreement was entered into on Dec. 21, 1915, but taking effect as from Jan. 1, 1915, provides that the five companies are to afford each other all reasonable facilities for through passenger traffic, etc., without apportioning the through fares among the five companies. In other words, each of the companies in the first instance keeps the whole of its takings from every source. Out of these takings it pays all of its revenue liabilities, which include working expenses, interest and dividends on all prior stocks (except the second preference stock of the Metropolitan District Railway Company) and sets aside a sum for reserve. The balance of the takings is credited to a common fund, and this fund is apportioned among the five companies as specified.

Omaha & Council Bluffs Street Railway

The comparative statement of income, profit and loss of the Omaha & Council Bluffs Street Railway, Omaha, Neb., for the calendar years 1914 and 1915, follows:

	1915		1914	
	Amount	Per Cent	Amount	Per Cent
Revenue from transportation	$2,839,180	94.76	$2,822,953	95.17
Revenue from other operations	156,898	5.24	143,260	4.83
Gross earnings from operation	$2,996,079	100.00	$2,966,213	100.00
Operating expenses	1,656,643	55.29	1,608,231	54.22
Net earnings from operation	$1,339,435	44.71	$1,357,982	45.78
Miscellaneous income	12,919	0.43	7,214	0.24
Gross income	$1,352,355	45.14	$1,365,196	46.02
Deductions from income	872,010	29.10	856,875	28.89
Net income	$480,344	16.04	$508,321	17.13
Dividends	412,500	13.77	450,000	15.17
Surplus for the year	$67,844	2.27	$58,321	1.96

The gross earnings in 1915, as compared with those of the year before showed an increase of $29,865, or 1 per cent. The operating expenses increased $48,411, or 3.01 per cent. A large part of this was due to increased service and to increased charges to injuries and damages. The occupation tax paid to the city of Omaha increased $4,961, largely due to the consolidation with South Omaha and Dundee. The total increase in taxes for the year is $7,533. The balance shown in the reserve for depreciation as of Jan. 1, 1916, was $1,254,837. A total of $83,011.83 was charged to this account during 1915 for rebuilding tracks and other replacements. During the year $45,127 was expended for betterments, additions and extensions.

During the year the competition of the jitneys was at times very annoying and impaired the earnings to the extent of about $100,000. This was practically all a loss in net earnings, as the operating expenses were not in any manner reduced by a decrease in service. During all of the first seven months of the year the jitneys were allowed to operate without any regulation whatever. The City Council passed several ordinances regulating them, but the ordinances were suspended by referendum petitions and therefore promptly repealed by the City Council, rather than to wait eighteen months for the next city election. Finally, in August, a very mild ordinance was passed and accepted by the jitney operators.

At times during the period the jitneys were operating without license or regulation, more than 100 jitneys were in operation daily on the streets where the traffic was most congested, and therefore where the street car service was most frequent. After the regulating ordinance went into effect forty-five licenses were issued, and bonds were furnished by the jitney operators in each instance. The most of these bonds were taken out for short periods, and, as they expired, the jitneys gradually retired from the field, until at the beginning of the year there were only fifteen jitneys in operation.

On account of the jitney situation, the dividend on the common stock was reduced to a 4 per cent basis, orders for twenty-five new cars were rescinded, and a conservative policy in general was adopted. It is said, however, that the loss of revenue through the jitneys was not without its compensations, for the company was almost entirely free from attacks by agitators for lower fares or requests for increased service or extensions.

SUPPLEMENTARY ACTION EXPECTED IN SYRACUSE

It is stated in Syracuse that on June 24 or on July 1 Justice W. S. Andrews is expected to hear the application of the Columbia Trust Company, as trustee, under the mortgage of $2,500,000 of the Syracuse, Lake Shore & Northern Railroad, to make Hendrick S. Holden and C. Loomis Allen, the co-receivers of the Empire United Railways, Inc., parties defendant in the action to foreclose the Syracuse, Lake Shore & Northern Railroad mortgage. At the same time the application is made the Columbia Trust Company is expected to request the appointment of receivers for the Syracuse, Lake Shore & Northern Railroad. The bondholders' protective committee, at whose request the application will be made, will ask that Justice Andrews name C. Loomis Allen and Hendrick S. Holden as co-receivers of the road. This will take the affairs of the Syracuse, Lake Shore & Northern out of the receivership of the Empire United.

MARCH AND JANUARY-MARCH EARNINGS

Net Electric Railway Earnings Show Improvement in Sections Other Than the West

A comparison of electric railway statistics for the quarter January-March, 1916, with figures for the corresponding months of 1915, made by the information bureau of the American Electric Railway Association and shown in the accompanying tables, indicates a considerable improvement in the electric railway business of the United States. Data for the quarter, representing 6,966.38 miles of line of companies scattered throughout the country, indicates an increase in operating revenues of 8.90 per cent, in operating expenses of 6.81 per cent and in net earnings of 12.47 per cent, while data representing 5,508.71 miles of line indicates an increase in taxes of 3.17 per cent, and in operating income of 14.26 per cent.

The number of revenue and transfer passengers carried by companies representing 5,352.41 miles of line increased 6.80 per cent, while the revenue car mileage increasd 3.49 per cent. It must be pointed out, however, that the Western district did not share in the improved business conditions.

Of the three sectional groups the Western, represented by 1,886.40 miles of line, indicates an increase in operating revenue of 1.78 per cent, in operating expenses of 2.89 per cent and a decrease in net earnings of 0.42 per cent. Returns for some 96 per cent of this mileage show a decrease in taxes paid of 1.09 per cent and in operating income of 0.12 per cent. The decrease in amount of taxes paid may be explained by the method of taxing gross receipts in vogue in several of the Western cities.

The Southern group, represented by 707.73 miles of line, shows an increase in net earnings of 15 per cent; however, returns for 78 per cent of this mileage indicate an increase in net of but 9 per cent, while taxes increased about 11 per cent and operating income 8.73 per cent.

The Eastern group, represented by 4,372.25 miles of line or about 60 per cent of the total mileage, indicates an increase in operating revenue of 11.92 per cent, in operating expenses of 8.95 per cent, and in net earnings of 16.74 per cent. Returns representing 72 per cent of this mileage show an increase in the amount of taxes paid of 5.04 per cent and in operating income of 21.61 per cent. The large percentage increase in the operating income is not due so much to the improved business conditions of this year as to the poor conditions of the past year and a comparison with figures for 1914, which are not available, would perhaps result in a poorer showing.

As a whole the number of passengers carried has increased as has the number of revenue car-miles run. While the Eastern district shows an increase of 10 per cent in the number of passengers carried and one of 3.5 per cent in the number of car-miles run, the Southern shows an increase of about 22 per cent in the number of passengers and an increase of 7.43 per cent in car-miles.

In the Western district, on the contrary, the number of car-miles run has increased faster than the number of passengers carried, but both increases have been small.

All of the districts, except the Western, show a decrease in the operating ratio, the United States as a whole indicating a decrease from 63.11 in 1915 to 61.90 in 1916. The operating ratio of the Western district increased from 66.48 in 1915 to 67.21 in 1916.

The returns for March shown in Table I indicate an improvement over January and February, though they are not strictly comparable because of the difference in miles of line represented. As a whole, the Western district shows better for March than for the two previous months.

TABLE I—REVENUES AND EXPENSES OF ELECTRIC RAILWAYS NOT REPORTING TAXES, FOR MARCH, 1916, AND FOR THE FIRST QUARTER OF 1916.

	March		Jan.-March	
Account	Amount In 1916	Increase Per Cent Over 1915	Amount In 1916	Increase Per Cent Over 1915
_United States_*				
Operating revenues....	$11,181,404	9.63	$38,681,617	8.90
Operating expenses.....	6,919,275	5.62	23,944,169	6.81
Net earnings..........	4,262,129	16.85	14,737,448	12.47
Operating ratio, per cent:				
1915	64.23	...	63.11	...
1916	61.88	...	61.90	...
Miles of line represented	6,670.39	...	6,966.38	...
_Eastern District_*				
Operating revenues.....	7,065,760	12.97	26,887,806	11.92
Operating expenses.....	4,263,747	8.20	16,196,261	8.95
Net earnings	2,802,013	21.08	10,691,545	16.74
Operating ratio, per cent:				
1915	63.00	...	61.88	...
1916	60.34	...	60.23	...
Miles of line represented	4,076.26	...	4,372.25	...
_Southern District_*				
Operating revenues.....	730,950	5.56	2,127,729	6.49
Operating expenses.....	435,985	1.96	1,251,375	1.22
Net operating revenue..	294,965	11.38	876,354	15.05
Operating ratio, per cent:				
1915	61.75	...	61.87	...
1916	59.64	...	58.81	...
Miles of line represented	707.73	...	707.73	...
_Western District_*				
Operating revenues.....	3,384,694	4.09	9,666,082	1.78
Operating expenses.....	2,219,543	1.68	6,496,533	2.89
Net earnings..........	1,165,151	9.03	3,169,549	*d* 0.42
Operating ratio, per cent:				
1915	67.13	...	66.48	...
1916	65.57	...	67,21	...
Miles of line represented	1,886.40	...	1,886.40	...

NOTE.—Letter *d* denotes a decrease.

TABLE II—REVENUES AND EXPENSES OF ELECTRIC RAILWAYS REPORTING TAXES FOR MARCH, 1916, AND FOR THE FIRST QUARTER OF 1916

	March		Jan.-March	
Account	Amount In 1916	Increase Per Cent Over 1915	Amount In 1916	Increase Per Cent Over 1915
_United States_*.				
Operating revenues....	$8,281,255	9.28	$30,356,769	8.65
Operating expenses....	5,250,937	5.50	19,147,095	6.75
Net earnings..........	3,030,318	16,51	11,209,674	12.05
Taxes	540,850	3.32	2,050,780	3.17
Operating income......	2,489,468	19.83	9,158,894	14.26
Operating ratio, per cent:				
1915	65.68	...	64.19	...
1916	63.41	...	63.07	...
Miles of line represented	5,210.72	...	5,508.71	...
Eastern District				
Operating revenues....	4,415,074	14.63	19,308,513	12.96
Operating expenses....	2,769,812	9.69	11,903,299	9.72
Net earnings	1,645,262	24.04	7,405,214	18.59
Taxes	249,916	4.92	1,196,793	5.04
Operating income......	1,395,346	28.22	6,208,421	21.61
Operating ratio, per cent:				
1915	65.56	...	63.46	...
1916	62.73	...	61.64	...
Miles of line represented	2,831.73	...	3,127.72	...
Southern District				
Operating revenues....	527,190	1.32	1,523,899	2.64
Operating expenses....	298,220	*d* 1.62	858,078	*d* 1.91
Net earnings	228,970	5.41	665,821	9.17
Taxes	45,759	11.04	136,348	10.91
Operating income......	183,211	4.10	529,473	8.73
Operating ratio, per cent:				
1915	58.25	...	58.92	...
1916	56.56	...	56.30	...
Miles of line represented	551.50	...	551.50	...
Western District				
Operating revenues....	3,338,991	4.15	9,524,357	1.73
Operating expenses....	2,182,905	1.59	6,385,718	2.78
Net earnings..........	1,156,086	9.35	3,138,639	*d* 0.34
Taxes	245,175	0.45	717,639	*d* 1.09
Operating income......	910,911	12.02	2,421,000	*d* 0.12
Operating ratio, per cent:				
1915	67.02	...	66.36	...
1916	65.35	...	67.04	...
Miles of line represented	1,827.49	...	1,827.49	...

NOTE.—Letter *d* denotes a decrease.

TABLE III

		Revenue and Transfer Passengers		Revenue Car Mileage	
	Miles of Line Represented	Total	Increase Over 1915	Total	Increase Over 1916
United States....	5,352.41	498,471,541	6.80	77,688,363	3.49
Eastern District..	3,088.13	242,913,999	10.24	35,674,750	3.51
Southern District	440.03	18,515,398	21.91	5,939,743	7.43
Western District	1,824.25	237,042,202	2.52	36,073,870	2.85

*Groupings are as follows: _Eastern District_—East of the Mississippi River and north of the Ohio River; _Southern District_—South of the Ohio River and east of the Mississippi River; _Western District_—West of the Mississippi River.

$14,000,000 OF CHICAGO NOTES EXTENDED

The details have been announced of the arrangements made for a three-year extension of $14,000,000 of Chicago (Ill.) Elevated Railways two-year 5 per cent secured gold notes which mature on July 1 next. As stated in the ELECTRIC RAILWAY JOURNAL of June 3, page 1060, it is proposed that the rate of interest on the extended notes be increased to 6 per cent per annum, payable semi-annually. The sum of $15 in cash will be paid in respect of each $1,000 face amount of notes extended as an inducement to the present holders to come in under the proposed extension plan. The company has arranged to increase materially the value of the security for all extended notes and has made public the manner in which this will be done. The provisions of the trust indenture of July 1, 1914, will remain in full force and effect. The extension does not involve the payment of commissions. All incidental expenses, however, will be borne by the Chicago Elevated Railways. Holders of the gold notes may become parties to the extension agreement by depositing their notes before July 15 with the National City Bank, New York, or with the Illinois Trust & Savings Bank, Chicago, and the International Banking Corporation, London, subdepositaries. The two-year 5 per cent secured gold notes of the Chicago Elevated Railways were issued on July 1, 1914, as part of a plan of temporary financing. Since that date the city of Chicago has appointed a commission of eminent engineers to study transportation conditions and to formulate concrete plans for the unification of all the elevated and surface lines in the city. This commission is now actively engaged in its labors. Pending the promulgation of such plan and of appropriate municipal action in the matter, the company believed it neither practical nor desirable to undertake permanent financing and as a result it was decided to extend the present notes to July 1, 1919.

Ardmore (Okla.) Railway.—The Ardmore Electric Railway has been reorganized by the election of Edward Galt as president, Wirt Franklin and Sam Apple, vice-presidents, I. M. Putnam, secretary and manager, and Roy M. Johnson, treasurer. It is planned to resume operation of the system by July 1. The application for a charter for the Ardmore Railway as the successor company was noted in the ELECTRIC RAILWAY JOURNAL of May 20.

Bay State Street Railway, Boston, Mass.—Hayden, Stone & Company, Boston, Mass., are offering for subscription at 103 and dividend, yielding 5.82 per cent, $250,000 of 6 per cent cumulative first preferred stock of the Bay State Street Railway, preferred as to dividends and assets. The stock is redeemable, all or in part, at 120 on any dividend date.

Boston & Worcester Electric Companies, Boston, Mass.—The trustees of the Boston & Worcester Electric Companies have declared a dividend of $1.50 per share on the preferred stock, payable on July 1, to holders of record of June 23. The trustees say: "The increase in the dividend from the usual $1 semi-annual declaration is a reflection of the steady growth of the business and development of the territory served by this property."

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Public Service Commission for the Second District of New York has authorized the absorption of the Elmira Transmission Company and of the Elmira & Seneca Lake Traction Company by the Elmira Water, Light & Railroad Company. All the capital stock of the transmission company is authorized to be bought and it is to be merged with the larger concern, which will purchase all the assets and assume the liabilities of the Elmira & Seneca Lake Traction Company. The Elmira Water, Light & Railroad Company is authorized to issue $100,000 of its 5 per cent first consolidated mortgage bonds at not less than 92½, $125,000 of its 7 per cent cumulative preferred and $200,000 of its 5 per cent second preferred stock both at par, netting in all $417,500. The proceeds will be used toward paying $402,114 of bills and accounts payable of Oct. 31, 1915, against the Water, Light & Railroad Company, $55,000 bills payable of the transmission company, $16,250 expenses incident to these transactions and $63,570 for new construction from Oct. 31, 1915. The commission approves the inventory and appraisal of the Elmira Water, Light & Railroad Company's property as of June 30, 1914, as affected by its subsequent operations and provides for the amortization of $1,500,000 of the company's $2,500,000 "intangible suspense to be amortized" account at the rate of $20,000 a year for five years and then at the rate of $30,000 a year.

Kansas City (Mo.) Railways.—N. W. Halsey & Company, New York, N. Y., are offering $4,000,000 of Kansas City Railways first mortgage 5 per cent gold bonds. These bonds are dated July 1, 1915, and are due July 1, 1944. They are callable as a whole or in part at 103 and interest on any interest date upon sixty days' notice. The bonds are secured by an absolute first mortgage on the entire property of the company. Under the terms of the mortgage additional first mortgage bonds may be issued on account of new expenditures for new construction, additions, extensions, betterments and improvements, properly chargeable to capital value in the ratio of $1,000 bonds for $1,100 of expenditures so made. It is announced that the bonds have all been sold.

Monmouth County Electric Company, Red Bank, N. J.—The property of the Monmouth County Electric Company, which operates an electric railway between Long Branch and Red Bank and to Rumson, has been sold under foreclosure to Charles A. Porter, Jr., Philadelphia, Pa., and Frank C. McDermott and A. A. Eldridge, Jersey City, representing the bondholders. The committee paid $10,000, subject to a $500,000 mortgage, interest and taxes. The company operates 26 miles of line. The jitneys are said to have been the largest single contributing factor to the company's recent failure.

Northern Ohio Traction & Light Company, Akron, Ohio.—The statement made in the Cleveland *News* of June 13 to the effect that negotiations had been resumed by eastern bankers for the purchase of the controlling interest in the Northern Ohio Traction & Light Company is authoritatively denied in New York. Application was filed with the Ohio Public Utilities Commission by the company on June 16 for permission to issue $14,075,000 of first lien and refunding 5 per cent bonds. Of the proceeds approximately $2,000,000 are to be used in making improvements and the remainder will be used to refund outstanding bonds that mature at an early date. The company recently sold to N. W. Halsey & Company, New York, N. Y., and Hayden, Miller & Company, Cleveland, Ohio, subject to the approval of the commission $4,000,000 of the bonds.

Public Service Corporation of New Jersey, Newark, N. J.— The Public Service Corporation of New Jersey has declared a quarterly dividend of 2 per cent, an increase of one-fourth of 1 per cent over the last quarterly declaration and placing the stock on an 8 per cent basis. The directors of the company have voted to recommend to the stockholders an increase in the authorized capital stock from $25,000,000 to $50,000,000.

DIVIDENDS DECLARED

American Cities Company, New York, N. Y., 1½ per cent, preferred.

Asheville Power & Light Company, Asheville, N. C., quarterly, 1¾ per cent, preferred.

Boston & Worcester Electric Companies, Boston, Mass., $1.50, preferred.

Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.

Cleveland (Ohio) Railroad, quarterly, 1¼ per cent.

Columbus (Ga.) Electric Company, 3 per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1 per cent, prior preferred; quarterly, 1½ per cent, preferred, Series A.

Commonwealth Power, Railway & Light Company, Grand Rapids, Mich., quarterly, 1½ per cent, preferred; quarterly, 1 per cent. common.

Eastern Texas Electric Company, Dallas, Tex., 3 per cent, preferred; 2 per cent, common.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¼ per cent, second preferred; quarterly, 1¾ per cent, first preferred.

Mohawk Valley Company, New York, N. Y., quarterly, 1¼ per cent.

National Properties Company, Philadelphia, Pa., 2 per cent, common.

New York State Railways, New York, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1¼ per cent, common.

Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.

Public Service Corporation, Newark, N. J., quarterly, 2 per cent.

Reading (Pa.) Traction Company, $0.75.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period	Operating Revenue	Operating Expense	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE ELECTRIC RAILWAY, SANFORD, ME.					
1m., May, '16	$26,079	*$24,520	$1,559	......	......
1 “ “ '15	27,878	*26,004	1,874	......	......
BATON ROUGE (LA.) ELECTRIC COMPANY					
1m., April, '16	$15,746	*$8,239	$7,507	$3,463	$4,044
1 “ “ '15	14,517	*8,998	5,519	2,146	3,373
12 “ “ '16	198,865	*106,176	92,689	32,306	60,383
12 “ “ '15	181,150	*112,334	68,816	25,071	43,745
COLUMBUS (GA.) ELECTRIC COMPANY					
1m., April, '16	$64,878	*$27,249	$37,629	$28,653	$8,976
1 “ “ '15	56,408	*25,431	30,977	28,791	2,186
12 “ “ '16	760,864	*330,277	430,587	344,103	86,484
12 “ “ '15	691,947	*309,939	382,008	340,043	41,965
EL PASO (TEX.) ELECTRIC COMPANY					
1m., April, '16	$85,799	*$43,892	$41,907	$4,670	$37,237
1 “ “ '15	76,697	*43,293	33,404	4,201	29,203
12 “ “ '16	1,023,938	*532,301	491,637	52,430	439,207
12 “ “ '15	1,016,196	*555,052	461,144	50,351	410,793
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.					
1m., April, '16	$151,416	*$102,096	$49,320	$36,579	$12,741
1 “ “ '15	152,211	*98,240	53,970	36,059	17,911
12 “ “ '16	1,924,891	*1,224,641	700,250	435,388	264,862
12 “ “ '15	2,283,456	*1,256,641	1,026,815	434,963	591,852
NORTHERN TEXAS ELECTRIC COMPANY, FT. WORTH, TEX.					
1m., April, '16	$146,494	*$91,984	$54,510	$28,724	$25,786
1 “ “ '15	123,464	*79,249	44,215	27,215	17,000
12 “ “ '16	1,801,013	*1,099,351	701,662	337,140	364,523
12 “ “ '15	1,910,801	*1,077,722	833,079	321,637	511,442
OHIO RIVER ELECTRIC RAILWAY & POWER COMPANY, POMEROY, OHIO					
1m., April, '16	$6,368	$3,967	$2,401	$1,662	‡$915
1 “ “ '15	5,561	3,543	2,018	1,604	‡834
10 “ “ '16	70,141	40,700	29,441	16,050	‡15,202
10 “ “ '15	59,695	36,101	23,594	16,526	‡11,045
PHILADELPHIA, (PA.) RAPID TRANSIT COMPANY					
1m., May, '16	$2,391,370	$1,296,001	$1,095,369	$815,599	$279,770
1 “ “ '15	2,070,160	1,213,940	856,220	817,318	38,902
11 “ “ '16	23,526,374	13,106,169	10,420,205	8,977,507	1,442,698
11 “ “ '15	21,846,966	12,700,115	9,146,851	8,918,781	228,070
PUGET SOUND TRACTION LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., April, '16	$645,088	*$422,899	$222,188	$184,290	$37,898
1 “ “ '15	605,180	*394,582	210,598	181,325	28,273
12 “ “ '16	7,643,873	*4,879,073	2,764,800	2,192,916	571,884
12 “ “ '15	8,072,022	*4,905,547	3,166,475	2,141,107	1,025,368
REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO					
1m., May, '16	$326,400	§*$199,694	$126,706	$69,132	‡$57,838
1 “ “ '15	247,644	*149,448	98,195	55,248	‡43,011
5 “ “ '16	1,612,894	§*954,731	658,162	339,057	‡320,533
5 “ “ '15	1,210,228	*760,355	449,873	276,348	‡173,848
SAVANNAH (GA.) ELECTRIC COMPANY					
1m., April, '16	$64,897	*$43,257	$21,640	$23,501	†$1,861
1 “ “ '15	65,689	*40,959	24,730	23,226	1,504
12 “ “ '16	785,244	*523,311	261,933	278,677	†16,744
12 “ “ '15	829,427	*538,953	290,473	276,816	13,657
WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.					
1m., Apr., '16	$20,072	$21,152	†$1,080	$1,755	†‡$2,813
1 “ “ '15	19,369	21,096	†1,727	1,449	†‡3,167
10 “ “ '16	206,432	212,102	†5,670	16,792	†‡22,179
10 “ “ '15	213,056	224,792	†11,736	13,168	‡24,798

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*Includes taxes. †Deficit. ‡Includes non-operating income. §Includes depreciation.

Traffic and Transportation

HEARING ON ONE-MAN AND OWL CARS

Commission Takes Under Advisement Plea of Spokane Companies to Effect Economies

The hearing by the Public Service Commission of the State of Washington on complaint of the city of Spokane against the Washington Water Power Company and the Spokane & Inland Empire Railroad in regard to owl and one-man car service was held in Spokane on June 9 and 10. D. L. Huntington, president of the Washington Water Power Compay, stated that the railway lines were losing money daily and that the company could not count on any large increase of revenue in the future. The only thing the company could do toward self-preservation was to reduce expenses. Both companies contended that they should be allowed to discontinue their owl service and be permitted to continue their system of having new cars of the near-side type operated during the part of the day by one man. Mr. Huntington stated that if the companies were permitted to operate one-man cars, a saving of about $35,000 a year would result.

Evidence submitted by the Washington Water Power Company showed that the lines of the corporation began to show a deficit in 1913-14, and have not been profitable since. The company hoped that revenues would increase with the increase in the population of the city and with the coming of better business conditions, but this hope had not been justified. Mr. Huntington said that the loss had been a steady one, and that the company did not feel like asking the stockholders to shoulder the deficit indefinitely. He gave the gross receipts of the railway lines of the company for 1910 as $1,050,000 and as $660,000 for 1915, and the expenses as $900,000 in 1910 and $700,000 in 1915. The record of passengers carried was as follows: 1910, 24,730,000; 1911, 23,691,000; 1912, 20,726,000; 1913, 19,437,000; 1914, 17,840,000; 1915, 15,714,000. These figures show a decrease since 1910 of 36½ per cent. The taxes of the company in 1910 were $34,000 and in 1915 $60,000. The record of miles traveled since 1910 was as follows: 1910, 3,621,000; 1911, 3,634,000; 1912, 3,398,000; 1913, 3,344,000; 1914, 3,308,000; 1915, 3,293,000. The operating expenses per car mile since 1910 follow: 1910, $0.2878; 1911, $0.2721; 1912, $0.2571; 1913, $0.2489; 1914, $0.2285; 1915, $0.1998.

J. F. Reardon, inspector of safety appliances for the commission, stated that while he approved of near-side cars, he regarded the one-man car as operated in Spokane as unsafe. Mr. Reardon said:

"The emergency door in the rear of the car is on the wrong side. It should be on the left and not on the right. Where it is, it opens directly on the opposite track. Furthermore it cannot be easily opened. The knob indicated for the release of the door is too high for the average person to reach. Sometimes it cannot be pulled out without great effort. The longitudinal seats in front of the car should have their corners sawed off, as they block the exits and entrances. The motorman is in a position where everyone can talk to him and distract his attention. He should be curtained off from the rest of the car."

Both companies contended that they should be allowed to discontinue the owl service. The Spokane & Inland Empire Railroad, which operates only one one-man car, devoted its statistics to the owl car service, showing how the number of after-midnight passengers had decreased since the closing of saloons the first of the year. On the other hand, Mr. Reardon submitted figures he had collected, showing the number of night workers who find the owl car a necessity. His testimony was corroborated by that of post office employees, newspaper men, telegraph operators, railroad employees, clerks, theater employees, telephone employees, janitors, etc. Suggestions that some night car other than the 12:30 be discontinued were favorably received by the commission and the representatives of the companies. Mr. Reardon suggested that if cars were operated at twenty-minute intervals between 9 p. m. and 12.30 a. m. instead of fifteen-minute intervals no great inconvenience would be caused, and a late car would be provided for night workers. Tables were presented by the Washington Water Power Company to show the increased losses in the operation of owl cars.

At the conclusion of the hearing Corporation Counsel H. M. Stephens of Spokane urged the abandonment of duplicate car lines of the Washington Water Power Company and the Spokane & Inland Empire Railroad as a means of reducing the expense of operation. F. T. Post, attorney for the Washington Water Power Company, agreed with Mr. Stephens that this suggestion was worthy of consideration. Will G. Graves, attorney for the Spokane & Inland Empire Railway, agreed with Mr. Post that a conference of the two companies on the question of abandoning duplicate lines was desirable.

Commissioner C. M. Fassett of the Spokane City Council made a voluntary statement explaining the condition that confront the companies and expressing fear that if additional burdens were imposed it might mean the curtailment or abandonment of outside lines and the loss of homes by many persons. Mr. Fassett stated that due to real estate speculators Spokane extended over two or three times the area of most cities of corresponding population.

It was stated in the hearing that the companies had made injudicious investments by extending their lines into thinly populated districts. Mr. Huntington replied to this as follows:

"In the more prosperous days of the street railway business we built lines into several districts that could not reasonably be expected to pay in years to come. But we justified this by considering that we were using the large surplus earnings of our downtown lines to develop new territory. That downtown surplus has been taken from us by the jitney buses."

NEW YORK ACCIDENT INVESTIGATION CONCLUDED

The coroner's jury which has been considering the question of responsibility for the accident on the elevated lines of the Interborough Rapid Transit Company, New York, N. Y., referred to at length in the ELECTRIC RAILWAY JOURNAL of June 17, page 1158, has returned its finding. The jury found that Kerrigan, the motorman, met death in an accident. The coroner discharged the towerman who was on duty at the point at which the accident occurred. Travis H. Whitney of the commission commented as follows on the recommendations of the jury:

"So far as specific matters relating to the accident are concerned, the jury makes a recommendation with respect to one signal. As a matter of fact, the commission has devoted a great deal of attention to the matter of proper signals on the elevated railroads.

"The Interborough Rapid Transit Company is now spending more than $1,500,000 in the installation of trip signals on express tracks throughout and on local tracks at curves and cross-overs. I was most careful to explain to the jury that while the company considered it unnecessary to extend the signals to the straight stretches of the local tracks, due to the closeness of local stations, this was as a matter of fact an open question with the commission, which might consider it necessary to require complete equipment of local tracks with such signals.

"Any system of signals must, because of the great expense involved, combine two elements. They are, first, insurance of safety, and, second, the reduction of train capacity as little as possible. The company contends that the extension of trip signals throughout the local tracks would force a reduction in the number of trains by at least 25 per cent. The commission, however, considers safety of primary importance. The commission is controlled in what it is able to do and in what it is able to compel companies to do by the provisions of the law and not by the findings of a coroner's jury.

"The inquest gave as its chief finding that there should be a Public Service Commissioner from The Bronx. The coroner who presided has annually been a candidate for appointment to the office. From July 1, 1907, to Dec. 30, 1915, there was a commissioner from The Bronx."

CALIFORNIA RAILROADS LOSE MORE THAN $4,000,000 THROUGH JITNEYS

The California Electric Railway Association has completed a tabulation of the losses suffered by all of the railroads of the State, steam and electric, due to the competition of jitney buses during the year 1915. The figures show the estimated losses in gross receipts in both passenger and freight service where there was competition in both classes. Where no freight traffic losses are mentioned the figures refer to reduction in income on passenger service. The figures in the second column refer to losses attributed directly to the use of privately owned automobiles as reported by companies which in most cases did not report losses by jitneys. The tabulation for the lines affiliated with the association is as follows:

	Jitneys	Private Cars
Bakersfield & Kern Electric Railway	$50,000	......
Central California Traction Company	52,214	......
Fresno Traction Company	......	$60,000
Glendale & Montrose Railway	6,570	......
Humboldt Transit Company (includes private cars)	18,999	......
Los Angeles Railway Corporation	500,000	......
Northern Electric Railway	30,000	......
Northwestern Pacific Railroad (steam and electric divisions)	40,000	......
Oakland, Antioch & Eastern Railway	......	......
Pacific Coast Railway	24,000	......
Pacific Electric Railway	454,360	......
Pacific Gas & Electric Company (Sacramento Street Railway	100,000	......
Petaluma & Santa Rosa Railway	......	8,000
Peninsular Railway, passenger	11,850	......
Peninsular Railway, freight	500	......
Riverside Rialto & Pacific Railroad	......	......
San Diego Southeastern Railway	150,000	......
San Diego Electric Railway (includes $10,000 for Point Loma Railroad)	210,000	......
San Francisco, Napa & Calistoga Railway	......	......
San Francisco-Oakland Terminal Railways	400,000	......
San Jose Railroads	4,700	......
Santa Barbara & Suburban Railway	8,000	......
Southern Pacific Company (electric division)	......	......
Stockton Electric Railroad	10,000	......
Tidewater Southern Railway	40,000	......
Union Traction Company	......	......
United Railroads of San Francisco	1,000,000	......
Visalia Electric Railway	35,000	......
Total	$3,146,193	$68,000

The tabulation for the electric railways and the cable lines that are not affiliated with the association is as follows:

Monterey & Pacific Grove Railway (six months; jitneys discontinued latter part of June, 1915, account ordinance passed in Monterey)	$1,640
Modesto & Empire Traction Company	.....
Municipal Railway of San Francisco (cannot estimate)	.....
Nevada County Traction Company (includes private cars)	1,242
South San Francisco Railroad & Power Company	1,800
California Street Cable Railway (no loss account grades)	.....
Total	$4,682

The tabulation which was made for the steam railroads is as follows:

	Jitneys	Private Cars
Amador Central Railroad	$3,000	....
A. T. & S. F. Ry., passenger loss only	335,000	$1,200,000
Colusa & Lake Railroad (auto competition for several years was largely responsible for discontinuance of operations)	......	......
Holston Interurban Railway, passenger	25,000	......
Holton Interurban Railway, freight	15,000	......
Lake Tahoe Railway & Transportation Company	1,600	......
Los Angeles & San Diego Beach Railway	7,900	7,800
Mt. Tamalpais & Muir Woods Railway—(no loss account grades)	......	......
Nevada County Railroad (N. G.), passenger	350	......
Nevada County Railroad (N. G.), freight	5,000	......
Ocean Shore Railroad, passenger (19.26 per cent)	13,095	......
Ocean Shore Railroad, freight	6,000	......
Pajaro Valley Consolidated Railroad	360	......
Quincy Western Railway (no competition account friendly attitude of people)	......	......
Sierra Railway of California	50,000	......
Santa Maria Valley Railroad	......	......
Southern Pacific Company, passenger loss only	500,000	......
Stockton Terminal & Eastern Railroad	4,200	......
Sunset Railway, passenger loss only	43,200	......
S. P., L. A. & S. L. RR., passenger, including private cars	75,000	......
S. P., L. A., & S. L. RR., freight, Los Angeles and San Pedro business	7,500	......
Tonopah & Tidewater Railroad	......	......
Ventura County Railway	1,607	......
Western Pacific Railway (no records kept)	......	......
Yreka Valley Railroad	5,000	......
Yosemite Valley Railroad	40,000	......
Total	$1,138,812	$1,207,800
Grand totals	4,289,687	1,275,800

Safety-First Work Among Winnipeg Scholars.—R. R. Knox, traffic superintendent of the Winnipeg (Man.) Electric Railway and president of the Winnipeg school board; H. Long, electrical engineer of the company, and L. Polk, secretary to Wilford Phillips, manager of the company, have been visiting the schools of Winnipeg armed with safety-first literature, which at their request was distributed among the teachers, who in turn imparted the information to the scholars.

New Jitney Ordinance in Muskogee.—An agreement has been reached between officials of the Muskogee (Okla.) Traction Company on the one side and the city officials of Muskogee on the other, by which the company will improve its service in return for an ordinance designed to prohibit jitneys from operating in the city. The city has enacted an ordinance levying a license fee of $25 a month on each jitney, and the company has inaugurated ten and fifteen-minute service on all its lines.

Extension of Safety Zones in Kansas City.—Safety zones, heretofore confined to a few corners in the business district of Kansas City, Mo., are to be painted on the pavements at all corners on Grand Avenue south to Thirty-first Street and on Fifteenth Street eastward to Troost Avenue, extending the zone-territory southward twenty blocks and eastward ten blocks. These two streets have the heavist combind street car and automobile traffic. They are the widest streets in the city and are well paved.

Bus Venture Unprofitable.—About a year and a half ago a number of officers and employees of the Southwest Missouri Railroad, Webb City, Mo., organized and incorporated the Auto Transportation Company with a capital of $30,000, half of which was paid in. Buses were bought and operated between Jasper and Carthage, Neosho and Joplin, and Baxter Springs, Kan., and Galena. The project did not prove as profitable as desired and the business has been discontinued. Part of the equipment was sold and the balance is for sale.

Dissensions Among Topeka Jitney Men.—The organization of jitney owners and drivers which was to maintain definite schedules and give transfers as a demonstration to secure more favorable license terms from the City Commissioners of Topeka, Kan., has largely disintegrated. Many operators have ceased to accept transfers, and the service has been demoralized through many drivers leaving routes to take special contracts for trips and because of light trade in non-rush hours. Another attempt is being made to guarantee jitney service at rush hours. It seems almost impossible to distribute routes equitably among the drivers.

Safety Talks in St. Louis.—H. L. Brownell, public safety engineer, Chicago, Ill., has recently completed a six weeks' campaign for safety methods in St. Louis. During this period he delivered about 100 lectures. Most of them were at schools and department stores, but they included a "lunch hour" talk to a large audience of business men given in the main dining room of the Masonic Athletic Association. One outcome of the series of talks was the organization of a safety committee by the Business Men's League. The chairman of this committee, Arthur T. Morey, has complimented Mr. Brownell on his work in St. Louis.

Final Hearing on Additional Surface Cars for Brooklyn.—The final hearing before the Public Service Commission for the First District of New York, on additional surface cars for Brooklyn, scheduled for June 2, was postponed until June 9 when William Siebert, superintendent of surface transportation for the Brooklyn Rapid Transit System, continued his testimony regarding the number of surface cars which would be released from certain lines when the rapid transit lines now under construction are opened. J. J. Dempsey, superintendent of elevated transportation, was also questioned regarding the amount of traffic the new rapid transit lines would take away from the surface lines.

St. Louis Files Brief in McKinley Fare Case.—The brief of the city of St. Louis in opposition to the proposed increase in passenger fares from 5 to 10 cents on the Illinois Traction System between St. Louis and Granite City has been filed by the City Counselor. It raises the question of jurisdiction because the company operates in St. Louis as a street railway and not as a common carrier. The reason for the company's poor financial showing is declared to be its failure to develop freight traffic. The brief is also signed by C. E. Smith, consulting engineer of St. Louis. The City Counselor has received from the Interstate Commerce Commission official notification of its decision several days previous, suspending the increased tariff until Dec. 29.

Police Urge San Francisco Jitney Regulation.—Chief of Police White of San Francisco recently addressed the Board of Supervisors on the traffic situation on Market Street, stating that "the point is now reached where it is absolutely necessary that something be done properly to safeguard pedestrians" and also to answer the complaints of property owners and business men along the main thoroughfare. He suggested several possible means of relief, some of which are that the supervisors refuse to grant any more jitney permits; that all jitney buses be diverted off Market Street between Sixth Street and the ferries, or that they be diverted during the hours of 10.30 a. m. to 4 p. m., or that they be allowed to run one way only on Market Street; that the limit be placed at 700 buses; that all drivers must be citizens of the United States and residents of the city for not less than one year, and that fixed points be established for receiving and discharging passengers. In conclusion Chief White recommended that the supervisors take some action to relieve the situation, as he is unable to assign the number of men to the traffic bureau that would be necessary to cope with the present situation.

Roosevelt and Billy Sunday as Traffic Producers. — The campaign of Billy Sunday in Kansas City, Mo., for seven weeks increased the business of the Kansas City Railways about $700 a day, under a conservative estimate. This is figuring 7000 passengers carried to and from the tabernacle of the average of 30,000 who attended the services every day. Exact figures were difficult to arrive at, because of the large increase of business of the company since March 1. The business shows a gain, starting with the last week or so of February, of 4½ to 5 per cent over corresponding months last year. The jitneys were credited with about $250,000 last year, but they are absent now, accounting for a gain in 1916 of about $900 a day. The increase of $700 a day credited to Billy Sunday leaves a large margin of gain unaccounted for. The day Theodore Roosevelt was in Kansas City the receipts of the company were $4,200 better than for the corresponding day in 1915. Decoration Day the receipts increased $4,200 over the corresponding day last year. The increase in receipts for May was in excess of $60,000. The Kansas City Railways contributed $1,000 to the $32,000 fund raised for Mr. Sunday, and the Kansas City Light & Power Company gave $1,000.

Kates Jitney Law Being Put Into Effect in New Jersey.—Reports from New Jersey indicate the crumpling of the defense of the jitneys before the decision of the local authorities in the municipalities throughout the State to put into effect the Kates law, which became operative on May 16. The principal provisions of the law are that each jitney owner shall file with the city in which he operates a bond showing that he has taken out liability insurance and that he must pay the municipality in which he operates a percentage of his gross receipts. There was at first a measure of unwillingness on the part of the municipalities to take the initiative against the operators of the buses. At the time the law went into effect on May 16 it is estimated that there were approximately 400 jitneys in operation in Newark, many of them running all the time. On June 14 it was estimated that there were not more than 180 still in operation. There were many itinerant operators of touring cars in Newark who confined their activities to Sundays, holidays and days when the weather was extremely propitious. Up to June 14, 172 jitney owners had filed bonds in Newark. To none of the 172 had a permanent consent to operate been given, as the Board of Works decided to wait until the City Counsel had approved the technical points in all the bonds. On June 17 a number of jitneys quit in Paterson. On the same date twelve jitney owners who had failed to pay to the city 5 per cent of their gross receipts for the previous month in accordance with the Kates law received notice to appear before the Board of Public Works on June 20 and show cause why their licenses should not be revoked.

Personal Mention

Mr. Philip J. Kealy, president of Kansas City (Mo.) Railways, has gone to Nevada, Mo., with the third regiment of Missouri, of which he is lieutenant-colonel.

Mr. Harry A. Arthur has resigned as assistant treasurer of the Savannah (Ga.) Electric Company, to become connected with the American International Corporation in New York.

Mr. Lawrence I. Grinnell, news editor of the ELECTRIC RAILWAY JOURNAL, has been mustered in at Beekman, N. Y., as a member of Troop D, Squadron A (mounted), for service on the Mexican border.

Mr. T. H. Bowden, formerly freight and passenger solocitor with the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., is now commercial agent with the Scranton & Binghamton Railroad, Scranton.

Mr. C. C. West, of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill., will have charge of the Peoples' Traction Company, succeeding Mr. S. E. Boggess, who has been transferred to Abingdon, Ill.

Mr. L. E. Drew, chief clerk of the Savannah (Ga.) Electric Company, has been appointed assistant treasurer of the company to succeed Mr. Harry A. Arthur, resigned, who has become connected with the American International Corporation.

Mr. S. E. Boggess, superintendent of the Peoples' Traction Company, Galesburg, Ill., has been transferred to Abingdon, Ill., as superintendent of the Abingdon Light & Power Company. Both properties are controlled by the Illinois Traction System.

Mr. Percy Ingalls has been elected secretary of the Public Service Corporation of New Jersey, Newark, N. J., to succeed Col. E. W. Hine, who on account of his military connections has relinquished the position and been made assistant to the president.

Mr. Matt Louy, chief instructor in the traction school of Toledo Railways & Light Company, Toledo, Ohio, operated by Henry L. Doherty & Company, has been visiting the electric railways in Brooklyn, New York, Boston, and Washington to obtain additional ideas for the Toledo school.

Mr. W. F. Turner has been elected vice-president of the Oregon Electric Railway, Portland, Ore., to succeed Mr. C. O. Jenks, who resigned to become general manager of the Great Northern Railway. Mr. Turner has relinquished the position of secretary of the company, but retains the office of comptroller.

Mr. George A. Butman, for twenty-five years identified with street railway interests in Massachusetts, and treasurer of the Boston & Worcester Street Railway, Boston, Mass., since its inception, has resigned, to enter another line of business in New York. Mr. Butman is widely known in electric railway circles in New England.

Mr. Frederick W. Lindars has been appointed chief of accounts of the Public Service Commission for the First District of New York. His principal duty will be to establish an adequate system of accounting under the dual system of rapid transit. Mr. Lindars is a public accountant and was connected formerly with the Bureau of Municipal Research.

Mr. Arthur H. Sooy, who has been connected with the Bridgeton & Millville Traction Company, Bridgeton, N. J., for many years, has been advanced to the position of manager, succeeding Mr. B. Frank Hires, who has been appointed to the International Electric Light, Heat & Power Company. Mr. Sooy started in the company's employ as a conductor.

Mr. Charles E. Cooley, an attorney, has been appointed head of the department of the Kansas City (Mo.) Railways which will give free legal aid to employees. The service will include advice and also practical assistance, at first in legal defense and later through a loan bureau. An office will be opened in an up-town location, separate from the street railway headquarters.

Mr. Charles A. Reynolds, chairman of the Public Service Commission of the State of Washington, recently tendered his resignation to Governor Ernest Lister and it has been accepted to become effective on July 1. Mr. Reynolds gives among his reasons for leaving the commission a desire to re-enter private law practice in Seattle. He was appointed to the commission about two years ago to succeed the late Judge M. M. Godman.

Mr. L. M. Levinson, general manager of the Bryan & College Interurban Railway and the Bryan & Central Texas Interurban Railway, Bryan, Tex., has also been appointed general manager of the Southwestern Traction & Power Company, New Iberia, La. For the present his headquarters after June 30 will be in Bryan, Tex. Mr. Levinson was general manager of the Shreveport (La.) Railways for fourteen years and subsequently was manager of the Mineral Wells (Tex.) Electric System, before taking charge in Bryan, Tex.

Mr. Arthur E. Stone has been elected treasurer of the Boston & Worcester Street Railway, Boston, Mass., succeeding Mr. George A. Butman, who has resigned to take up business in New York. Mr. Stone entered street railway work in 1896, with the Wakefield & Stoneham Street Railway, being connected with that company in various capacities in the operating, accounting and construction departments. He entered the service of the Boston & Worcester Street Railway in 1904 as auditor, and later was appointed purchasing agent. He was elected treasurer of the company on June 16.

F. L. FRANCISCO

Mr. Ferris LeRoy Francisco has been appointed by Mayor Thompson, with the concurrence of the City Council, as Chicago's representative on the Boards of Supervising Engineers, Chicago Traction, to succeed Mr. E. W. Bemis. Mr. Francisco is the senior member of the engineering firm of Francisco & Jacobus, New York. He began his engineering work in connection with power house construction with the Newark Electric & Power Company, Newark, N. J., and for more than twenty years has been actively engaged in similar work embracing the supervision and construction of transmission lines and electric railways. In addition he has personally had charge for the last fourteen years, as electrical and chief engineer, of all the construction, power houses, lighting and heating systems of the American and Continental tobacco companies, including the Canadian company. Under his personal supervision his firm has also been extensively engaged in building power houses, installing pumping and hoisting equipment, and transmission systems in connection with groups of mines in Mexico. A little more than a year ago, Mr. Francisco was retained by Chicago to make a study of the electrolysis conditions as they affected the city's water mains and its other underground properties. In this work he was the personal representative of Mr. W. R. Moorehouse, Commissioner of Public Works. In the discharge of these duties Mr. Francisco came in close touch with the details of construction of the street railways and thus will assume his duties as the city's representative on the Board of Supervising Engineers possessed of considerable first-hand information. Mr. Francisco was born in Cleveland, Ohio. He is a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Engineers' Club of New York City.

Gen. Edwin W. Hine has resigned as secretary of the Public Service Corporation of New Jersey, Newark, N. J., because of enforced absence in military service in his capacity as brigadier-general of the New Jersey National Guard. He has been elected assistant to the president of the company, thus retaining his official connection with the company. General Hine became connected with the Public Service Corporation in 1903 at the time of the organization of the company. He had previously been with the Elizabeth, Plainfield & Central Jersey Railway. General Hine was made assistant to the president on becoming connected with the Public Service Corporation, and continued in that capacity until 1907. He was then elected secretary of the company and the position of assistant to the president was abolished.

Mr. R. W. Palmer has resigned as manager of the Cleveland & Erie Railway Girard, Pa., to accept a position with Allen & Peck, Inc., in charge of the Auburn & Syracuse Electric Railroad, Auburn, N. Y. Mr. Palmer has been associated with the electric railway and lighting business since 1889. His first work was with the construction department of the Chicago branch of the Thomson-Houston Electric Company. In the fall of 1889 he accepted a position with the Eckington & Soldiers' Home Railway, Washington, D. C., to overhaul old equipment and look after the installation of new equipment. After the work at the Eckington shops had been completed, Mr. Palmer became associated with Mr. Malone Wheless, in the development of an electro-magnetic railway conduit system at Washington, D. C. In June, 1892, he accepted a position with the construction department of the General Electric Company to assist in the installation of electrical equipment on the Rock Creek Railway, then under construction between Washington and Chevy Chase, Md. After this road was placed in operation Mr. Palmer assumed charge of the electrical and mechanical departments and remained with the company until the road was consolidated with the Washington & Georgetown Railway into the Capitol Traction Company. When the Capitol Traction Company decided to change its motive power from cable to underground conduit system, Mr. Palmer was placed in charge of the electrical department, in which capacity he served during the entire reconstruction. On March 14, 1899, he resigned from the Capitol Traction Company to accept a position with Mr. James F. Heyward, street railway expert, New York City, to look after his interests in connection with the reconstruction of the electric railway property at Petersburg, Va., which was later reorganized into the South Side Railway & Development Company. After the work at Petersburg was finished, Mr. Palmer assumed charge of the Roanoke Railway & Electric Company, but resigned from the company when it changed hands in 1902 and entered the testing department of the General Electric Company at Schenectady in order to familiarize himself with modern equipment. He remained at Schenectady until June 3, 1903, when he was transferred to the railway department of the company's Cincinnati office. In 1907 he was transferred to Columbus, Ohio, by the General Electric Company and placed in charge of its office there. On Sept. 30, 1907, he accepted the position of manager of the Conneaut & Erie Traction Company, Girard, Pa., and remained with the company during the reorganization into the Cleveland & Erie Railway and up to the present time. Mr. Palmer has contributed occasionally to the ELECTRIC RAILWAY JOURNAL articles on practical electric railway subjects based on his wide knowledge of the problems met in operation.

R. W. PALMER

OBITUARY

Cyrus B. Winters, author of the first public utilities law in Ohio, died at his home in Castalia, south of Sandusky, on June 9.

Frank E. Seagrave, who was a pioneer in street and electric railway development in Toledo, is dead. He was seventy-one years of age. Mr. Seagrave was for a number of years secretary and manager of the Toledo & Western Railway.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***North River Terminal Underground Railroad, New York, N. Y.**—Incorporated in New York to operate a railway from Broadway and Battery Place, Manhattan, under Battery Place and the Hudson River to Communipaw. Capital stock, $100,000. Incorporators: G. Russell, J. M. Fiske, H. I. Swelton; L. C. Ferguson, 41 Park Row, New York, and O. P. Pell, 54 New Street, Brooklyn.

McConnellsburg & Fort Loudon Railway, McConnellsburg, Pa.—A charter has been approved by Governor Martin G. Brumbaugh of Pennsylvania for the operation of this company's proposed line from McConnellsburg to Fort Loudon by steam. The company was originally projected as an electric railway, but the character of the country, it is understood, required a change in the plans. [July 3, '15.]

FRANCHISES

***Camden, Ark.**—R. W. Mason and S. Q. Sevier have asked the Council for a franchise to construct a line in Camden.

***Lodi, Cal.**—W. T. Owens has received a franchise from the Council to construct a line in Lodi.

Aurora, Ill.—The Aurora, Elgin & Chicago Railroad has asked the Kane County Board of Supervisors for a twenty-year extension of the franchise under which it is operating cars on public highways between Fox River Park, Aurora, and the northern terminal at Carpentersville, including only highways which are outside of the corporate limits of cities and villages. The company petitioned for a franchise which will allow them to build extensions, sidings and double tracks without seeking special permission from the County Board.

Pontiac, Mich.—William H. Osmun has received a franchise from the Council to construct a line in Pontiac. [May 13, '16.]

Reno, Nev.—The Reno Traction Company has received a franchise to construct an extension to the race track.

Seattle, Wash.—Hugh M. Caldwell, Corporation Counsel of Seattle, has advised the City Council to pass an ordinance declaring forfeited the franchise of the proposed Seattle-Tacoma Short Line, granted in 1907 to M. J. Wightman and C. E. Muckler, and that $14,000 deposited with the city treasurer by the promoters be forfeited to the city. It was proposed to construct a line on Fourth Avenue south to Spokane Street, thence to the city limits of Seattle and on to Tacoma. Little work was done on the road, although the line was to have been completed by July 1, 1909. Several years ago, the franchise for the road was assigned to the Seattle-Tacoma Short Line Company. In September, 1915, the City Council adopted a resolution, declaring its intention to forfeit the franchise, unless work on the line began at once. [Sept. 18, '15.]

Tacoma, Wash.—The Tacoma Railway & Power Company has asked the County Commissioners for a franchise to erect a power line along Lincoln Avenue on the tide flats.

TRACK AND ROADWAY

Municipal Railways of San Francisco, San Francisco, Cal.—Bids will be received until June 28 by the Municipal Railways of San Francisco for furnishing and delivering track special work, contract No. 82. Printed proposal forms may be obtained on application to the City Engineer.

Clear Lake Suspended Monorail Company, Hopland, Cal.—The Railroad Commission of California has denied the application of the Clear Lake Suspended Monorail Company for permission to issue $50,000 worth of stock and $900,000 worth of bonds. The company was recently incorporated to construct a suspended monorail system between Hopland and Lakeport, 24 miles. [April 15, '16.]

***Grand Junction, Col.**—The Western Slope Railway Development & Investment Company has been organized to secure finances to build an electric line from Grand Junction to Vernal, Utah, and the Uinta basin. Officers: Alonzo M. Schmidt, president; C. P. McCary, vice-president; W. A. Marsh, treasurer, and J. H. Barclay, secretary.

Georgia Railway & Power Company, Atlanta, Ga.—Plans are being considered by this company for the construction of a double track along the present Lakewood line and the extension of the line in the form of a loop inside the fair grounds to accommodate the crowds expected at the southeastern fair and grand circuit races at Lakewood during October.

Fairburn & Atlanta Railway & Electric Company, Fairburn, Ga.—This company, which operates an 11-mile gasoline railway from Fairburn to College Park, reports that it will not electrify its line in the near future as rumored.

Chicago & Interurban Traction Company, Chicago, Ill.—Permission has been given by the City Council of Kankakee to the Chicago & Interurban Traction Company to install wyes on Schuyler Avenue near Oak Street running into the proposed new traction station and the Public Service Building.

Peoria (Ill.) Railway.—Plans are being made by this company to improve its Heights line. It is proposed to construct an extension from the present double track on Frye Avenue to Wilcox Avenue on Pacific Street.

Kankakee & Urbana Traction Company, Urbana, Ill.—Rails are being laid by this company into Paxton, Ill., and through service will be opened between Urbana and Paxton on or about July 1. Wesslund Park, owned by a private stock company, will be opened to the public on July 4. This park is located midway between Ludlow and Paxton on the company's new line.

Public Utilities Company, Evansville, Ind.—This company is making extensive repairs to its Washington Avenue line between Linwood and Kentucky Avenues.

The Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company will have completed its temporary pile bridge across the Kaw River at Lawrence by July 1, and will then enter its station at Sixth and Massachusetts Streets, Lawrence. At present the trains from Kansas City stop on the north side of the river, near the Union Pacific station. The company uses the tracks of the Lawrence Street Railway & Light Company in the city. Practically all the rights-of-way have been secured for the extension of the company's line to Topeka, Kan., but the route has not been selected, three being available. Construction work will not begin until the permanent highway bridge, use of which will be rented by the interurban company, is completed over the Kaw River at Lawrence.

United Railways & Electric Company, Baltimore, Md.—This company reports that it now has under construction 5084 ft. of new tracks through the Guilford section from St. Paul Street and University Parkway to Charles Street.

Cumberland & Westernport Electric Railway, Cumberland, Md.—This company will relocate ½ mile of track at Barton and will erect a new bridge across Georges Creek at Gilmore.

Connecticut Valley Street Railway, Greenfield, Mass.—This company will reconstruct 2000 ft. of 60-lb. track with 90-lb. rail.

Detroit, Pontiac & Owosso Railway, Owosso, Mich.—A contract has been awarded to the Detroit Construction Company for the engineering and construction of this company's proposed line in Pontiac. [May 13, '16.]

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company will construct an extension to the Hines mill site.

Kansas City (Mo.) Railways.—It is reported that arrangements may be made by the Kansas City Railways for the use of the Inter-City viaduct between Kansas City, Mo., and Kansas City, Kan., pending the rebuilding of the Central Avenue structure and also pending negotiations by the two cities for the purchase of the Inter-City viaduct. The Kansas City Railways had used the viaduct until 1911, paying 1 cent a passenger, which totalled about $10,000 a year. The recent offer to the company was $5,000 a month. The company is said to be willing to pay part of the cost of the viaduct if the two cities arrange to purchase it.

United Railways, St. Louis, Mo.—A permit has been granted to the United Railways by the Board of Public Service to remove its loop from the Laclede Pavilion in Forest Park and lay it just south of the West Line Boulevard.

***New York, N. Y.**—The Public Service Commission for the First District of New York has ordered the Secretary to advertise for bids for the construction of a tunnel from Second Avenue under Sixtieth Street and the East River to Blackwell's Island and Queensboro to the Queensboro Bridge Station. The bids will be opened on July 13. Some time ago one of the prominent contracting companies undertook to build this tunnel at a cost not to exceed $4,500,000, but since that offer has been withdrawn because of the increased price of materials and labor, it is estimated that the construction will cost the city about $6,000,000.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has approved the requisition of the Board of Estimate for $200,000 to cover the cost of the property required for the Brooklyn approach of the East River tunnel section of the Fourteenth Street subway. The property to be purchased is at the foot of North Seventh Street and is owned by the Brooklyn Cooperage Company. It includes the pier at this point, the land under water, a strip 100 ft. wide from the bulkhead line to the pierhead line, and an easement in a 100-ft. strip under water on either side.

Columbus, Marion & Bucyrus Railway Company, Marion, Ohio.—The Silver Street line of this company will be operated to Lee Street, following the installation of crossings over the railway tracks at a cost of $10,000, if the present plans of the company are carried out.

Tulsa (Okla.) Interurban Railway.—It is now assured that an interurban line from Tulsa to Wagoner, 37 miles, will be built this summer, according to H. D. Pattee, promoter of the Tulsa Interurban Railway. The line will be built from Tulsa to Broken Arrow, and will extend northeast from that place to Wagoner. Mr. Pattee announces that grading on the roadbed will begin within fifty days. Bonuses amounting to $250,000 from towns and communities along the route are assured.

***Gananoque & Arnprior Railway, Gananoque, Ont.**—An extension of time has been granted this company by the Ontario Legislature in which to construct its proposed railway from Gananoque, Ont., north to Arnprior, about 80 miles, with extensions from Morton to Lyndhurst and from a point on the proposed line to Ottawa. The company has been given authority to use steam, electricity or other motive power. Chrysler & Higgerty, Ottawa, are interested.

Pittsburgh & Butler Street Railway, Butler, Pa.—It is reported that this company is considering the construction of an extension on Center Street.

Westside Electric Street Railway, Charleroi, Pa.—This company reports that it has purchased a set of Spalding's all-steel apparatus for playgrounds and has placed same in its park.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—Plans are being made by this company to rehabilitate its entire system, about 6 miles.

SHOPS AND BUILDINGS

Municipal Railways of San Francisco, San Francisco, Cal.—Plans for the superstructure of Laguna Honda station, which will be the first stop of tunnel trains in the west of Twin Peaks district, have been given out by City Engineer O'Shaughnessy. The floor of the superstructure will be 60 ft. above the promenade of the substructure, which has been built in the main tunnel section. Elevators will be provided to lift passengers from level to level. The substation is 300 ft. long, giving immediate access to five-car trains. The superstructure will be 60 ft. x 100 ft., of reinforced-concrete, the exterior being of classic design. It is expected that the station will be fully completed by Oct. 1. The cost is estimated at $250,000.

Illinois Traction System, Peoria, Ill.—This company is erecting a station at Muncie, Ill.

Kankakee & Urbana Traction Company, Urbana, Ill.—This company has purchased a site for a new station in Paxton, Ill.

New York Municipal Railway, Brooklyn, N. Y.—The award of the contract for the construction of twelve stations on the Jamaica Avenue extension of the Broadway elevated line in Brooklyn by the New York Municipal Railway Corporation to the P. J. Carlin Construction Company, the lowest bidder, at $280,700, has been approved by the Public Service Commission for the First District of New York. The stations are located at Cypress Hills, Elderts Lane, Forest Parkway, Woodhaven Avenue, Freedom Avenue, Greenwood Avenue, Spruce Street, Metropolitan Avenue, Queens Boulevard, Sutphin Road, Newark Street and Cliffside Avenue. The six stations from Cypress Hills to Greenwood Avenue must be completed within five months from the date of the contract, and the others within four months from the time the steel structure is turned over to the station contractor.

Hanover & McSherrystown Street Railway, Hanover, Pa.—A new building is being constructed by this company at Eickelberger Park to replace the restaurant recently destroyed by fire.

Scranton (Pa.) Railway.—The Scranton Iron & Steel Company has been awarded a contract by the Scranton Railway covering alterations on the carhouse at Providence Road. The contract covers not only the steel work, but all other work connected with this operation. The work comprises the cutting away of the first section of the carhouse erected in 1892, so that all the tracks inside the carhouse can be connected directly with the siding now in the street. The steel which is being removed will be replaced in the rear of the same building, so as to carry the roof and eliminate the heavy brick partition. The contract calls for this work to be finished by July 15.

POWER HOUSES AND SUBSTATIONS

Madison Light & Railway Company, Madison, Ind.—Among the improvements being made by this company to its power station is the construction of a 46 ft. x 46 ft. brick and steel boiler room and the installation of a 400-hp. Babcock & Wilcox boiler. A 160 ft. x 5 ft. concrete stack is also being built.

Cumberland & Westernport Electric Railway, Cumberland, Md.—This company is installing a 500-kw. turbine in its Clarysville power house and a 400-kw. turbine in its Reynolds power house.

Beaver Valley Electric Railway, Baker, Mont.—This company, which proposes to construct an electric railway from Baker to Ekalaka, contemplates the construction of a power house and two substations.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—This company is transferring a 750-kw. rotary unit from its central station to its Lake Street substation and is replacing same with a General Electric eight-pole, 2000-kw., 375-r.p.m., 600-volt rotary unit.

Atlantic Coast Electric Railway, Asbury Park, N. J.—This company is installing a 5000-kw. General Electric turbo-generator in its power station.

Public Service Corporation of New Jersey, Newark, N. J.—The Hay Foundry & Iron Works, Newark, has received a contract from the Public Service Corporation of New Jersey for the erection of new electrical equipment at its substation at Albany and Peace Streets, New Brunswick. The contract price is $13,000.

Cortland County Traction Company, Cortland, N. Y.—This company is installing a 1500-kw. General Electric turbine in its power plant.

Toledo & Indiana Railroad, Toledo, Ohio.—This company is installing in its power house a 2000-kw. General Electric turbine and 800-hp. Stirling boilers.

Hanover & McSherrystown Street Railway, Hanover, Pa.—This company has recently installed a 400-kw. General Electric 2200-volt generator direct connected with a heavy-duty cross-compound engine.

Manufactures and Supplies

NEW CARHOUSES FOLLOW TENDENCIES OF MODERN BUILDING CONSTRUCTION

A very small amount of work on new carhouses and repair shops is now being carried on. Reference to the Construction News columns of the ELECTRIC RAILWAY JOURNAL, which contain an approximately complete record of new electric railway work, shows that from Jan. 1, 1916, to the present date only eighteen different cases were recorded of new carhouses and repair shops or extensions to such buildings being planned, under construction or completed, as compared with twenty-three for the same period in 1915, a period which could hardly be termed fruitful in construction. It is evident, however, from the reports of manufacturers furnishing materials embodied in the construction of carhouses and repair shops that the tendencies applying to industrial plants in general apply even more forcibly to the electric railways in furthering the construction of a better class of buildings of the modern fireproof type. This movement towards more permanent fireproof construction has been shown through the steadily growing demand for reinforced concrete. The present condition of the steel market is another important reason for the adoption of concrete construction. The rise in the price of steel has greatly increased the cost of building with structural steel, while in a reinforced concrete structure, such a small amount of steel is used that the increase in the cost of the building is relatively small. Furthermore, the reinforced steel can be secured with practically immediate deliveries, while with the structural steel it is usually a matter of months.

A tendency in the direction of fire-extinguishing apparatus for carhouses and repair shops is shown by the steady increase in the demand for sprinkling devices and small fire extinguishers containing special extinguishing liquid. In spite of the recent rise of prices for the sprinkling outfits, which in one device has been 25 per cent owing to the higher cost of brass and iron materials, a good demand is expected in the future, owing to a general awakening consciousness of the need of safeguarding buildings and also to the fact that insurance is reduced by the installation of such precautionary equipments. One company which markets a small portable type of fire extinguisher apparatus reports an increase of business since Jan. 1 of 100 per cent, a large proportion of this business being for renewals of liquid as well as for complete new apparatus. The tendency toward fire prevention is certainly well warranted by the unusually high proportion of serious fires to carhouses and repair shops which have occurred during the last year.

ROLLING STOCK

Chicago & West Towns Railway, Oak Park, Ill., is in the market for five city cars.

Topeka (Kan.) Railway is building five one-man cars which will soon be placed in service.

Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala., is rebuilding one ten-bench open car.

Columbus Railway, Light & Power Company, Columbus, Miss., is reported to have purchased three double-truck cars.

Beaumont (Tex.) Traction Company is reported to be in the market for seven single-truck cars similar to those purchased in 1915.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will build fifty cars in its own shops. Work on them is expected to start at once.

Iquique (Chile) Tramways have purchased one five-bench open storage battery car and an extra set of batteries from the Railway Storage Battery Car Company.

Oakwood Street Railway, Dayton, Ohio, is building in its shops five double-truck, pay-within cars which will have

Westinghouse 323-V. quadruple equipment, H. L. control and GE air brakes.

Steubensville, Wellsburg & Weirton Railway, Wellsburg, W. Va., has ordered from The J. G. Brill Company three double-truck, pay-as-you-enter cars. The company is also rebuilding three of its cars.

Union Street Railway, New Bedford, Mass., noted in the ELECTRIC RAILWAY JOURNAL of June 17 as expecting to purchase twelve closed car bodies has ordered this equipment from the Osgood-Bradley Car Company.

United Railways & Electric Company, Baltimore, Md., has under way the work of lengthening platforms and complete vestibuling of 560 semi-convertible cars. This company is also installing automatic wheel guards on 1250 cars.

Cumberland County Power & Light Company, Portland, Me., noted in the ELECTRIC RAILWAY JOURNAL of June 3 as being in the market for four 36-ft. semi-convertible single-truck pay-as-you-enter passenger cars equipped with Brill Radiax trucks, has ordered this equipment from the Wason Manufacturing Company.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan., has recently added a second electric locomotive to its freight equipment. The company has two self-propelling electric freight cars in service, and twelve box cars, the regulation railroad cars, besides its construction and other cars. It will probably have a total of thirty freight cars in service within a few months.

TRADE NOTES

Lord Manufacturing Company, New York, N. Y., has received an order from the Osgood Bradley Car Company for twenty-four Horne double-acting brakes for the twelve cars being built for the Union Street Railway, New Bedford, Mass. This company has also received an order for a screenless air cleaner from the Milford & Uxbridge Street Railway, Milford, Mass.

The White Company, Cleveland, Ohio, announces that during the last six weeks it has received orders for 100 motor truck equipments from thirty-nine companies, including street railway and other public service corporations. The types of gasoline motor truck included in the above consists of construction and delivery, line repair, emergency and cable pulling power winch.

E. P. Seymour Portable Rail Grinder Company, Waltham, Mass., announces that its rail grinder is now being used by the following companies: Public Service Railway, six machines; Connecticut Company, four machines, Rhode Island Company, Middlesex and Boston Street Railway, Union Street Railway of New Bedford, Mass., Manchester (N. H.) Street Railway, and the Concord and Manchester electric branch of the Boston and Maine Railroad.

ADVERTISING LITERATURE

Ohmer Fare Register Company, Dayton, Ohio, has issued a booklet entitled "Your Public—Your Men—Yourself," which deals with the relation of the employees to the company and what the Ohmer system accomplishes in this regard.

Moller & Schumann Company, Brooklyn, N. Y., has issued Bulletin No. 1 on its black enamels and japans, which describes the range of blacks which fit every need, whether wood, steel, cast iron, tin or brass. Each article is described in a manner to indicate the type of article for which it might be used and gives the necessary reduction for applying, as well as the various methods of brushing, spraying, dipping and tumbling.

Ebert, Michaelis & Company, New York, N. Y., have issued a very attractive circular of eighteen pages and cover with two inserts dealing with the United Light & Railways Company organization and its properties. They describe the physical properties of the company and then proceed to the financial structure, giving statements of the capital liabilities of the company. Following this details are presented of the first and refunding 5 per cent bonds, the 6 per cent gold coupon notes and the first preferred 6 per cent stock. There is also a map showing the location and nature of the properties and an insert chart showing the intercorporate relations between the company and its subsidiaries as of March 31. There are also maps of the Tri-City Railway & Light System and of the Grand Rapids, Grand Haven & Muskegon Railway, the so-called Lake Line.

Railway Improvement Company, New York, N. Y., has issued a beautifully printed book entitled "Increasing Car-Operation Economies," by C. C. Chapelle, consulting engineer and vice-president. The book contains five chapters on these subjects respectively: The Commercial Application of Fundamental Principles of Car-Operation Efficiency; Fundamental Principles of Car-Operation Efficiency; Relation Between Car Operation and Power Consumption, by J. F. Layng, railway and traction engineering department, General Electric Company; Economies in Railway Operation, by F. E. Wynne, engineer railway section, general engineering division, Westinghouse Electric & Manufacturing Company; and Car-Operation Efficiency, with Special Reference to the Energy-Input Method of Determining Motormen's Efficiency. In a brief preface the contents of the book are analyzed and interpreted. Chapter 1, by Mr. Chappelle, discusses the applications of the Rico coasting recorder and the Rico C & S recorder of the company; Chapter 2 is a reprint from the ELECTRIC RAILWAY JOURNAL of an article by Mr. Chappelle; Chapter 3, by Mr. Layng, is a reprint from the *General Electric Review;* Chapter 4 is a reprint of parts of a paper delivered in 1912 by Mr. Wynne before the Baltimore section of the A. I. E. E., and Chapter 5, by Mr. Chappelle, analyzes the comparative advantages of the coasting recorder and meter for checking motormen's efficiency, and is based largely on communications heretofore appearing in the ELECTRIC RAILWAY JOURNAL.

JITNEY COST FIGURES ANALYZED AT DALLAS

Jitneys operating twelve hours a day on the streets of Dallas, Tex., should make a net profit of $429.18 a year, according to estimates carefully compiled by the city of Dallas under direction of J. W. Shull, departmental accountant. The figures were prepared at the instance of Mayor Henry D. Lindsley. Investigation disclosed that there are eleven jitney lines in Dallas, averaging 3 miles in length. The longest is 4½ miles and the shortest 2 miles. It is estimated that the average jitney in Dallas runs twelve hours a day, making fourteen round trips and averaging 168 miles a day, or 61,320 miles a year. The average number of passengers per round trip is five. A Ford, the car generally used in jitney service, costing $474.10 new, was used in making the estimates. Depreciation was estimated at 33 per cent a year. From the report compiled by Mr. Shull, the following is taken:

Cost of operation a year:	
Depreciation	$158.03
License	75.00
Interest	37.928
Gas, oil, etc	759.754
Wages operator	1,095.00
Total cost a year	$2,125.71
Total cost a day:	
Depreciation	$0.43295
License	.20547
Interest	.10535
Gas, oil, etc.	2.08152
Wages, operator	3.00
Total cost a day	$5.82529
Cost of operation a mile:	
Depreciation	$0.002577
License	.001233
Interest	.000627
Gas	.012390
Wages	.017859
Total cost a mile	$0.034667
Net profit a year:	
Gross receipts for year	$2,554.89
Less cost of operation	2,125.71
Net profit	$429.18
Net profit for day:	
Gross receipts for day	$6.99972
Less cost of operation	5.82529
Net profit a day	$1.17443
Net profit for mile:	
Gross receipts for mile	$0.041665
Less cost of operation	.034667
Net profit a mile	$0.006998

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